

# Management Plan Update Report



**January 2011 – December 2011**

**April 1, 2012**

**Irrigated Lands Regulatory Program**

**Central Valley Regional Water Quality Control Board**

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## ATTACHMENTS

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### Appendix I. High Priority Site Subwatershed Analysis

## LIST OF ACRONYMS

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|          |                                                                   |
|----------|-------------------------------------------------------------------|
| A        | Assessment                                                        |
| AMR      | Annual Monitoring Report                                          |
| APN      | Assessor Parcel Number                                            |
| AWEP     | Agricultural Water Enhancement Program                            |
| BMP      | Best Management Practice                                          |
| C        | Core                                                              |
| CURES    | Coalition for Urban/Rural Environmental Stewardship               |
| CVRWQCB  | Central Valley Regional Water Quality Control Board               |
| CV-SALTS | Central Valley Salinity Alternatives for Long-Term Sustainability |
| DDD      | Dichlorodiphenyldichloroethane                                    |
| DDE      | Dichlorodiphenyldichloroethylene                                  |
| DDT      | Dichlorodiphenyltrichloroethane                                   |
| DO       | Dissolved Oxygen                                                  |
| EQIP     | Environmental Quality Incentives Program                          |
| ESJWQC   | East San Joaquin Water Quality Coalition                          |
| F        | Field                                                             |
| HCH      | Hexachlorocyclohexane                                             |
| ILRP     | Irrigated Land and Regulatory Program                             |
| MLJ-LLC  | Michael L. Johnson, LLC                                           |

|         |                                                         |
|---------|---------------------------------------------------------|
| MPUR    | Management Plan Update Report                           |
| MPM     | Management Plan Monitoring                              |
| MRP     | Monitoring and Reporting Program Order No. R5-2008-0005 |
| MRPP    | Monitoring and Reporting Program Plan                   |
| NA      | Not Applicable                                          |
| NM      | Normal Monitoring                                       |
| NRCS    | Natural Resource Conservation Service                   |
| PAM     | Polyacrylamide                                          |
| pH      | Power of Hydrogen                                       |
| Prop 84 | Proposition 84                                          |
| PUR     | Pesticide Use Report                                    |
| SAMR    | Semi-Annual Monitoring Report                           |
| SC      | Specific Conductance                                    |
| TDS     | Total Dissolved Solids                                  |
| TIE     | Toxicity Identification Evaluation                      |
| TMDL    | Total Maximum Daily Load                                |
| TRS     | Township, Range, Section                                |
| USEPA   | United States Environmental Protection Agency           |
| WQO     | Water Quality Objective                                 |
| WQTL    | Water Quality Trigger Limit                             |

## LIST OF UNITS

---

|           |                                          |
|-----------|------------------------------------------|
| cfs       | cubic feet per second                    |
| cm        | centimeter                               |
| L         | Liter                                    |
| lbs       | pounds                                   |
| mg        | milligram                                |
| mph       | miles per hour                           |
| MPN/100mL | most probable number per 100 milliliters |
| sec       | second                                   |
| µg        | microgram                                |
| µS        | microsiemens                             |
| µg/kg dw  | microgram per kilogram of dry weight     |

## ESJWQC MANAGEMENT PLAN UPDATES AND AMENDMENTS

**Table A. ESJWQC Management Plan Updates and Amendments Summary.**

| ITEM<br>NUMBER                                | AMENDMENTS DESCRIPTIONS                                                                                                                                                     | DATE SUBMITTED <sup>1</sup> | MANAGEMENT PLAN<br>PAGE NUMBER                         | DATE APPROVED            |
|-----------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------|--------------------------------------------------------|--------------------------|
| <b>Original ESJWQC Management Plan Report</b> |                                                                                                                                                                             | <b>October 30, 2008</b>     |                                                        | <b>November 25, 2008</b> |
| 1                                             | 2009 Management Plan Update Report.                                                                                                                                         | April 1, 2009               | NA                                                     | September 28, 2009       |
| 2                                             | Request to exchange priority sites: Hilmar Drain @ Central Ave for Bear Creek @ Kibby Rd.                                                                                   | October 23, 2009            | Table B<br>Pages 23-25<br>Pages 35-36                  | November 18, 2009        |
| 3                                             | Request to modify Management Plan schedules to review status of current and the next set of high priority subwatersheds and proposed schedule for year of focused approach. | June 5, 2009                | Verbiage, Page 65<br>Table B                           | December 16, 2009        |
| 4                                             | Request to exchange sites: Exchanged Mootz Drain @ Langworth Rd for Mootz Drain downstream of Langworth Pond.                                                               | September 8, 2009           | Table B                                                | November 18, 2009        |
| 5                                             | 2010 Management Plan Update Report.                                                                                                                                         | April 1, 2010               | NA                                                     | June 21, 2010            |
| 6                                             | Request to modify Management Plan Performance Goal schedule to address the remaining site subwatersheds.                                                                    | June 5, 2010                | Table 8, Table 9<br>Pages 28-31<br>Table 18, pgs 77-79 | June 8, 2010             |
| 7                                             | Request to exchange priority sites: Ash Slough @ Ave 21 with Lateral 2 ½ near Keyes Rd and update Management Plan Performance Goals table for 3rd priority.                 | October 12, 2010            | Table B                                                | November 17, 2010        |
| 8                                             | 2011 Management Plan Update Report.                                                                                                                                         | April 1, 2011               | NA                                                     | May 17, 2011             |
| 9                                             | Request to update Management Plan Performance Goals table for 4th priority.                                                                                                 | October 17, 2011            | NA                                                     | November 14, 2011        |
| 10                                            | Request to remove constituents from site specific management plan.                                                                                                          | January 6, 2012             | NA                                                     | TBD                      |

<sup>1</sup> All deliverables are submitted electronically (quarterly monitoring data reports, Annual Monitoring Report, Annual Management Plan Update Report)

NA-Not applicable

TBD-To Be Determined; Regional Board is still reviewing.

**Table B. ESJWQC 2012 MPUR Amendments Summary.**

| ITEM<br>NUMBER | AMENDMENTS DESCRIPTIONS                                                                                                  | DATE SUBMITTED | MANAGEMENT PLAN<br>PAGE NUMBER                                                      | DATE APPROVED  |
|----------------|--------------------------------------------------------------------------------------------------------------------------|----------------|-------------------------------------------------------------------------------------|----------------|
| 1              | 2012 MPM Schedule-revised due to suspension of Management Plan Monitoring at all locations except Bear Creek @ Kibby Rd. | April 30, 2012 | Table 7, Page 28                                                                    | April 17, 2012 |
| 2              | Revised exceedance tally tables and Appendix I table to exclude azinphos methyl exceedance (APPL lab report error).      | April 30, 2012 | Tables 4-5,<br>Pages 12-14,<br>Appendix I Table<br>VIII-5 and Verbiage,<br>Page 241 | NA             |
| 3              | Added TMDL Dissolved Oxygen section as requested by Regional Board                                                       | April 30, 2012 | Tables 44-45,<br>Pages 144-145                                                      | NA             |

NA-Not Applicable



## EXECUTIVE SUMMARY

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The East San Joaquin Water Quality Coalition (ESJWQC or Coalition) is submitting a Management Plan Update Report on the status and methods used to identify agriculture sources, track implemented management practices, and progress toward meeting its performance goals as outlined in the ESJWQC Management Plan. A Management Plan Update Report (MPUR) is submitted every April 1 to report on the previous year's activities and update management plan implementation schedules and timelines for reporting to the Central Valley Regional Water Quality Control Board (CVRWQCB or Regional Board).

This is the fourth yearly update report to the Coalition's Management Plan. In this report, previous year's monitoring data are reviewed and assessed for exceedances and water quality improvements. This update includes an assessment of water quality based on 2011 monitoring results, including new exceedances and new site/constituents requiring management plans.

Water quality monitoring was conducted during every month from January through December 2010 as described in the ESJWQC Monitoring and Reporting Program Plan (MRPP, pages 33-38). Management Plan Monitoring (MPM) was conducted based on prior exceedances at Coalition monitoring sites. There were 12 MPM sites monitored between January 2011 and December 2011: Dry Creek @ Wellsford Rd, Duck Slough @ Hwy 99, Prairie Flower Drain @ Crows Landing Rd, Cottonwood Creek @ Rd 20, Duck Slough @ Gurr Rd, Highline Canal @ Hwy 99, Bear Creek @ Kibby Rd, Berenda Slough along Ave 18 ½, Dry Creek @ Rd 18, Howard Lateral @ Hwy 140, Lateral 2 ½ near Keyes Rd and Livingston Drain @ Robin Ave. Based on the prioritization of exceedances, MPM was conducted for copper, chlorpyrifos, diazinon, diuron and lead, as well as toxicity to *Ceriodaphnia dubia*, *Selenastrum capricornutum*, and *Hyalella azteca*.

As a result of 2011 monitoring, several new site/constituent specific management plans are required including:

- pH
  - Deadman Creek @ Hwy 59
  - McCoy Lateral @ Hwy 140
- Dissolved solids
  - Dry Creek @ Wellsford Rd
- *E. coli*
  - Rodden Creek @ Rodden Rd
- Copper, dissolved
  - Berenda Slough along Ave 18 ½
  - McCoy Lateral @ Hwy 140
- Molybdenum
  - Prairie Flower Drain @ Crows Landing Rd

- Dimethoate
  - Prairie Flower Drain @ Crows Landing Rd
- *P. promelas* water column toxicity
  - Prairie Flower Drain @ Crows Landing Rd

The Coalition developed an updated flow chart for its MPM strategy. The strategy is updated to include MPM for high priority subwatersheds during Year 1, Year 2, Year 3 and Year 4. When a site becomes a high priority site subwatershed, the Coalition makes contacts to individuals within the subwatershed who have the potential for direct drainage and have applied constituents of concern. Contacts occur between October 1 prior to Year 1 and March 30 of Year 1 in order to schedule meetings and conduct individual contacts/interviews between November 1 and July 30. Individual meetings are used to inform growers of current water quality concerns and potential management practices that can be implemented to reduce impairments of water quality due to agricultural discharge.

During the interviews, growers are asked about their current farming operations and surveys are completed which document the grower's current management practices and record recommended management practices. It is anticipated that all surveys will be completed and entered into a database by August 1 of Year 1. Implementation of management practices is anticipated to occur between April of Year 1 and November of Year 2. It is difficult to predict when implementation will occur since some practices, such as structural management practices, may take multiple years to fund and construct.

Follow up surveys document newly implemented practices since initial contacts were completed. Follow up surveys document whether growers implemented those practices in Year 1 and if not, whether they plan to implement those practices in Year 2. The Coalition conducts follow up surveys with growers between February of Year 2 and April of Year 2. If the grower indicates that they do not intend to implement additional practices despite their previous declaration that they would, they are queried as to why (e.g. they no longer farm, no available funds). Follow up may be extended to Year 3 depending on information obtained from the growers as to when they plan to implement practices; in some cases, a third year may be necessary for funds to be available for structural improvements.

The Coalition prioritized constituents and site subwatersheds to allow for focused source identification, outreach and evaluation. The Coalition prioritized subwatersheds based on the number, frequency and magnitude of chlorpyrifos and diazinon exceedances. Other factors considered include size of the subwatershed and known improvements in management practices that have already been implemented in those areas. Although the Coalition is focusing on chlorpyrifos and diazinon exceedances and associated applications, management practices implemented to help reduce the runoff of these constituents will also reduce the runoff of other pesticides, nutrients, salts and metals.

The Coalition developed High Priority Site Subwatershed Performance Goals (hereafter referred to as Performance Goals) for its high priority site subwatersheds. Performance goals are submitted for approval each time a new set of subwatersheds rotates into high priority status and are built on the following actions essential to the Management Plan strategy:

1. Determine number/type of management practices currently in place, based on APN associated with baseline survey responses
2. Grower Group Contacts / Individual Contacts
3. Implementation of new management practices
4. Assess number/type of new management practices implemented
5. Evaluate effectiveness of new management practices

The Coalition submitted Performance Goals on November 24, 2008 in an amendment to the Management Plan. These goals were developed with coordination with Regional Board staff after evaluation of the effectiveness of the Coalition's Management Plan strategy. Performance goals, measures, outputs and completion dates for third priority subwatersheds were approved by the Regional Board on November 17, 2010.

For the third set of high priority sites (2011–2013), the Coalition completed Performance Measure 1.1 (100% of identified growers contacted), Performance Measure 1.2 (contact owners/operators representing at least 1,000 acres of member acres) of Performance Goal 1; Performance Measure 2.1 (document current management practices at 100% of identified growers) and Performance Measure 2.2 (document management practices that growers were encouraged to implement) of Performance Goal 2. Performance Measure 3.1 (document new management practices implemented by growers) of Performance Goal 3, Performance Measure 4.1 (Assess water quality results from Coalition monitoring locations) of Performance Goal 4, and Performance Goal 5 are in the process of being completed. Completion dates are February (Performance Measure 3.1 – record implemented management practices in an Access database) or April 2013 (Performance Measure 3.1 – summary of management practices implemented as a result of individual contacts; Performance Measure 4.1) as expensive structural management practices may take some time to implement.

Overall, the following conclusions can be drawn about Coalition outreach efforts:

- Subwatersheds that are high priority status and have had individual grower visits have seen a reduction in exceedances,
- The drop in exceedances coincides with implementation of management practices encouraged by the Coalition,
- Subwatersheds with high numbers of exceedances of pesticides either have not completed or started focused outreach,
- Agriculture may not be the only cause of copper water quality impairments in Coalition Zone 6,
- Growers in the ESJWQC region are taking advantage of available funding resources to be used to implement management practices that improve water quality,
- Growers across the ESJWQC region are implementing management practices, and
- After demonstrating two or more consecutive years of monitoring without exceedances, the Coalition has been able to petition to the Regional Board to remove certain constituents from active management plans from 10 high priority subwatersheds including all of the first and second priority subwatersheds.

The ESJWQC established monitoring and management activities for Total Maximum Daily Load (TMDL) constituents as required in the Regional Board's Basin Plan for the Sacramento and San Joaquin River basins to meet compliance for TMDL constituents.

### **Chlorpyrifos and Diazinon**

The Basin Plan requires that dischargers either individually or as a coalition describe the actions that they will take to reduce chlorpyrifos and diazinon discharges and meet the applicable load allocations by the required compliance date. Improved management practices were implemented to meet WQOs and load allocations set forth in the Basin Plan including pesticide application practices to reduce drift, alternative irrigation practices to reduce runoff, and drainage management practices to decrease or reduce the volume of runoff of contaminants.

In 2010, the ESJWQC and Westside Water Quality Coalition (Westside Coalition) began implementing a monitoring strategy to comply with the chlorpyrifos and diazinon TMDL program Monitoring Objectives. During the first three quarters of 2011, each Coalition sampled three of the six compliance points as well as tributaries within their respective regions as per each Coalition's monitoring plan.

The Coalitions and Regional Board have agreed to move the chlorpyrifos and diazinon Annual Monitoring Report (AMR) due date from October 31 to May 1 (refer to memorandum submitted April 29, 2011). Each chlorpyrifos and diazinon AMR will report on a water year of monitoring data (October of year 1 through September of year 2). The San Joaquin River Chlorpyrifos and Diazinon 2012 AMR will be submitted on May 1, 2012 and will include a complete analysis and discussion of all monitoring data collected during October 2010 through September 2011.

### **Salt and Boron**

The Regional Board and stakeholders initiated the Central Valley Salinity Alternatives for Long-Term Sustainability (CV-SALTS) in July 2008 to facilitate efforts needed for the efficient management of salinity in the Central Valley. The Regional Board and State Water Board have initiated this comprehensive effort to address salinity concerns in California's Central Valley and adopt long-term solutions that will lead to improved water quality and economic sustainability with the goal of developing a Salt and Boron Basin Plan Amendment. Coalition representatives attend CV-SALTS meetings and participate in planning and reviewing studies relevant to the development of a Basin Plan amendment for salt and boron. Coalition technical consultants participated in several CV-SALTS committees including the Technical Advisory Committee, the Knowledge Gained and Best Management Practice (BMP) Subcommittees, and the Executive Committee.

## INTRODUCTION

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The East San Joaquin Water Quality Coalition (ESJWQC or Coalition) is submitting a Management Plan Update Report (MPUR) on the status of water quality in the region and methods used to identify sources of agricultural discharges, track implemented management practices, and evaluate Performance Goals as outlined in the ESJWQC Management Plan. A Management Plan Update is submitted every April 1 to report on the previous year's activities and the status of management plan implementation schedules and timelines for reporting to the Regional Board. Yearly updates allow the Coalition to assess the need to conduct outreach to growers, evaluate information about pesticide use, and obtain water quality data collected from the previous year.

The Management Plan Update Report includes the following:

1. Status of constituents and subwatersheds requiring a management plan
2. Updates to the prioritization process of constituents (if applicable)
3. Status of priority subwatershed Performance Goals
4. Compliance with TMDL requirements
5. Summary of newly implemented management practices
6. Evaluation of management practice effectiveness

The Coalition compiled a detailed analysis of high priority subwatersheds (2008 – 2010, 2010 – 2012, 2011– 2013 and 2012–2014) including monitoring and exceedance histories, source analyses, outreach and management practice tracking.

## OVERVIEW OF MONITORING

This is the fourth annual update report to the Coalition's Management Plan. In this report, monitoring data for the previous year are reviewed and assessed for exceedances and water quality improvements. This update includes an assessment of water quality based on 2011 monitoring results including new exceedances and new site/constituents requiring management plans.

During 2011, monitoring was conducted as outlined in the Coalition's Monitoring and Reporting Program Plan (MRPP, pages 33-59). In addition, Management Plan Monitoring (MPM) in 2011 was conducted at high priority locations for high priority constituents requiring a management plan. In some cases, these constituents were already being monitored under the MRPP monitoring schedule (Table 10, pages 52-53). The Coalition's Annual Monitoring Report (AMR) submitted on March 1, 2012 lists the locations, dates and type of sampling that was conducted during 2011.

There were 18 sites (including Lateral 3 along East Taylor Rd) monitored from January through December 2011 (Table 1). Lateral 3 along East Taylor Rd has been removed from the Coalition's MRPP (approved on February 7, 2012) and all Lateral 3 along East Taylor Rd monitoring results are located in Appendix X of the 2012 AMR (submitted on March 1, 2012). Twelve of the 18 sites were monitored for management plan constituents either additionally or as part of Assessment Monitoring; the other six sites were monitored specifically for MPM constituents only. Based on the prioritization of exceedances, MPM was conducted for copper, lead, chlorpyrifos, diazinon and diuron, water column toxicity (*Ceriodaphnia dubia* and *Selenastrum capricornutum*) and sediment toxicity (*Hyalella azteca*). Howard Lateral @ Hwy 140 was added to the priority schedule as a result of 2010 exceedances and in 2011 additional MPM was conducted during months of previous exceedances. Since Howard Lateral @ Hwy 140 is scheduled for high priority (2015-2017) the site is not listed in the MPM table. Additional MPM during 2011 at Howard Lateral occurred for chlorpyrifos (June) and copper (July and October) to demonstrate two years of monitoring data for high priority constituents prior to the site rotating to high priority.

**Table 1. January-December 2011 Core (C), Assessment (A) and Management Plan Monitoring (MPM) Sites and Locations.**

| ZONE | SITE TYPE <sup>1</sup> | 2011<br>MONITORING | SITE NAME                                   | STATION CODE | LATITUDE | LONGITUDE  |
|------|------------------------|--------------------|---------------------------------------------|--------------|----------|------------|
| 1    | Core                   | A, MPM             | Dry Creek @ Wellsford Rd                    | 535XDCAWR    | 37.66000 | -120.87526 |
| 1    | Assessment             | A                  | Rodden Creek @ Rodden Rd                    | 535XRCARD    | 37.79053 | -120.80886 |
| 2    | Core                   | A, MPM             | Prairie Flower Drain @ Crows Landing Rd     | 535XPFDC     | 37.44187 | -121.00331 |
| 2    | Assessment             | A                  | Lateral 3 along East Taylor Rd <sup>2</sup> | 535LTAETR    | 37.53673 | -120.98410 |
| 2    | Assessment             | MPM                | Lateral 2 1/2 near Keyes Rd                 | 535LTHNKR    | 37.54766 | -121.08509 |
| 3    | Core                   | A, MPM             | Highline Canal @ Hwy 99                     | 535XHCHNN    | 37.41254 | -120.75941 |
| 3    | Assessment             | A                  | Highline Canal @ Lombardy Rd                | 535XHCALR    | 37.45547 | -120.72181 |
| 4    | Core                   | A                  | Merced River @ Santa Fe                     | 535XMRSFD    | 37.42705 | -120.67353 |
| 4    | Assessment             | A                  | McCoy Lateral @ Hwy 140                     | 535XMLAHO    | 37.30968 | -120.78771 |
| 4    | Assessment             | MPM                | Livingston Drain @ Robin Ave                | 535XLDARA    | 37.31693 | -120.74229 |
| 4    | Assessment             | MPM                | Howard Lateral @ Hwy 140                    | 535XHLAHO    | 37.30790 | -120.78200 |

| ZONE | SITE TYPE <sup>1</sup> | 2011<br>MONITORING | SITE NAME                       | STATION CODE | LATITUDE | LONGITUDE  |
|------|------------------------|--------------------|---------------------------------|--------------|----------|------------|
| 4    | Assessment             | MPM                | Bear Creek @ Kibby Rd           | 535XBCAKR    | 37.31230 | -120.41535 |
| 5    | Core                   | A, MPM             | Duck Slough @ Gurr Rd           | 535XDSAGR    | 37.21408 | -120.56126 |
| 5    | Assessment             | A                  | Deadman Creek @ Hwy 59          | 535DMCAHF    | 37.19755 | -120.48763 |
| 5    | Assessment             | MPM                | Duck Slough @ Hwy 99            | 535XDSAHN    | 37.25031 | -120.41043 |
| 6    | Core                   | A, MPM             | Cottonwood Creek @ Rd 20        | 545XCCART    | 36.86860 | -120.18180 |
| 6    | Assessment             | A, MPM             | Berenda Slough along Ave 18 1/2 | 545XBSAAE    | 37.01820 | -120.32650 |
| 6    | Assessment             | MPM                | Dry Creek @ Rd 18               | 545XDCARE    | 36.98180 | -120.22056 |

<sup>1</sup> Site types are either Assessment or Core based on the ESJWQC MRPP (page 33). Type of monitoring conducted at sample locations depends on the rotation schedule outlined in the ESJWQC MRPP (Table 10, pages 52-53), Core Monitoring locations rotate into Assessment Monitoring every third year.

<sup>2</sup> All data for Lateral 3 along East Taylor Rd (2011 Assessment Monitoring) reported in ESJWQC Annual Monitoring Report in Appendix X (submitted March 1, 2012).

C – Core Monitoring

A – Assessment Monitoring

MPM – Management Plan Monitoring

Water quality results from MPM are used to evaluate the effectiveness of Coalition outreach in priority subwatersheds and the effectiveness of management practices implemented by growers within those subwatersheds. Table 2 provides a comparison between 2010 and 2011 MPM results. Table 3 lists all MPM sites and monitoring results from 2011. Overall there was a decrease in the percentage of exceedance for chlorpyrifos, *S. capricornutum* toxicity, and *H. azteca* toxicity (Table 3). There was an overall increase in the percentage of copper exceedances (Table 2). There was no change in the percentage of exceedances of the water quality trigger limits (WQTLs) for diazinon, diuron and *C. dubia* toxicity; all three of these MPM constituents had zero exceedances in 2010 and 2011 (Table 2). Two constituents cannot be compared between 2010 and 2011: lead and simazine. Lead was first monitored as a MPM constituent in 2011 and simazine was monitored in 2010 at Mustang Creek @ East Ave. The monitoring concluded two consecutive years with no exceedances of the WQTLs which allows the Coalition to petition to remove the constituents from the sites management plan (Table 2).

Management Plan Monitoring that occurred in 2011 resulted in no exceedances for the following constituents: *C. dubia* toxicity, lead, diazinon, diuron and chlorpyrifos. The 2011 MPM results compared to 2010 indicate a 13% decrease in chlorpyrifos exceedances (Table 2). There was a single *S. capricornutum* toxicity (Prairie Flower Drain, February 17, 2011) out of 22 MPM samples collected (Table 3). Of the 47 MPM samples collected for copper in 2011, 15 exceeded the WQTL (19%, Table 2). Sediment toxicity to *H. azteca* occurred in two out of nine management plan samples collected in 2011 (22%, Table 2); this is a 3% decrease from 2010 where one out of four sediment samples was toxic (25%, Table 2).

Each high priority subwatershed is discussed in more detail regarding water quality exceedances, sourcing of exceedances, outreach and evaluation of management practices in relation to water quality in Appendix I.

**Table 2. ESJWQC Management Plan Monitoring results 2010 and 2011.**

| MANAGEMENT PLAN MONITORING RESULTS  | 2010                  |                             |               | 2011                  |                             |               | 2010 vs 2011 |
|-------------------------------------|-----------------------|-----------------------------|---------------|-----------------------|-----------------------------|---------------|--------------|
|                                     | TOTAL MPM EXCEEDANCES | TOTAL MPM SAMPLES COLLECTED | % EXCEEDANCES | TOTAL MPM EXCEEDANCES | TOTAL MPM SAMPLES COLLECTED | % EXCEEDANCES | % DIFFERENCE |
| Copper                              | 4                     | 30                          | 13%           | 15                    | 47                          | 32%           | +19%         |
| Lead (2011 Only)                    | NA                    | NA                          | NA            | 0                     | 11                          | 0%            | NA           |
| Chlorpyrifos                        | 3                     | 23                          | 13%           | 0                     | 2                           | 0%            | -13%         |
| Diazinon                            | 0                     | 2                           | 0%            | 0                     | 2                           | 0%            | 0%           |
| Diuron                              | 0                     | 5                           | 0%            | 0                     | 7                           | 0%            | 0%           |
| Simazine (2010 Only)                | 0                     | 2                           | 0%            | NA                    | NA                          | NA            | NA           |
| <i>C. dubia</i> (% Control)         | 0                     | 9                           | 0%            | 0                     | 8                           | 0%            | 0%           |
| <i>S. capricornutum</i> (% Control) | 1                     | 18                          | 6%            | 1                     | 22                          | 5%            | -1%          |
| <i>H. azteca</i> (% Control)        | 1                     | 4                           | 25%           | 2                     | 9                           | 22%           | -3%          |

NA-Constituent not monitored for MPM during that year and 2010/2011 % difference could not be compared.

MPM-Management Plan Monitoring

**Table 3. 2011 MPM results including a percentage of samples with exceedances.**

"X" Indicates that a sample was collected for a management plan constituent and no exceedance of a WQTL occurred. Red numbers indicate exceedances of a WQTL in a MPM sample. Grey shaded cells indicate that no MPM was conducted on that date for that constituent.

| SITE NAME                               | 2011 MPM YEAR* | SAMPLE DATE      | COPPER     | LEAD | CHLORPYRIFOS | DIAZINON | DIURON | C. DUBIA (% CONTROL) | H. AZTECA (% CONTROL) | S. CAPRICORNUTUM (% CONTROL) |
|-----------------------------------------|----------------|------------------|------------|------|--------------|----------|--------|----------------------|-----------------------|------------------------------|
| Bear Creek @ Kibby Rd                   | Year 2         | 1/18/2011        | X          |      |              |          |        |                      |                       |                              |
| Cottonwood Creek @ Rd 20                | Year 2         | 1/18/2011        | X          |      | X            |          | X      |                      |                       |                              |
| Dry Creek @ Rd 18                       | Year 1         | 1/18/2011        | 12 (8.65)  |      |              |          | X      |                      |                       | X                            |
| Duck Slough @ Gurr Rd                   | Year 2         | 1/18/2011        | X          |      |              |          |        |                      |                       |                              |
| Highline Canal @ Hwy 99                 | Year 2         | 1/18/2011        | X          |      | X            |          | X      |                      |                       | X                            |
| Livingston Drain @ Robin Ave            | Year 1         | 1/18/2011        | X          | X    | X            |          |        |                      |                       |                              |
| Prairie Flower Drain @ Crows Landing Rd | Year 3         | 1/18/2011        |            |      |              |          |        |                      |                       | X                            |
| Bear Creek @ Kibby Rd                   | Year 2         | 2/17/2011        | X          |      |              |          |        |                      |                       |                              |
| Cottonwood Creek @ Rd 20                | Year 2         | 2/17/2011        | X          |      | X            | X        | X      |                      |                       |                              |
| Dry Creek @ Rd 18                       | Year 1         | 2/17/2011        | X          |      | X            | X        | X      |                      |                       | X                            |
| Dry Creek @ Wellsford Rd                | Year 3         | 2/17/2011        | X          |      |              |          | X      |                      |                       | X                            |
| Duck Slough @ Gurr Rd                   | Year 2         | 2/17/2011        | X          |      |              |          |        | X                    |                       |                              |
| Duck Slough @ Hwy 99                    | Year 3         | 2/17/2011        | X          |      |              |          |        |                      |                       |                              |
| Highline Canal @ Hwy 99                 | Year 2         | 2/17/2011        | X          |      | X            |          | X      |                      |                       |                              |
| Livingston Drain @ Robin Ave            | Year 1         | 2/17/2011        | X          | X    |              |          |        |                      |                       | X                            |
| Prairie Flower Drain @ Crows Landing Rd | Year 3         | 2/17/2011        |            |      |              |          |        |                      |                       | 82                           |
| Dry Creek @ Rd 18                       | Year 1         | 3/17/2011        |            |      |              |          |        |                      | X                     |                              |
| Dry Creek @ Wellsford Rd                | Year 3         | 3/15/11, 3/17/11 |            |      |              |          |        |                      | X                     | X                            |
| Duck Slough @ Gurr Rd                   | Year 2         | 3/15/2011        |            |      |              |          |        | X                    |                       |                              |
| Highline Canal @ Hwy 99                 | Year 2         | 3/15/11, 3/17/11 |            |      |              |          |        |                      | X                     | X                            |
| Prairie Flower Drain @ Crows Landing Rd | Year 3         | 3/15/11, 3/17/11 |            |      |              |          |        | X                    | X                     |                              |
| Cottonwood Creek @ Rd 20                | Year 2         | 4/19/2011        | 4.6 (3.83) |      |              |          |        |                      |                       |                              |
| Dry Creek @ Rd 18                       | Year 1         | 4/19/2011        | 3.9 (3.2)  |      | X            |          |        |                      |                       |                              |
| Dry Creek @ Wellsford Rd                | Year 3         | 4/19/2011        | X          |      |              |          |        |                      |                       |                              |
| Duck Slough @ Hwy 99                    | Year 3         | 4/19/2011        | X          | X    |              |          |        |                      |                       | X                            |
| Highline Canal @ Hwy 99                 | Year 2         | 4/19/2011        | X          |      |              |          |        |                      |                       | X                            |
| Howard Lateral @ Hwy 140                | MPM 1          | 4/19/2011        | X          |      |              |          |        |                      |                       |                              |
| Lateral 2 1/2 near Keys Rd              | Year 1         | 4/19/2011        |            |      | X            |          |        |                      |                       |                              |
| Livingston Drain @ Robin Ave            | Year 1         | 4/19/2011        |            |      |              |          |        |                      |                       | X                            |
| Prairie Flower Drain @ Crows Landing Rd | Year 3         | 4/19/2011        |            |      |              |          |        |                      |                       | X                            |



| SITE NAME                               | 2011<br>MPM<br>YEAR* | SAMPLE DATE | COPPER     | LEAD | CHLORPYRIFOS | DIAZINON | DIURON | C. DUBIA (% CONTROL) | H. AZTECA (% CONTROL) | S. CAPRICORNUTUM (%<br>CONTROL) |
|-----------------------------------------|----------------------|-------------|------------|------|--------------|----------|--------|----------------------|-----------------------|---------------------------------|
| Bear Creek @ Kibby Rd                   | Year 2               | 5/17/2011   |            |      | X            |          |        | X                    |                       |                                 |
| Berenda Slough along Ave 18 1/2         | Year 1               | 5/17/2011   |            |      |              |          |        |                      |                       | X                               |
| Cottonwood Creek @ Rd 20                | Year 2               | 5/17/2011   | 3.8 (3.02) |      |              |          |        |                      |                       |                                 |
| Dry Creek @ Rd 18                       | Year 1               | 5/17/2011   | 2.9 (1.36) | X    |              |          |        |                      |                       | X                               |
| Duck Slough @ Gurr Rd                   | Year 2               | 5/17/2011   | X          |      |              |          |        |                      |                       |                                 |
| Duck Slough @ Hwy 99                    | Year 3               | 5/17/2011   |            | X    | X            |          |        |                      |                       |                                 |
| Highline Canal @ Hwy 99                 | Year 2               | 5/10/2011   |            |      |              |          |        | X                    |                       | X                               |
| Livingston Drain @ Robin Ave            | Year 1               | 5/17/2011   | X          |      |              |          |        |                      |                       | X                               |
| Prairie Flower Drain @ Crows Landing Rd | Year 3               | 5/10/2011   |            |      |              |          |        |                      |                       | X                               |
| Cottonwood Creek @ Rd 20                | Year 2               | 6/21/2011   | 3.8 (3.74) |      |              |          |        |                      |                       |                                 |
| Dry Creek @ Rd 18                       | Year 1               | 6/21/2011   | 4.8 (1.03) | X    |              |          |        |                      |                       |                                 |
| Duck Slough @ Gurr Rd                   | Year 2               | 6/21/2011   | X          |      |              |          |        |                      |                       |                                 |
| Duck Slough @ Hwy 99                    | Year 3               | 6/21/2011   | X          | X    |              |          |        |                      |                       |                                 |
| Highline Canal @ Hwy 99                 | Year 2               | 6/14/2011   | X          |      |              |          |        |                      |                       |                                 |
| Livingston Drain @ Robin Ave            | Year 1               | 6/21/2011   | X          |      | X            |          |        |                      |                       |                                 |
| Bear Creek @ Kibby Rd                   | Year 2               | 7/19/2011   |            |      | X            |          |        | X                    |                       |                                 |
| Berenda Slough along Ave 18 1/2         | Year 1               | 7/19/2011   |            |      | X            |          |        |                      |                       | X                               |
| Cottonwood Creek @ Rd 20                | Year 2               | 7/19/2011   | 4.3 (3.56) |      |              |          |        |                      |                       |                                 |
| Dry Creek @ Rd 18                       | Year 1               | 7/19/2011   | 4.3 (0.81) |      | X            |          |        |                      |                       |                                 |
| Dry Creek @ Wellsford Rd                | Year 3               | 7/12/2011   |            |      | X            |          |        |                      |                       |                                 |
| Duck Slough @ Gurr Rd                   | Year 2               | 7/19/2011   | X          |      | X            |          |        |                      |                       | X                               |
| Duck Slough @ Hwy 99                    | Year 3               | 7/19/2011   | X          | X    | X            |          |        |                      |                       | X                               |
| Highline Canal @ Hwy 99                 | Year 2               | 7/12/2011   | X          |      | X            |          |        |                      |                       |                                 |
| Lateral 2 1/2 near Keys Rd              | Year 1               | 7/12/2011   |            |      | X            |          |        |                      |                       |                                 |
| Livingston Drain @ Robin Ave            | Year 1               | 7/19/2011   | 2.6 (1.67) |      | X            |          |        |                      |                       |                                 |
| Bear Creek @ Kibby Rd                   | Year 2               | 8/16/2011   | X          |      |              |          |        |                      |                       |                                 |
| Cottonwood Creek @ Rd 20                | Year 2               | 8/16/2011   | X          |      |              |          |        |                      |                       |                                 |
| Dry Creek @ Rd 18                       | Year 1               | 8/16/2011   | 5.0 (0.81) | X    |              |          |        |                      |                       |                                 |
| Dry Creek @ Wellsford Rd                | Year 3               | 8/9/2011    |            |      | X            |          |        |                      |                       |                                 |
| Duck Slough @ Hwy 99                    | Year 3               | 8/16/2011   | X          | X    |              |          |        |                      |                       |                                 |
| Highline Canal @ Hwy 99                 | Year 2               | 8/9/2011    | X          |      |              |          |        | X                    |                       |                                 |
| Livingston Drain @ Robin Ave            | Year 1               | 8/16/2011   |            |      | X            |          |        |                      |                       |                                 |
| Prairie Flower Drain @ Crows Landing Rd | Year 3               | 8/9/2011    |            |      | X            |          |        |                      |                       |                                 |
| Berenda Slough along Ave 18 1/2         | Year 1               | 9/13/2011   |            |      | X            |          |        |                      |                       |                                 |
| Cottonwood Creek @ Rd 20                | Year 2               | 9/13/2011   | 5.8 (3.2)  |      |              |          |        |                      |                       |                                 |
| Dry Creek @ Rd 18                       | Year 1               | 9/13/2011   | 4.6 (1.03) | X    |              |          |        |                      | X                     |                                 |
| Dry Creek @ Wellsford Rd                | Year 3               | 9/6/2011    |            |      | X            |          |        |                      | 65                    |                                 |
| Duck Slough @ Gurr Rd                   | Year 2               | 9/13/2011   |            |      |              |          |        |                      | 83                    | X                               |
| Duck Slough @ Hwy 99                    | Year 3               | 9/13/2011   | X          |      | X            |          |        |                      |                       |                                 |
| Highline Canal @ Hwy 99                 | Year 2               | 9/6/2011    |            |      |              |          |        |                      | X                     |                                 |
| Livingston Drain @ Robin Ave            | Year 1               | 9/13/2011   | 1.7 (1.25) |      |              |          |        |                      |                       |                                 |
| Prairie Flower Drain @ Crows Landing Rd | Year 3               | 9/6/2011    |            |      | X            |          |        | X                    | X                     |                                 |
| Total MPM Exceedances                   |                      |             | 14         | 0    | 0            | 0        | 0      | 0                    | 2                     | 1                               |
| Total MPM Samples Collected             |                      |             | 45         | 11   | 27           | 2        | 7      | 8                    | 9                     | 22                              |
| % Exceedances                           |                      |             | 31%        | 0%   | 0%           | 0%       | 0%     | 0%                   | 22%                   | 5%                              |

MPM- Management Plan Monitoring

WQTL – Water Quality Trigger Limit

\* Year 1, Year 2 and Year 3 refer to the year of high priority that the site subwatershed is in.

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## 2004 - 2011 EXCEEDANCES

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An important aspect of the ESJWQC Management Plan is to maintain yearly updates of exceedances based on the most recent WQTLs. Table 4 provides a tally of exceedances for sites monitored from 2004 through 2011.

Sites not included in this tally, as described in the ESJWQC Management Plan submitted on September 30, 2008 are August Drain, Jones Drain and Lone Willow Slough. Sough Slough @ Quinley Rd was removed from the ESJWQC MRPP and from Table 4 (approved June 3, 2010). In addition, exceedances that occurred at the site Lateral 3 along East Taylor Rd are not included in Tables 4 and 5. Lateral 3 along East Taylor Rd is removed from the Coalition's MRPP (approved on February 7, 2012) and all 2011 monitoring results from the site can be located in Appendix X of the AMR 2012 (submitted on March 1, 2012). Sites monitored as upstream MPM sites in 2008 where exceedances occurred are not included in Table 4 or 5. These sites and associated exceedances were included in the Management Plan Update Report (MPUR) submitted on April 1, 2009 and are referenced in the site subwatershed section (Appendix I).

Table 5 includes a tally of exceedances that occurred since the last update (April 1, 2011) and includes monitoring results from 2011. In both Table 4 and 5, cells with blue highlights indicate exceedances that are currently under the ESJWQC Management Plan. In Table 5, green highlights indicate sites/constituents that have been added to the ESJWQC Management Plan due to exceedances in 2011.

**Table 4. ESJWQC exceedance tally based on results through December 2011.**

Sites are listed alphabetically by site name and constituents are listed alphabetically within each of the following groups: field parameters (F), inorganics (I), bacteria (B), metals (M), pesticides (P) and toxicity (T). Constituents under a management plan are highlighted. The tally only includes field duplicate exceedances if the environmental sample did not also have an exceedance.

|                                  | F                 |    |                       | I                |                |              |              | B                      | M       |         |                   |               |      | P          |      |          |          |            |              |           |            |            |            |          |          |            |                | T          |           |              |              |                  |             |          |          |             |                  |           |   |  |
|----------------------------------|-------------------|----|-----------------------|------------------|----------------|--------------|--------------|------------------------|---------|---------|-------------------|---------------|------|------------|------|----------|----------|------------|--------------|-----------|------------|------------|------------|----------|----------|------------|----------------|------------|-----------|--------------|--------------|------------------|-------------|----------|----------|-------------|------------------|-----------|---|--|
| SITE NAME                        | OXYGEN, DISSOLVED | PH | SPECIFIC CONDUCTIVITY | DISSOLVED SOLIDS | AMMONIA        | NITRATE AS N | NITRITE AS N | NITRATE + NITRITE AS N | E. COLI | ARSENIC | COPPER DISSOLVED† | COPPER TOTAL† | LEAD | MOLYBDENUM | ZINC | ALDICARB | CARBARYL | CARBOFURAN | CHLORPYRIFOS | CYANAZINE | DDD (P,P') | DDE (P,P') | DDT (P,P') | DIAZINON | DIELDRIN | DIMETHOATE | DIURON         | HCH, DELTA | MALATHION | METHIDATHION | METHOXYCHLOR | METHYL PARATHION | THIOBENCARB | SIMAZINE | C. DUBIA | P. PROMELAS | S. CAPRICORNUTUM | H. AZTECA |   |  |
| Ash Slough @ Ave 21              | 1                 |    |                       |                  |                |              |              |                        | 3       |         | 2                 | 5             | 2    |            |      |          |          |            | 4            |           |            |            |            |          |          |            |                |            |           |              |              |                  |             |          |          |             |                  | 1         |   |  |
| Bear Creek @ Kibby Rd            | 2                 | 3  |                       |                  |                |              |              |                        | 7       | 1       |                   | 4             |      |            |      |          |          |            | 2            |           |            |            | 1          |          |          |            |                |            |           |              |              |                  |             |          | 3        |             | 2                | 2         |   |  |
| Berenda Slough along Ave 18 ½    | 10                |    |                       |                  |                |              |              |                        | 7       |         | 11                |               |      |            |      |          |          |            | 4            |           |            |            |            |          |          |            | 1              |            |           |              |              |                  |             |          | 1        |             | 3                |           |   |  |
| Black Rascal Creek @ Yosemite Rd | 17                | 2  |                       |                  |                |              |              |                        | 11      |         |                   | 1             | 2    |            |      |          |          |            | 4            |           |            |            |            |          |          |            |                |            |           |              |              |                  |             |          | 5        |             | 1                | 1         |   |  |
| Cottonwood Creek @ Rd 20         | 19                | 1  |                       |                  |                |              |              |                        | 19      |         | 9                 | 12            | 3    |            |      |          |          |            | 3            | 1         |            |            |            |          | 1        |            |                | 2          |           |              |              |                  |             | 1        |          | 1           | 2                | 1         |   |  |
| Deadman Creek @ Gurr Rd          | 27                | 1  | 6                     | 6                | 5              |              |              |                        | 41      | 11      |                   | 4             |      |            |      |          |          |            | 4            |           |            |            | 1          |          | 1        |            |                |            |           | 1            |              |                  |             |          | 4        | 7           | 3                |           |   |  |
| Deadman Creek @ Hwy 59           | 17                | 4  |                       |                  |                |              |              |                        | 17      | 5       |                   |               |      |            |      |          |          |            | 6            |           | 1          |            | 1          |          |          |            |                | 1          |           |              |              |                  |             | 1        |          |             | 3                | 1         |   |  |
| Dry Creek @ Rd 18                | 3                 | 4  |                       |                  |                |              |              |                        | 4       |         | 7                 | 21            | 5    |            | 1    |          |          |            | 3            |           |            |            |            |          | 2        |            |                | 2          |           |              |              |                  |             |          | 1        |             | 4                | 2         |   |  |
| Dry Creek @ Wellsford Rd         | 36                | 6  | 1                     | 1                |                |              |              |                        | 40      |         |                   | 3             | 1    |            |      |          |          |            | 8            |           |            |            |            |          |          |            | 2              |            |           |              |              |                  | 1           |          | 2        |             | 5                | 3         |   |  |
| Duck Slough @ Gurr Rd            | 4                 | 6  | 2                     | 1                |                |              |              | 1                      | 22      |         | 1                 | 8             | 4    |            |      |          |          | 1          | 1            |           |            |            |            |          |          |            |                |            |           |              |              |                  |             | 2        |          | 3           | 1                | 2         | 7 |  |
| Duck Slough @ Hwy 59             | 3                 |    | 1                     |                  |                |              |              |                        |         |         |                   |               |      |            |      |          |          |            |              |           |            |            |            |          |          |            |                |            |           |              |              |                  |             |          |          |             |                  |           |   |  |
| Duck Slough @ Hwy 99             | 2                 | 3  |                       |                  |                |              |              |                        | 12      |         |                   | 11            | 11   |            |      |          |          |            | 4            |           |            |            |            |          |          |            |                |            |           |              |              |                  |             |          | 1        |             | 3                | 2*        |   |  |
| Hatch Drain @ Tuolumne Rd        | 23                |    | 22                    | 12               | 1              | 13           | 1            |                        | 12      | 12      |                   |               |      |            |      |          |          |            |              |           |            | 1          |            |          |          | 1          |                |            |           |              |              | 1                |             |          |          |             |                  | 10        | 6 |  |
| Highline Canal @ Hwy 99          | 1                 | 15 | 1                     | 2                | 2              |              |              |                        | 11      |         |                   | 7             | 7    |            |      |          |          |            | 5            |           |            | 1          |            |          |          |            | 2              |            |           |              |              |                  |             |          | 4        |             | 4                | 6         |   |  |
| Highline Canal @ Lombardy Rd     | 1                 | 5  | 1                     |                  | 1              |              |              |                        | 6       |         | 2                 | 5             | 8    |            | 1    |          |          |            | 6            |           |            |            |            |          |          |            | 1              |            | 1         |              |              | 1                |             | 1        | 6        | 2*          | 5                | 7         |   |  |
| Hilmar Drain @ Central Ave       | 6                 | 3  | 37                    | 26               | 2              | 12           |              |                        | 20      |         |                   | 2             |      |            |      |          |          |            | 1            |           | 1          | 1          |            |          |          |            | 3              |            |           |              |              |                  |             |          | 1        |             | 6                | 4         |   |  |
| Howard Lateral @ Hwy 140         | 1                 | 6  | 1                     | 1                |                |              |              | 1                      | 3       |         | 4                 |               |      |            |      |          |          |            | 1            |           |            |            |            |          |          |            |                |            |           |              |              |                  |             |          |          |             |                  | 1         |   |  |
| Lateral 2 ½ near Keyes Rd        |                   | 5  |                       |                  | 1              |              |              | 1                      | 2       |         |                   |               |      |            |      |          |          |            | 3            |           |            |            |            |          |          |            |                |            | 1         |              |              |                  |             |          |          |             |                  | 1         | 1 |  |
| Livingston Drain @ Robin Ave     | 1                 | 11 |                       |                  |                | 1            |              |                        | 2       |         | 2                 | 9             | 2    |            |      |          |          |            | 4            |           |            |            |            |          |          |            |                |            |           |              |              |                  |             |          |          |             |                  | 4         |   |  |
| McCoy Lateral @ Hwy 140          |                   | 2  |                       |                  |                |              |              |                        |         |         | 3                 |               |      |            |      |          |          |            |              |           |            |            |            |          |          |            |                |            |           |              |              |                  |             |          |          |             |                  |           |   |  |
| Merced River @ Santa Fe          | 4                 | 1  |                       |                  |                |              |              |                        | 4       |         |                   | 1             | 2    |            |      |          |          |            | 3            |           |            |            | 1          |          |          |            |                |            | 1         |              |              |                  |             |          |          | 5           |                  | 1         |   |  |
| Miles Creek @ Reilly Rd          | 10                |    |                       |                  |                |              |              |                        | 7       |         |                   | 7             | 5    |            |      | 1        |          |            | 4            |           |            |            |            |          |          |            |                |            |           |              | 1            |                  |             |          | 3        |             | 3                | 3         |   |  |
| Mootz Drain @ Langworth Rd       | 10                | 1  |                       |                  | 1 <sup>2</sup> |              |              |                        | 9       |         |                   |               |      |            |      |          |          |            | 2            |           |            |            |            |          |          |            | 1 <sup>2</sup> |            |           |              |              |                  |             |          |          |             |                  |           | 1 |  |

|                                          | F                 |    |                       | I                |                |              |              | B                      | M       |         |                   |               |      | P          |      |          |          |            |              |           |            |            |            |          |          |            |                |            | T         |              |              |                  |             |          |          |                |                  |           |
|------------------------------------------|-------------------|----|-----------------------|------------------|----------------|--------------|--------------|------------------------|---------|---------|-------------------|---------------|------|------------|------|----------|----------|------------|--------------|-----------|------------|------------|------------|----------|----------|------------|----------------|------------|-----------|--------------|--------------|------------------|-------------|----------|----------|----------------|------------------|-----------|
|                                          | OXYGEN, DISSOLVED | PH | SPECIFIC CONDUCTIVITY | DISSOLVED SOLIDS | AMMONIA        | NITRATE AS N | NITRITE AS N | NITRATE + NITRITE AS N | E. COLI | ARSENIC | COPPER DISSOLVED† | COPPER TOTAL† | LEAD | MOLYBDENUM | ZINC | ALDICARB | CARBARYL | CARBOFURAN | CHLORPYRIFOS | CYANAZINE | DDD (P,P') | DDE (P,P') | DDT (P,P') | DIAZINON | DIELDRIN | DIMETHOATE | DIURON         | HCH, DELTA | MALATHION | METHIDATHION | METHOXYCHLOR | METHYL PARATHION | THIOBENCARB | SIMAZINE | C. DUBIA | P. PROMELAS    | S. CAPRICORNUTUM | H. AZTECA |
| SITE NAME                                |                   |    |                       |                  |                |              |              |                        |         |         |                   |               |      |            |      |          |          |            |              |           |            |            |            |          |          |            |                |            |           |              |              |                  |             |          |          |                |                  |           |
| Mootz Drain downstream of Langworth Pond | 9                 |    |                       |                  | 1 <sup>2</sup> |              |              |                        | 10      |         |                   |               |      |            |      |          |          |            |              |           |            |            |            |          |          |            | 1 <sup>2</sup> |            |           |              |              |                  |             |          |          |                |                  |           |
| Mustang Creek @ East Ave                 | 12                |    | 9                     | 6                | 1              |              |              | 2                      | 10      |         | 4                 |               |      |            |      |          |          |            | 2            |           |            | 3          |            |          |          |            |                |            |           |              |              |                  |             | 2        | 2*       |                | 1                | 1         |
| Prairie Flower Drain @ Crows Landing Rd  | 18                | 6  | 84                    | 67               | 11             | 18           | 1            | 37                     | 51      | 1       |                   |               |      | 5          |      |          | 1        |            | 4            |           |            |            |            | 1        |          |            | 3              |            |           | 1            |              |                  |             |          | 3        | 3 <sup>1</sup> | 12               | 6         |
| Rodden Creek @ Rodden Rd                 |                   |    |                       |                  |                |              |              |                        | 4       |         |                   |               |      |            |      |          |          |            |              |           |            |            | 1          |          |          |            | 1              |            |           |              |              |                  |             |          |          |                |                  |           |
| Silva Drain @ Meadow Dr                  | 17                | 1  |                       |                  | 3              |              |              |                        | 13      |         |                   | 3             | 1    |            |      |          |          |            | 6            |           |            |            |            |          |          |            |                |            |           |              |              |                  |             |          | 3        | 1              |                  | 4         |
| Westport Drain @ Vivian Rd               | 7                 |    | 19                    | 13               |                | 13           |              |                        | 7       |         |                   |               |      |            |      |          |          |            | 2            |           |            |            |            |          |          |            |                |            |           |              |              |                  |             |          |          |                | 4                | 1         |
| GRAND TOTAL                              | 261               | 86 | 184                   | 135              | 29             | 57           | 2            | 42                     | 354     | 30      | 45                | 103           | 53   | 5          | 2    | 1        | 1        | 1          | 86           | 1         | 2          | 4          | 8          | 3        | 1        | 4          | 17             | 2          | 3         | 1            | 1            | 1                | 3           | 5        | 47       | 15             | 82               | 58        |

\*Not prioritized for MPM; both toxic samples were from the same sampling event (sample and resample to test for persistence).

<sup>1</sup>Two of the toxic samples were from the same sampling event (sample and resample to test for persistence).

<sup>2</sup>Exceedances from the Mootz Drain @ Langworth Rd site count toward the management plan for Mootz Drain Downstream of Langworth Pond (site location was moved in December 2010, as approved on November 18, 2009).

† Exceedances of the copper WQTL determined by either total or dissolved copper are evaluated under the same copper management plan.

**Table 5. ESJWQC exceedance tally based on 2011 sampling events.**

All sites are listed that have had at least one exceedance in 2011. Sites are listed alphabetically by site name and constituents are listed alphabetically within each of the following groups: field parameters (F), inorganics (I), bacteria (B), metals (M), pesticides (P) and toxicity (T). Green highlighted cells refer to sites/constituents that require a management plan due to 2011 exceedances; blue highlights refer to sites/constituents already in a management plan. The tally only includes field duplicate exceedances if the environmental sample did not also have an exceedance.

| ZONES       | SITE NAME                               | F                 |    |                       | I                |         |                        | B       | M                 |            | P        |              |            |            |        | T        |             |                  |           |
|-------------|-----------------------------------------|-------------------|----|-----------------------|------------------|---------|------------------------|---------|-------------------|------------|----------|--------------|------------|------------|--------|----------|-------------|------------------|-----------|
|             |                                         | OXYGEN, DISSOLVED | PH | SPECIFIC CONDUCTIVITY | DISSOLVED SOLIDS | AMMONIA | NITRATE + NITRITE AS N | E. COLI | COPPER DISSOLVED† | MOLYBDENUM | CARBARYL | CHLORPYRIFOS | DDT (P,P') | DIMETHOATE | DIURON | C. DUBIA | P. PROMELAS | S. CAPRICORNUTUM | H. AZTECA |
| 6           | Berenda Slough along Ave 18 ½           | 2                 |    |                       |                  |         |                        | 5       | 11                |            |          | 1            |            |            |        |          |             |                  |           |
| 6           | Cottonwood Creek @ Rd 20                | 1                 |    |                       |                  |         |                        | 3       | 6                 |            |          |              |            |            |        |          |             |                  |           |
| 5           | Deadman Creek @ Hwy 59                  |                   | 4  |                       |                  |         |                        | 5       |                   |            |          | 2            |            |            |        |          |             |                  |           |
| 6           | Dry Creek @ Rd 18                       |                   | 2  |                       |                  |         |                        |         | 7                 |            |          |              |            |            |        |          |             |                  |           |
| 1           | Dry Creek @ Wellsford Rd                | 4                 | 1  |                       | 1                |         |                        | 5       |                   |            |          |              |            |            |        |          |             |                  | 1         |
| 5           | Duck Slough @ Gurr Rd                   | 1                 | 1  |                       |                  |         |                        | 2       |                   |            |          |              |            |            |        |          | 1           |                  | 1         |
| 3           | Highline Canal @ Hwy 99                 |                   | 1  |                       |                  |         |                        | 1       |                   |            |          | 1            |            |            |        |          |             |                  |           |
| 3           | Highline Canal @ Lombardy Rd            |                   |    |                       |                  |         |                        | 2       | 1                 |            |          |              |            |            |        |          |             | 1                |           |
| 4           | Howard Lateral @ Hwy 140                |                   |    |                       |                  |         |                        |         | 1                 |            |          |              |            |            |        |          |             |                  |           |
| 2           | Lateral 2 ½ near Keyes Rd               |                   | 1  |                       |                  |         |                        |         |                   |            |          |              |            |            |        |          |             |                  |           |
| 4           | Livingston Drain @ Robin Ave            |                   |    |                       |                  |         |                        |         | 2                 |            |          |              |            |            |        |          |             |                  |           |
| 4           | McCoy Lateral @ Hwy 140                 |                   | 2  |                       |                  |         |                        |         | 3                 |            |          |              |            |            |        |          |             |                  |           |
| 4           | Merced River @ Santa Fe                 |                   |    |                       |                  |         |                        | 1       |                   |            |          | 1            |            |            |        |          |             |                  |           |
| 2           | Prairie Flower Drain @ Crows Landing Rd | 3                 |    | 13                    | 11               | 5       | 10                     | 9       |                   | 5          | 1        | 1            | 2          |            | 1      | 1        | 3           |                  |           |
| 1           | Rodden Creek @ Rodden Rd                |                   |    |                       |                  |         |                        | 4       |                   |            |          | 1            |            | 1          |        |          |             |                  |           |
| GRAND TOTAL |                                         | 11                | 12 | 13                    | 12               | 5       | 10                     | 37      | 31                | 5          | 1        | 3            | 4          | 2          | 1      | 1        | 2           | 4                | 2         |

† Exceedances of the copper WQTL determined by either total or dissolved copper are evaluated under the same copper management plan.

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## 2011 NEW SITE/CONSTITUENTS REQUIRING MANAGEMENT PLANS

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New sites that require a focused management plan approach are added to the priority list (Table 6). Source identification, outreach and evaluation of management practices will be addressed at all new site subwatersheds that have been added to the focused management plan list during their years of high priority status as specified in Table 6.

As a result of 2011 monitoring, several new site/constituent specific management plans are required (see green highlights in Table 5). Below is a list of constituents with 2011 exceedances that triggered a new site/constituent specific management plan:

- pH
  - Deadman Creek @ Hwy 59
  - McCoy Lateral @ Hwy 140
- Total Dissolved Solids (TDS)
  - Dry Creek @ Wellsford Rd
- *E. coli*
  - Rodden Creek @ Rodden Rd
- Copper, dissolved
  - Berenda Slough along Ave 18 ½
  - McCoy Lateral @ Hwy 140
- Molybdenum
  - Prairie Flower Drain @ Crows Landing Rd
- Dimethoate
  - Prairie Flower Drain @ Crows Landing Rd
- *P. promelas* water column toxicity
  - Prairie Flower Drain @ Crows Landing Rd

## MANAGEMENT PLAN PROCESS

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The ESJWQC Management Plan process was first outlined in the ESJWQC Management Plan submitted on September 30, 2008 and updated in the 2010 MPUR to reflect the current monitoring strategy outlined in the ESJWQC MRPP (page 33) of rotating Core and Assessment Monitoring locations. Except for new Assessment Monitoring locations initiated in October 2008, all other subwatersheds under the ESJWQC Management Plan followed the original Management Plan flow charts. The process required additional monitoring in 2007 and upstream monitoring in 2008 during the irrigation season for high priority constituents during months of past exceedances. In 2009, the Coalition was able to utilize source information gained from MPM during its outreach efforts, especially within high priority site subwatersheds. Due to the extensive amount of monitoring conducted within the Coalition region, the Coalition is focusing its efforts on documenting changes in management practices and performing outreach at both an individual and grower group level.

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## MANAGEMENT PLAN MONITORING STRATEGY

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The Coalition developed an updated flow chart for its MPM strategy for low priority subwatersheds (Figure 1) and high priority subwatersheds (Figure 2). Sites are rotated from non-high priority to high priority based on a schedule approved by the Regional Board (Table 6). Based on this strategy, the Coalition will monitor new management plan sites/constituents during months of past exceedances for at least two years after the initiation of a management plan. This monitoring may overlap with Assessment Monitoring already occurring at that location and therefore there would not be “additional” monitoring. Appendix I (Low Priority Subwatersheds section) contains details on low priority sites monitored in 2011 which are sampling locations that were not sampled by the Coalition until the 2008 MRPP was approved, and therefore the Coalition does not have a long historical record of water quality data at the site. Management plans were recently initiated at these sites as a result of monitoring and, in order for the Coalition to gain two years of monitoring data for high priority constituents prior to the site rotating to high priority, the Coalition conducts additional monitoring as needed. While this additional monitoring is occurring, the Coalition considers the site a low priority subwatershed.

The Coalition selected this strategy for new management plan sites/constituents since outreach and education will continue with all members within the Coalition, not just with those in high priority subwatersheds. The Coalition anticipates growers will take the initiative and implement additional management practices before the subwatershed becomes a high priority site. Therefore, it is possible that Coalition monitoring results will indicate an improvement in water quality which would eliminate the need for future individual contacts/interviews. The other benefit of this strategy is that the additional monitoring will help in the assessment of the sources of exceedances (both temporally and geographically) between years.

Once a subwatershed rotates into high priority status, the Coalition initiates the process outlined in Figure 2 (Year 1 refers to the first year that the subwatershed is a high priority site). If there are two years of no exceedances of high priority constituents (either in Year 1 and Year 2 or Year 2 and Year 3), that site/constituent is petitioned for removal from an active management plan. Monitoring will occur for those constituents when the site is rotated back into Assessment Monitoring. Management Plan Monitoring may continue beyond two years if the Coalition determines that an extra year of monitoring is necessary to evaluate improvements in water quality and/or the effectiveness of newly implemented management practices. Figures 1, 2 and 4 further outline the Coalition's processes for management plan evaluation and prioritization of exceedances.



**Figure 1. ESJWQC Management Plan Monitoring strategy for new non-high priority subwatersheds.**

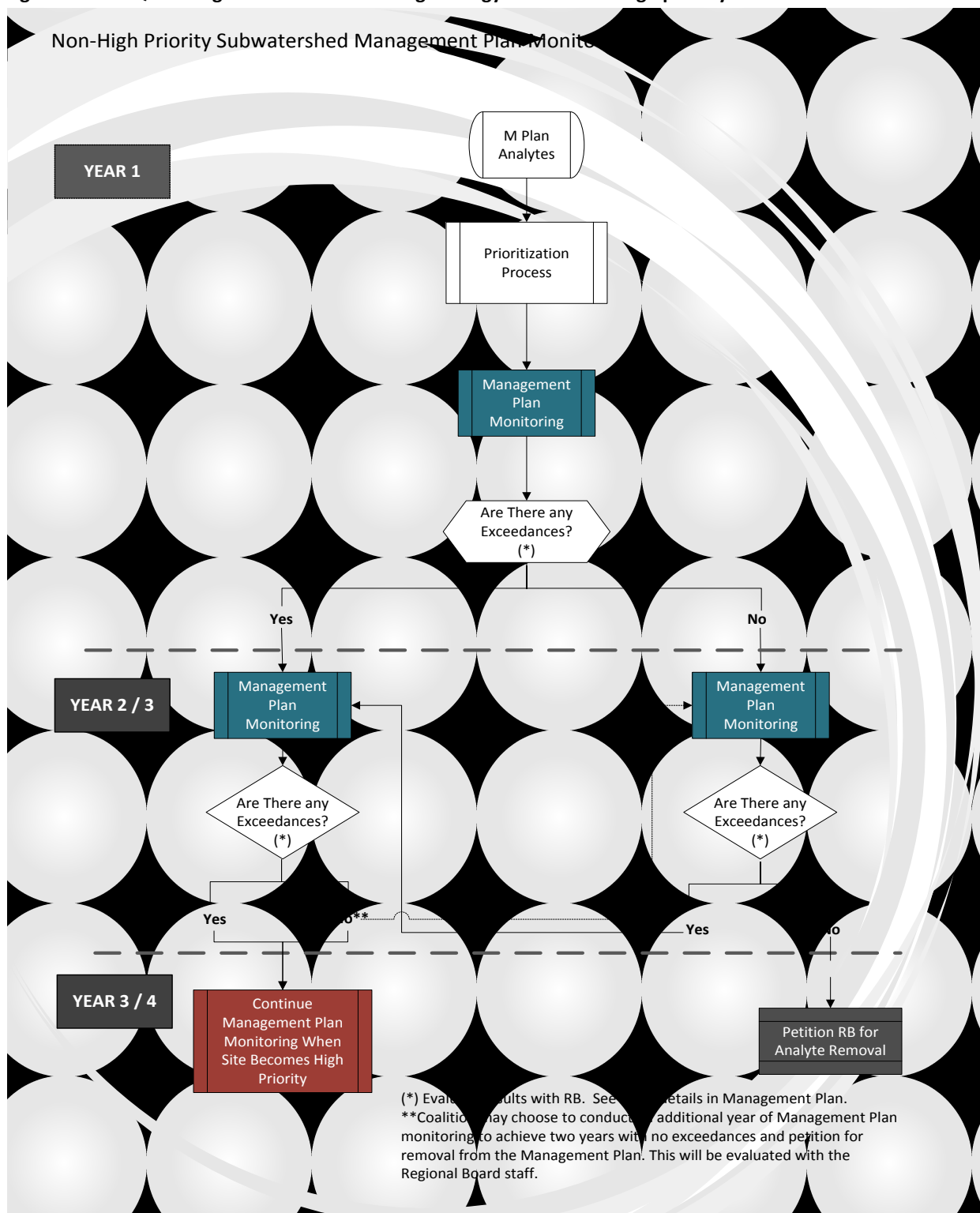
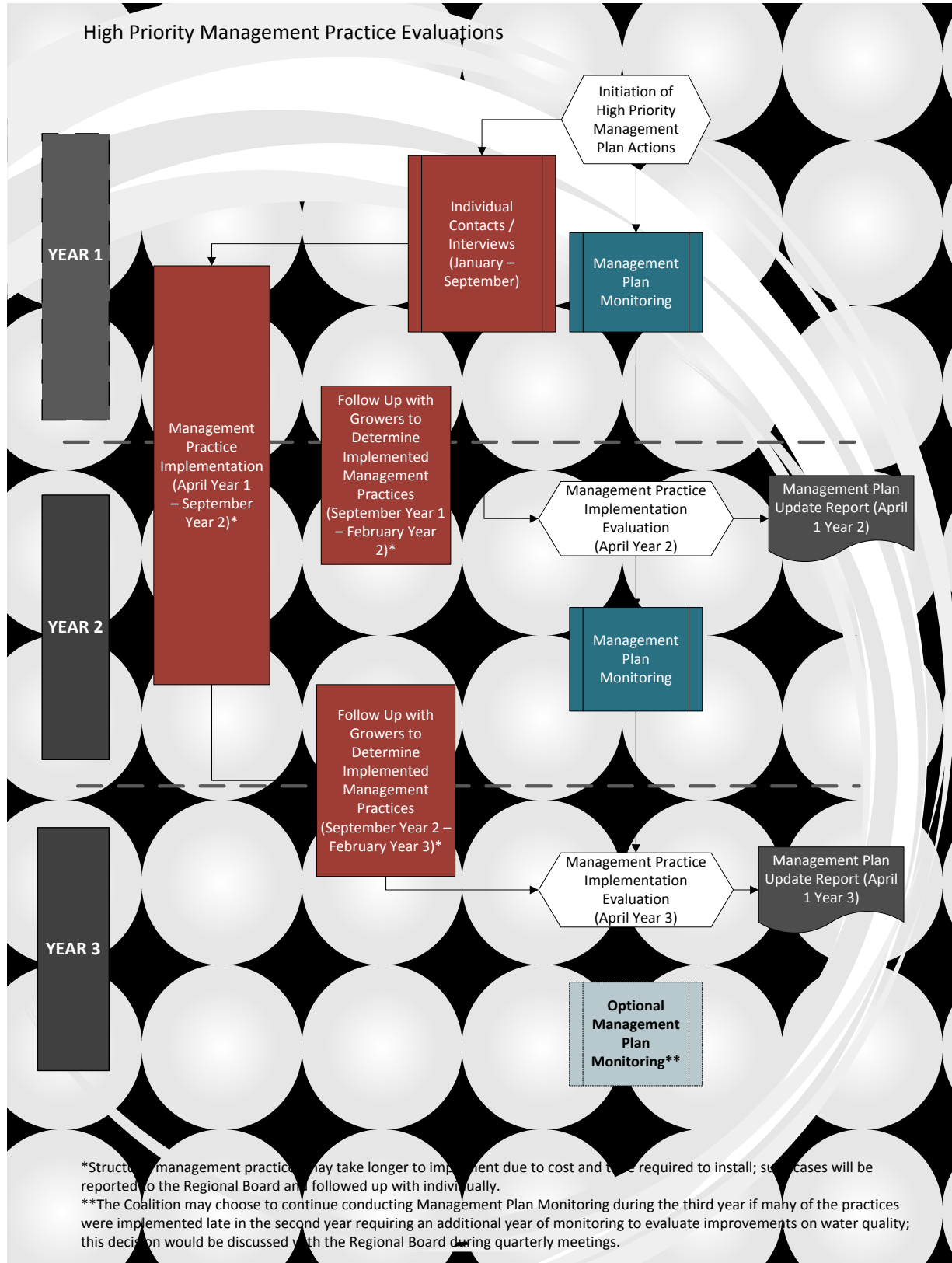


**Figure 2. ESJWQC High Priority Subwatershed Management Plan Monitoring and management practice evaluation strategy.**



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## MANAGEMENT PRACTICE TRACKING STRATEGY

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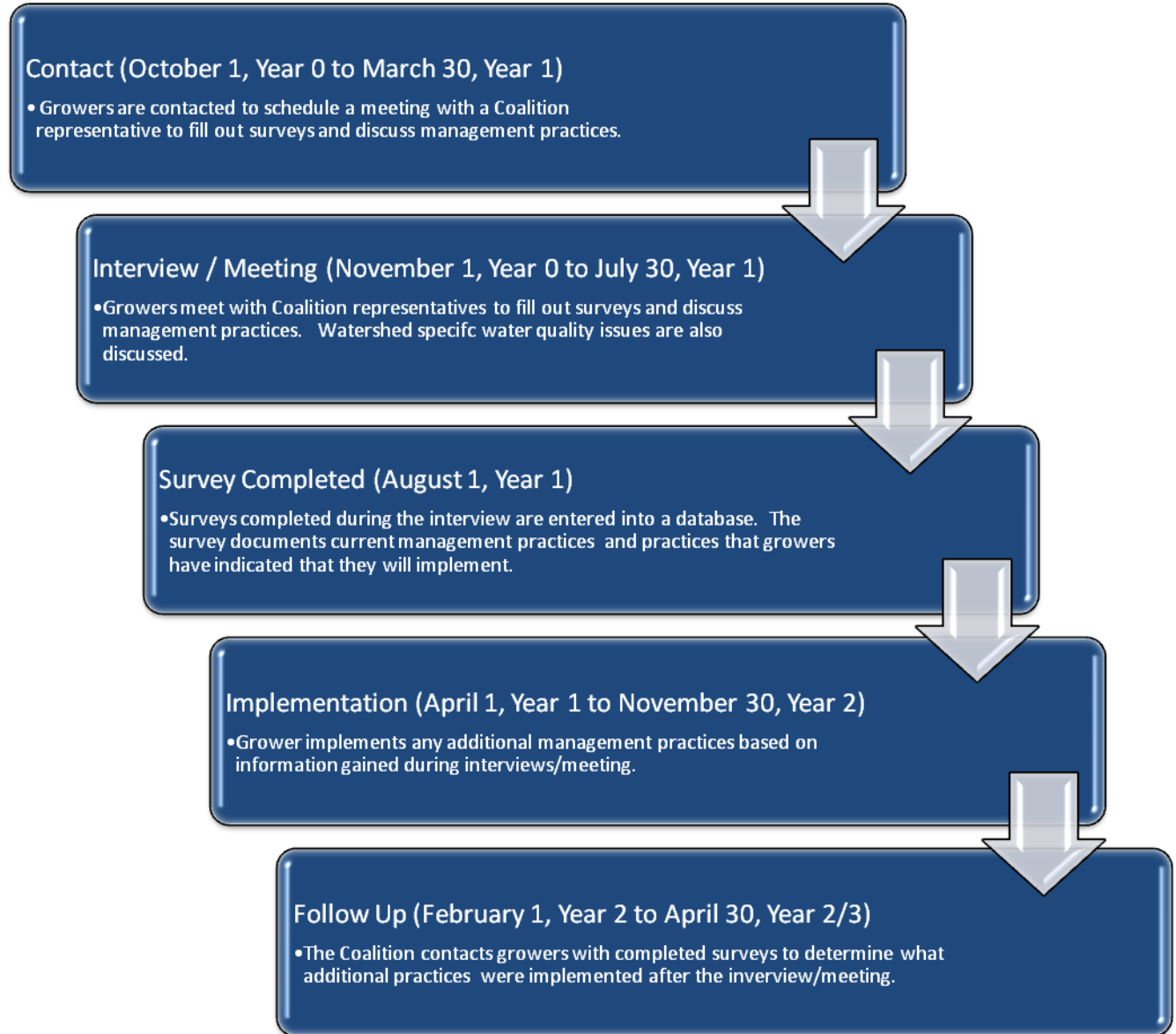
The schedule outlined in Figure 3 lists a general timeline of actions in Years 1, 2 and 3 of the flow chart outlined in Figure 2. When a site becomes a high priority site subwatershed, the Coalition makes contacts to individuals within the subwatershed who have the potential for direct drainage and applied constituents of concern. Contacts occur between October 1 and March 30 of Year 1 in order to schedule meetings and conduct individual contacts/interviews between November 1 and July 30. Individual meetings are initiated to inform growers of current water quality concerns and potential management practices that can be implemented to reduce impairments of water quality due to agricultural inputs.

During the interviews, growers are asked about their current farming operations and surveys are completed which document the grower's current management practices and record recommended management practices. It is anticipated that all surveys will be completed and entered into a database by August 1 of Year 1. Implementation of management practices is anticipated to occur between April of Year 1 and November of Year 2. It is difficult to predict when implementation will occur since some practices such as structural management practices may take multiple years to fund and construct.

The Coalition conducts follow up surveys with growers between February of Year 2 and April of Year 2. Follow up may be extended to Year 3 depending on information obtained from the growers as to when they plan to implement practices; in some cases a third year may be necessary for funds to be available for structural improvements. Growers contacted in Year 1 are scheduled to attend a follow up meeting. At the meeting, interactive devices are used by attendees to answer survey questions included in a PowerPoint presentation given by Coalition representatives. Growers who did not attend the follow up meeting are contacted via phone calls/phone interviews in order to complete their follow up survey questions.

The follow up survey documents whether growers implemented new management practices in Year 1; if they did not implement new management practices the survey documents whether or not they plan to implement those practices in Year 2. If the grower indicates that they did not implement any practices nor do they intend to implement additional practices in the next year, the grower is asked why (i.e. they no longer farm that parcel, no available funds, etc.).

**Figure 3. Schedule for Coalition Management Plan strategy activities to document management practices for high priority subwatersheds.**



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## PRIORITIZATION OF CONSTITUENTS WITH EXCEEDANCES

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The ESJWQC developed a prioritization process (Figure 4) which allows the Coalition to focus on constituents of the greatest concern. The prioritization process was developed in collaboration with the Regional Board and allows the Coalition to focus on constituents where sourcing is possible (i.e. pesticide applications) and for which management practices are available. Following the process outlined in the flow chart in Figure 4, a priority level is assigned to a management plan constituent for a specific site subwatershed. Priority levels of a constituent determine the level of activity for sourcing, outreach and evaluation.

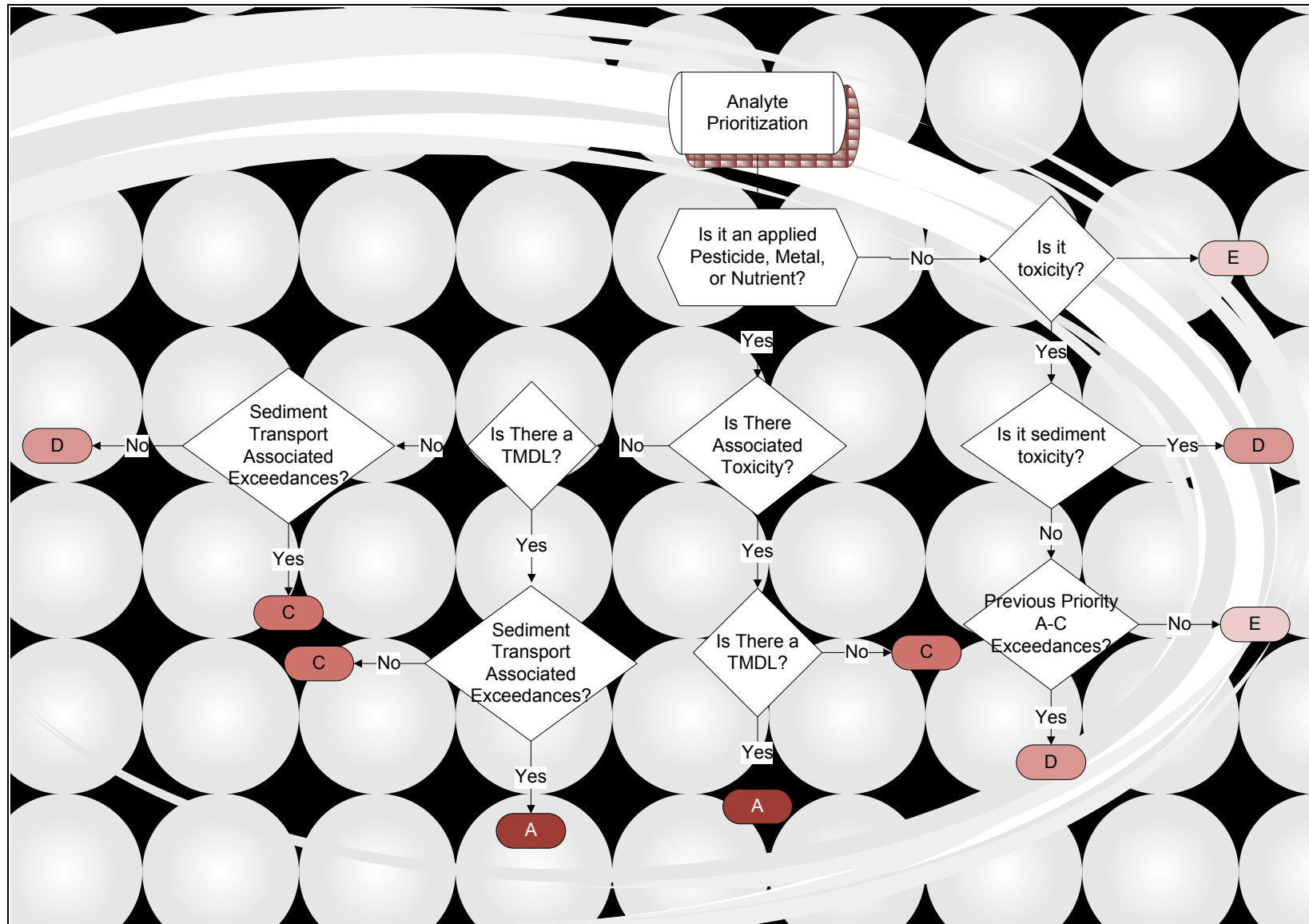
Source analysis is conducted by utilizing Pesticide Use Reports (PUR). All PUR data are considered preliminary and may contain some level of inaccuracy until they are finalized and made available through California Pesticide Information Portal (CalPIP). The most recently available CalPIP data are through December 2010. Preliminary PUR data associated with 2011 exceedances that were available for review included data from Madera County (January through June), Merced County (January through October) and Stanislaus County (January through September). Any outstanding PUR data that become available after this report is submitted will be included in an addendum to the AMR to be submitted on June 1, 2012.

Source analysis is also conducted by analyzing any relevant MPM data (may include upstream and/or increased frequency of monitoring conducted in previous years). Monitoring is conducted for priority constituents A through D; priority E constituents will not have MPM except for field parameters which are collected each time monitoring occurs.

The Coalition continues to provide information regarding management practices and water quality exceedances to growers during annual meetings and site subwatershed meetings as needed. When a site subwatershed is rotated into high priority, the Coalition focuses its outreach on high priority constituents; however, individual contacts also include discussions of all exceedances that have occurred within that waterbody.

The Coalition evaluates management practice information obtained from individual survey contacts including follow up surveys which document newly implemented practices. The Coalition expects that as a direct result of individual contacts and newly implemented practices, downstream water quality will improve. However, it is possible that due to actions of non members, there may continue to be downstream water quality impairments. Therefore, evaluations of management practices involve both an assessment of water quality and the degree of implementation of management practices at the subwatershed level.

Figure 4. ESJWQC constituent prioritization process.



## MANAGEMENT PLAN DEVELOPMENT TIMELINES

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The Coalition developed a schedule (Table 6) establishing when sites become high priority and undergo a focused management plan approach. This schedule was submitted as an addendum to the ESJWQC Management Plan which was approved on November 25, 2008 (Table B). This schedule is evaluated and updated in each yearly MPUR for 1) any new sites requiring a management plan, and 2) changes to the years for focused outreach. Based on the Management Plan process, any new site that requires a management plan due to the previous year's exceedances is added to the bottom of the schedule. Changes such as time extensions, removal of sites and/or changing the year of prioritization must be approved by the Regional Board's Executive Officer.

Table 6 provides the updated schedule that includes approved changes to prioritization years. Updates to the schedule (other than the addition of new sites requiring a management plan) from previous years include the omission of South Slough @ Quinley Rd and the exchange of priority years for Bear Creek @ Kibby Rd, Hilmar Drain @ Central Ave, Lateral 2 ½ near Keyes Rd and Ash Slough @ Ave 21. Specific details regarding changes made to the priority schedule following 2011 monitoring are provided below.

McCoy Lateral @ Hwy 140 is the only new site to be added to the focused management plan schedule and it will rotate into high priority status in 2016 (Table 6). McCoy Lateral was monitored for the first time in 2011 as a rotating Assessment site. Exceedances of the following WQTLs occurred at McCoy Lateral in 2011: pH and copper (dissolved). McCoy Lateral is scheduled for Assessment Monitoring in 2012 and all constituents will be monitored during that time. There are currently 26 site subwatersheds included in the ESJWQC Management Plan that will become high priority sites between 2008 and 2018 (Table 6).

**Table 6. Schedule for addressing each site subwatershed with a detailed, focused Management Plan approach (revised and approved May 17, 2011).**

| <b>SITE SUBWATERSHED NAME</b>                                 | <b>UPDATED YEAR FOR FOCUSED APPROACH</b> |
|---------------------------------------------------------------|------------------------------------------|
| Dry Creek @ Wellsford Rd                                      | 2008-2010                                |
| Duck Slough @ Hwy 99                                          | 2008-2010                                |
| Prairie Flower Drain @ Crows Landing Rd                       | 2008-2010                                |
| Cottonwood Creek @ Rd 20                                      | 2010-2012                                |
| Duck Slough @ Gurr Rd                                         | 2010-2012                                |
| Highline Canal @ Hwy 99                                       | 2010-2012                                |
| Bear Creek @ Kibby Rd                                         | 2010-2012                                |
| Lateral 2 ½ near Keyes Rd                                     | 2011-2013                                |
| Berenda Slough along Ave 18 1/2                               | 2011-2013                                |
| Dry Creek @ Rd 18                                             | 2011-2013                                |
| Livingston Drain @ Robin Ave                                  | 2011-2013                                |
| Hilmar Drain @ Central Ave                                    | 2012-2014                                |
| Black Rascal Creek @ Yosemite Rd                              | 2012-2014                                |
| Deadman Creek @ Hwy 59                                        | 2012-2014                                |
| Deadman Creek (Dutchman) @ Gurr Rd                            | 2012-2014                                |
| Hatch Drain @ Tuolumne Rd                                     | 2013-2015                                |
| Highline Canal @ Lombardy Rd                                  | 2013-2015                                |
| Merced River @ Santa Fe                                       | 2013-2015                                |
| Miles Creek @ Reilly Rd                                       | 2013-2015                                |
| Mustang Creek @ East Ave                                      | 2014-2016                                |
| Silva Drain @ Meadow Dr                                       | 2014-2016                                |
| Westport Drain @ Vivian Rd                                    | 2014-2016                                |
| Ash Slough @ Ave 21                                           | 2015-2017                                |
| Mootz Drain downstream of Langworth Pond <sup>1</sup>         | 2015-2017                                |
| Howard Lateral @ Hwy 140                                      | 2015-2017                                |
| McCoy Lateral @ Hwy 140                                       | 2016-2018                                |
| <b>RE-EVALUATE ALL SITE SUBWATERSHEDS AND REVISE SCHEDULE</b> | <b>ANNUALLY</b>                          |

<sup>1</sup>Mootz Drain downstream of Langworth Pond was monitored for all management plan constituents detected at the upstream location, Mootz Drain @ Langworth Rd.



## PRIORITY SITE MANAGEMENT

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### MANAGEMENT OBJECTIVES

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The Coalition prioritizes constituents and site subwatersheds to allow for source identification, focused outreach and evaluation of management practices. In 2008, the Coalition prioritized subwatersheds based on the number, frequency and magnitude of chlorpyrifos and diazinon exceedances. Other factors considered include size of the subwatershed and known improvements in management practices in those areas.

The objective of the prioritization process is to identify watersheds where exceedances are common and management practices can be implemented to decrease agricultural discharges that may contribute to downstream impairments. Although the Coalition is focusing on chlorpyrifos and diazinon exceedances and associated applications, management practices implemented to help reduce the runoff of these constituents will also reduce the runoff of other pesticides, nutrients, salts, and metals.

The Coalition will monitor for Priority A- D constituents when a site becomes a high priority subwatershed. The purpose of monitoring is to evaluate improvements in water quality and the effectiveness of management practices. In addition, if there is a new site subwatershed requiring a management plan, that site will be monitored for at least two years for Priority A-D constituents. A site subwatershed analysis has been included in Appendix I for all high priority subwatersheds.

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### 2012 MANAGEMENT PLAN MONITORING (MPM) SCHEDULE

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In 2012, the ESJWQC will conduct MPM at the following sites. Years 1, 2, 3 and 4 reflect the number of years that the site will have been monitored as of 2012 (i.e. Year 4 indicates that the site is in its fourth year of MPM).

#### Year 4: First Priority (2008 – 2010)

- Dry Creek @ Wellsford
- Duck Slough @ Hwy 99
- Prairie Flower Drain @ Crows Landing

#### Year 2: Third Priority (2011-2013)

- Berenda Slough along Ave 18 ½
- Dry Creek @ Rd 18
- Lateral 2 ½ near Keyes Rd
- Livingston Drain @ Robin Ave

#### Year 3: Second Priority (2010 – 2012)

- Bear Creek @ Kibby Rd
- Cottonwood Creek @ Rd 20
- Duck Slough @ Gurr Rd
- Highline Canal @ Hwy 99

#### Year 1: Fourth Priority (2012-2014)

- Black Rascal Creek @ Yosemite Rd
- Deadman Creek @ Gurr Rd
- Deadman Creek @ Hwy 59
- Hilmar Drain @ Central Ave

The first priority subwatersheds are scheduled for continued monitoring in the fourth year (Year 4) to assess water quality due to initial delays in management practice evaluation and/or implementation. After two consecutive years without exceedances the Coalition will petition to have the constituents removed from that sites active management plan. The Coalition has petitioned for the removal of 14 constituents from 14 ESJWQC subwatersheds (letter mailed on January 6, 2012). Management Plan Monitoring will continue at high priority subwatershed sites until the Regional Board Executive Officer approves the removal of the site/constituent from the ESJWQC Management Plan.

Table 7 includes all sites that are scheduled for MPM for priority constituents during months of past exceedances in 2012. Table 8 includes monitoring details for Howard Lateral @ Hwy 140 and McCoy Lateral @ Hwy 140 which are scheduled for monitoring in 2012 for constituents added to their management plans as a result of exceedances. Howard Lateral @ Hwy 140 was added to the priority schedule as a result of 2010 exceedances and in 2011 completed the first of two years of additional MPM during months of previous exceedances required before rotating into high priority status. Howard Lateral @ Hwy 140 (high priority years 2015-2017) is scheduled for additional monitoring in 2012 for chlorpyrifos (June) and copper (April, July and October) to demonstrate two years of monitoring data for high priority constituents prior to the site rotating to high priority (Table 8). Furthermore, McCoy Lateral @ Hwy 140 was added to the priority schedule as a result of 2011 exceedances and in 2012 will start the first of two years of additional monitoring during months of previous exceedances required before rotating into high priority status. McCoy Lateral @ Hwy 140 (high priority years 2016-2018) is scheduled for additional monitoring in 2012 for copper (January, September and October) to demonstrate two years of monitoring data for high priority constituents prior to the site rotating to high priority (Table 8).

**Table 7. 2012 Management Plan Monitoring schedule.**

| SITE NAME                               | 2012<br>MPM<br>YEAR | MONTH    | COPPER | LEAD | CHLORPYRIFOS | DIAZINON | DIURON | C. DUBIA | P. PROMELAS | S. CAPRICORNUTUM | H. AZTECA |
|-----------------------------------------|---------------------|----------|--------|------|--------------|----------|--------|----------|-------------|------------------|-----------|
| Bear Creek @ Kibby Rd                   | Year 3              | January  | X      |      |              |          |        |          |             |                  |           |
| Berenda Slough along Ave 18 1/2         | Year 2              | January  | X      |      |              |          |        |          |             |                  |           |
| Cottonwood Creek @ Rd 20                | Year 3              | January  | X      |      | X            |          | X      |          |             |                  |           |
| Deadman Creek @ Gurr Rd                 | Year 1              | January  | X      |      |              |          |        |          | X           |                  |           |
| Deadman Creek @ Hwy 59                  | Year 1              | January  |        |      |              |          |        |          |             | X                |           |
| Dry Creek @ Rd 18                       | Year 2              | January  | X      |      |              |          | X      |          |             | X                |           |
| Duck Slough @ Gurr Rd                   | Year 3              | January  | X      |      |              |          |        |          |             |                  |           |
| Highline Canal @ Hwy 99                 | Year 3              | January  | X      |      | X            |          | X      |          |             |                  |           |
| Livingston Drain @ Robin Ave            | Year 2              | January  | X      | X    | X            |          |        |          |             |                  |           |
| Prairie Flower Drain @ Crows Landing Rd | Year 4              | January  |        |      |              |          |        |          |             | X                |           |
| Bear Creek @ Kibby Rd                   | Year 3              | February | X      |      |              |          |        |          |             |                  |           |
| Berenda Slough along Ave 18 1/2         | Year 2              | February | X      |      |              |          |        |          |             |                  |           |
| Cottonwood Creek @ Rd 20                | Year 3              | February | X      |      | X            | X        | X      |          |             |                  |           |
| Deadman Creek @ Gurr Rd                 | Year 1              | February | X      |      |              |          |        | X        | X           | X                |           |
| Dry Creek @ Rd 18                       | Year 2              | February | X      |      | X            | X        | X      |          |             | X                |           |
| Dry Creek @ Wellsford Rd                | Year 4              | February | X      |      |              |          | X      |          |             | X                |           |
| Duck Slough @ Gurr Rd                   | Year 3              | February | X      |      |              |          |        | X        |             |                  |           |
| Duck Slough @ Hwy 99                    | Year 4              | February | X      |      |              |          |        |          |             |                  |           |
| Highline Canal @ Hwy 99                 | Year 3              | February | X      | X    | X            |          | X      |          |             | X                |           |
| Hilmar Drain @ Central Ave              | Year 1              | February | X      |      |              |          |        |          |             |                  |           |
| Livingston Drain @ Robin Ave            | Year 2              | February | X      | X    |              |          |        |          |             | X                |           |
| Prairie Flower Drain @ Crows Landing Rd | Year 4              | February |        |      |              |          |        |          |             | X                |           |
| Deadman Creek @ Gurr Rd                 | Year 1              | March    |        |      | X            |          |        | X        | X           |                  |           |
| Dry Creek @ Rd 18                       | Year 2              | March    |        |      |              |          |        |          |             |                  | X         |
| Dry Creek @ Wellsford Rd                | Year 4              | March    |        |      |              |          |        |          |             | X                | X         |
| Duck Slough @ Gurr Rd                   | Year 3              | March    |        |      |              |          |        | X        |             |                  |           |
| Highline Canal @ Hwy 99                 | Year 3              | March    |        |      |              |          |        | X        |             | X                | X         |
| Hilmar Drain @ Central Ave              | Year 1              | March    |        |      |              |          |        |          |             |                  | X         |
| Prairie Flower Drain @ Crows Landing Rd | Year 4              | March    |        |      |              |          |        | X        |             |                  | X         |
| Bear Creek @ Kibby Rd                   | Year 3              | May      |        |      | X            |          |        | X        |             |                  |           |
| Bear Creek @ Kibby Rd                   | Year 3              | July     |        |      | X            |          |        | X        |             |                  |           |
| Bear Creek @ Kibby Rd                   | Year 3              | August   | X      |      |              |          |        |          |             |                  |           |

"X" indicates when a sample was collected for a particular constituent.

**Table 8. 2012 Additional monitoring schedule for Assessment sites with new management plans.**

| SITE NAME                | YEAR | MONTH     | COPPER | CHLORPYRIFOS |
|--------------------------|------|-----------|--------|--------------|
| McCoy Lateral @ Hwy 140  | 2012 | January   | X      |              |
| Howard Lateral @ Hwy 140 | 2012 | April     | X      |              |
| Howard Lateral @ Hwy 140 | 2012 | June      |        | X            |
| Howard Lateral @ Hwy 140 | 2012 | July      | X      |              |
| McCoy Lateral @ Hwy 140  | 2012 | September | X      |              |
| Howard Lateral @ Hwy 140 | 2012 | October   | X      |              |
| McCoy Lateral @ Hwy 140  | 2012 | October   | X      |              |

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## PERFORMANCE GOALS AND SCHEDULES

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The Coalition Strategic Plan is outlined in the original Management Plan (approved on November 25, 2008) in Table 18, pages 77-79 and is designed to meet the following management goal:

“To continue to monitor and analyze the water and sediment quality of ESJWQC site subwatersheds and to facilitate the implementation of management practices by providing outreach and support to growers in order to effectively enhance water quality in the Coalition region.”

The Coalition developed High Priority Site Subwatershed Performance Goals (hereafter referred to as Performance Goals) for its first four sets of high priority site subwatersheds: first priority subwatersheds (2008-2010), second priority subwatersheds (2010- 2012), third priority subwatersheds (2011-2013) and fourth priority subwatersheds (2012-2014). Performance Goals are submitted for approval each time a new set of subwatersheds rotates into high priority status and are built on the following actions essential to the Management Plan strategy:

1. Determine number/type of management practices currently in place, based on Assessor Parcel Number (APN) associated with baseline survey responses
2. Grower Group Contacts / Individual Contacts
3. Implementation of new management practices
4. Assess number/type of new management practices implemented
5. Evaluate effectiveness of new management practices

Performance Goals were approved by the Regional Board as amendments to the ESJWQC Management Plan on June 16, 2009 (first priority subwatersheds), June 8, 2010 (second priority subwatersheds), November 17, 2010 (third priority subwatersheds) and November 14, 2011 (fourth priority subwatersheds). The following sections describe the Coalition actions to meet the approved Performance Goals and the status of each of the Performance Goals along with associated measures/outputs.

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### First Priority Subwatersheds (2008 – 2010)

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The amended Performance Goals for the first priority subwatersheds are presented in Table 9 (details and amendments are discussed in detail in the schedule extension request submitted on June 5, 2009 and approved on June 8, 2010). The updated management practices survey, outreach, implementation and evaluation tracking schedule is included in Table 10.

#### **Performance Goal 1: Individually contact members on adjacent properties to waterways where discharges have been identified from February to August 2009.**

The Coalition’s strategy for identifying target growers within the high priority subwatersheds includes selecting a subset of parcels adjacent to the waterways with:

1. the potential for direct drainage to the waterway (identified using GIS),
2. the potential for spray drift to reach the waterway, and
3. applications of priority pesticides (based on PURs).

The Coalition may omit members and their associated parcels from the target list if it is determined that the parcel does not drain into the waterbody, the grower is not currently farming the parcel(s), there is no reported pesticide use, and/or the land is pasture only with no pesticide use.

In the Dry Creek @ Wellsford Rd, Duck Slough @ Hwy 99 and Prairie Flower Drain @ Crows Landing Rd site subwatersheds, there were 25, 24 and 11 targeted members, respectively. In the 2010 MPUR, the Coalition reported contacting and receiving management practice information from 22 growers within the Dry Creek @ Wellsford Rd subwatershed. The number of total contacts was updated from 22 to 25 growers because two growers who failed to respond to the Coalition's contacts eventually responded and met with Coalition representatives to document current (2009) management practices. An additional grower within the Dry Creek @ Wellsford Rd subwatershed was identified and contacted in 2010 due to recent enrollment in the Coalition, direct drainage potential and proximity to the Dry Creek @ Wellsford Rd monitoring location. Due to the added three members, the acreage represented by individual contacts increased from 6,116 to 6,392. The numbers of contacted growers did not change for Duck Slough @ Hwy 99 and Prairie Flower Drain @ Crows Landing Rd since the 2010 MPUR.

**Performance Goal 2: Establish current practices August 15, 2009 on adjacent properties to waterways or where discharges are identified.**

Performance Goal 2 was completed by the required date as reported in the 2010 MPUR (Table 11, pages 36-37). The actions taken by the Coalition to meet this performance goal by August 15, 2009 were described in the 2010 MPUR including dates of contacts. As described under Performance Goal 1, the Coalition contacted an additional three growers: two growers were going to be dropped from the Coalition for not completing a survey but later complied and one joined the Coalition in 2010.

The Coalition contacted 100% of the targeted growers and recorded 100% of management practice information in an Access database. A summary of currently implemented and recommended management practices is included in the First Priority Subwatersheds Summary of Management Practices section of this report.

**Performance Goal 3: Encourage growers to implement additional management practices based on water quality results.**

All current and recommended practices were recorded in an Access database and were summarized in the section First Priority Subwatersheds Summary of Management Practices. The Coalition conducted follow up meetings and phone calls to obtain information regarding practices that were implemented in 2009 and 2010 (Table 16). The Coalition followed up with all growers who indicated that they planned to implement additional practices.

**Performance Goal 4: Evaluate effectiveness of the new management practices implemented during 2009 and 2010.**

The Coalition evaluates the effectiveness of new management practices by reviewing water quality monitoring results collected during years after implementation of new management practices (2010 and 2011). Those results are then compared to monitoring results from years prior to implementation of

new practices in the first priority subwatersheds (refer to the Evaluation of Management Practice Effectiveness section of this report).

Water quality results for MPM conducted in 2011 within each subwatershed are included in the High Priority Subwatershed Analysis Appendix (Appendix I) and are tabulated in Tables 2 and 3. The Coalition is monitoring all first priority sites an additional year for management plan constituents and will update its evaluation of management practice effectiveness to include monitoring results from 2012 in the 2013 MPUR. This additional year of monitoring in the first priority subwatersheds will allow the Coalition to assess water quality due to initial delays in management practice implementation.

**Performance Goal 5: Consult with the Central Valley Regional Water Quality Control Board (CVRWQCB or Regional Board) at least once during 2008/2009 to discuss Management Plan activities and consider if changes need to be made in Management Plan for High Priority waterbodies.**

The Coalition met with Regional Board staff to discuss the Management Plan activities for high priority waterbodies; topics included status of individual contacts, survey completion and extension to time lines for completing Performance Goals in 2009 and 2010. Quarterly meeting dates from 2009 were reported in the 2010 MPUR (Table 10, page 34). The Coalition continues to discuss Management Plan activities with the Regional Board during meetings; quarterly meetings held in 2011 are listed in Table 14.

**Table 9. High Priority Performance Goals status for 2008-2010 high priority subwatersheds (Dry Creek @ Wellsford, Duck Slough @ Hwy 99 and Prairie Flower Drain @ Crows Landing Rd), updated on June 5, 2009 and approved on June 16, 2009.**

| Performance Goal/Performance Measure                                                                                                                                                                             | Outputs                                                                                                             | Who                   | Status as of April 1, 2012 <sup>1</sup>                  |                                                          |                                                          |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------|-----------------------|----------------------------------------------------------|----------------------------------------------------------|----------------------------------------------------------|
|                                                                                                                                                                                                                  |                                                                                                                     |                       | Dry Creek @ Wellsford                                    | Duck Slough @ Hwy 99                                     | Prairie Flower Drain @ Crows Landing Rd                  |
| Performance Goal 1: Individually contact members on adjacent properties to waterways where discharges have been identified from February to August 2009.                                                         |                                                                                                                     |                       |                                                          |                                                          |                                                          |
| Performance Measure 1.1. – 100% of targeted growers contacted.                                                                                                                                                   | Report ratio of individual contacts made versus total growers identified with discharges.                           | Parry Klassen         | 25 of 25<br>(100%)                                       | 24 of 24<br>(100%)                                       | 11 of 11<br>(100%)                                       |
| Performance Measure 1.2 – Contact owners/operators representing at least 1,000 acre of membership acreage in the site subwatershed.                                                                              | Report ratio of acreage represented by individual contacts versus total subwatershed acreage <sup>2</sup> .         | MLJ-LLC               | 6,392 of 23,331 <sup>3</sup><br>(27%)                    | 4,016 of 10,695 <sup>3</sup><br>(38%)                    | 865 of 3,611 <sup>3</sup><br>(24%)                       |
| Performance Goal 2: Establish current practices by August 15, 2009, on adjacent properties to waterways or where discharges are identified.                                                                      |                                                                                                                     |                       |                                                          |                                                          |                                                          |
| Performance Measure 2.1 – Obtain current management practice information from 100% of targeted growers.                                                                                                          | Completed individual contact checklists recorded in an Access database.                                             | Parry Klassen         | 25 of 25<br>(100%)                                       | 24 of 24<br>(100%)                                       | 11 of 11<br>(100%)                                       |
| Performance Measure 2.2 – Document current management practices of the targeted growers during individual contacts and encourage the adoption of new practices not currently implemented.                        | Record of management practices used that may reduce agricultural impact on water quality.                           | MLJ-LLC               | 25 of 25<br>(100%)                                       | 24 of 24<br>(100%)                                       | 11 of 11<br>(100%)                                       |
| Performance Measure 2.3 – Document management practices targeted grower was encouraged to implement.                                                                                                             | Summary of management practice evaluations on a site subwatershed level in the Management Plan update (April 2010). | MLJ-LLC               | Complete                                                 | Complete                                                 | Complete                                                 |
| Performance Goal 3: Encourage growers to implement additional management practices based on water quality results.                                                                                               |                                                                                                                     |                       |                                                          |                                                          |                                                          |
| Performance Measure 3.1 – By February 2011, document additional management practices implemented by targeted growers.                                                                                            | Summary of management practices implemented as a result of individual contacts.                                     | Parry Klassen/MLJ-LLC | Complete                                                 | Complete                                                 | Complete                                                 |
| Performance Goal 4: Evaluate effectiveness of the new management practices implemented during 2009 and 2010.                                                                                                     |                                                                                                                     |                       |                                                          |                                                          |                                                          |
| Performance Measure 4.1 – Assess water quality results from Coalition monitoring locations within the priority site subwatersheds.                                                                               | Summary of 2009 and 2010 water quality data from site subwatershed (April 2010 and 2011).                           | MLJ-LLC               | 2010-2011 Summary Complete<br>April 1, 2012 <sup>4</sup> | 2010-2011 Summary Complete<br>April 1, 2012 <sup>4</sup> | 2010-2011 Summary Complete<br>April 1, 2012 <sup>4</sup> |
| Performance Goal 5: Consult with CVRWQCB at least once during 2008/2009 to discuss Management Plan activities and consider if changes need to be made in Management Plan strategy for high priority waterbodies. |                                                                                                                     |                       |                                                          |                                                          |                                                          |

<sup>1</sup>Acreage has been updated; total irrigated acreages have been updated to be more accurate by updating GIS parcel layers (actual parcels did not change).

<sup>2</sup>Performance Goal states that 'total subwatershed acreage' was reported; however, the Coalition reported overall irrigated acres for the first priority subwatersheds.

<sup>3</sup>Irrigated acreage for 1st Priority Subwatersheds comes from 2008/2009 parcel data layers.

<sup>4</sup>The Coalition will continue MPM at Dry Creek @ Wellsford Rd, Duck Slough @ Hwy 99 and Prairie Flower Drain @ Crows Landing Rd to assess water quality improvements.

**Table 10. Updated Management Practices survey, outreach, implementation and evaluation tracking schedule to reflect status as of April 1, 2012 (based on the table submitted with the ESJWQC schedule extension request submitted on June 5, 2009 and approved on June 8, 2010).**

| PRIORITY SUBWATERSHED<br>EVALUATION OF MANAGEMENT<br>PRACTICES        | DRY CREEK @ WELLSFORD RD     |                            | DUCK SLOUGH @ HWY 99          |                            | PRAIRIE FLOWER DRAIN @ CROWS LANDING RD |                                   |
|-----------------------------------------------------------------------|------------------------------|----------------------------|-------------------------------|----------------------------|-----------------------------------------|-----------------------------------|
|                                                                       | 2009 Schedule                | Status as of April 1, 2012 | 2009 Schedule                 | Status as of April 1, 2012 | 2009 Schedule                           | Status as of April 1, 2012        |
| 1a) Associate baseline survey responses with member APNs.             | Completed                    | Completed                  | Completed                     | Completed                  | Completed                               | Completed                         |
| 1b) Determine number/type of management practices currently in place. | Completed                    | Completed                  | Completed                     | Completed                  | Completed                               | Completed                         |
| 2a) Group Grower Contacts                                             | Completed                    | Completed                  | Completed                     | Completed                  | No grower group contact scheduled       | No grower group contact scheduled |
| 2b) Individual Contacts                                               | February – August 15, 2009   | Completed                  | February – September 30, 2009 | Completed                  | February – September 30, 2009           | Completed                         |
| 3) Implementation of new management practices.                        | October 2009 – April 2010    | Completed <sup>1</sup>     | October 2009 – April 2011     | Completed <sup>1</sup>     | October 2009 – April 2011               | Completed <sup>1</sup>            |
| 4) Assess number/type of new management practices implemented.        | October 2009 - February 2010 | Completed <sup>1</sup>     | October 2009 - February 2010  | Completed <sup>1</sup>     | October 2009 - February 2010            | Completed <sup>1</sup>            |
| 5) Evaluate effectiveness of new management practices.                | April 2009 - February 2011   | Completed <sup>2</sup>     | April 2009 - February 2011    | Completed <sup>2</sup>     | April 2009 - February 2011              | Completed <sup>2</sup>            |

<sup>1</sup>Management practices have been implemented and documented with follow up surveys in all three first priority subwatersheds; however, due to an additional contact in Dry Creek during 2010 (new member) and the potential for additional funding in all three subwatersheds, there may be new management practices implemented in 2011 and 2012 that could improve water quality.

<sup>2</sup> An evaluation of the Coalition's water quality data collected in 2011 compared to implemented management practices in all three subwatersheds can be reviewed in the Evaluation of Management Practice Effectiveness section of this report.



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## Second Priority Subwatersheds (2010 – 2012)

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Performance Goals, measures, outputs and completion dates for second priority subwatersheds are included in Table 11 and were approved by the Regional Board on June 8, 2010.

### **Performance Goal 1: Individually contact members on adjacent properties to waterways where discharges have been identified to fill out surveys.**

One hundred percent of targeted members were contacted by May 30, 2010 as scheduled in the second priority subwatershed Performance Goal 1 (Table 11). The Coalition initiated contacts to second priority subwatershed targeted members with conference calls to discuss member responsibilities, management plan strategies and initiate scheduling of visits with growers (Table 16). Following these conference calls, the Coalition sent mailings to targeted growers in Cottonwood Creek @ Rd 20 and Highline Canal @ Hwy 99 (both on November 10, 2009) and Bear Creek @ Kibby Rd and Duck Slough @ Gurr Rd (both on April 28, 2010) subwatersheds (Table 16). The mailings also informed growers about the Coalition's Management Plan strategy, member responsibilities and requested that growers call the Coalition to schedule meetings for individual interviews.

A total of 55 growers were contacted by May 30, 2010 representing 10,084 acres or 42% of the acreage determined to have the potential for direct drainage in the four second priority subwatersheds (Table 11). Of the four subwatersheds, Duck Slough @ Gurr Rd had the highest percent of acreage represented by contacted growers (46%) followed by Cottonwood Creek @ Rd 20 (45%), Highline Canal @ Hwy 99 (33%) and Bear Creek @ Kibby Rd (31%, Table 11).

### **Performance Goal 2: Establish current practices (beyond established baseline practices) on adjacent properties to waterways or where discharges are identified.**

The Coalition met with and documented current management practices for 100% of targeted growers within the Bear Creek @ Kibby Rd, Cottonwood Creek @ Rd 20, Duck Slough @ Gurr Rd and Highline Canal @ Hwy 99 subwatersheds (Table 11). As detailed in the Management Practices section of this report, surveys document current management practices regarding irrigation management, storm water runoff, erosion and sediment management, pest management and dormant sprays (when applicable). One hundred percent of the management practices documented on the surveys filled out by growers during meetings have been recorded in an Access database (Table 11).

A summary of currently implemented and recommended management practices is included in the Second Priority Subwatersheds Summary of Management Practices section of this report.

### **Performance Goal 3: Encourage growers to implement additional management practices based on water quality results.**

One hundred percent of the management practices recommended to growers to implement in 2010 and 2011 are recorded in an Access database (Table 11). The Coalition submitted an amendment to the 2011 MPUR on June 27, 2011 reporting newly implemented management practices for the second priority subwatersheds based on follow up results that had been received at that time. A summary of

both recommended and newly implemented management practices is included in the Second Priority Subwatersheds Summary of Management Practices section of this report.

**Performance Goal 4: Evaluate effectiveness of the new management practices implemented during years that site is high priority.**

The Coalition conducted MPM in the second high priority site subwatersheds during 2011 and will continue monitoring in 2012 to assess water quality improvements that occurred since these subwatersheds have become high priority. Water quality results for MPM for each subwatershed are included in the High Priority Subwatershed Analysis Appendix I.

The Coalition conducts follow up meetings with growers between February 1 and April 30<sup>th</sup> to determine what management practices were implemented in the previous year (Table 11). The Coalition initiated follow up contacts with growers in April 2011 (April 26 and 28, 2011) to record new practices that were implemented in 2010 and used data gathered from follow up contacts and recent water quality results (2011) to evaluate the effectiveness of management practices (Table 16). The Coalition will conduct MPM at all second high priority sites during 2012 and will update its evaluation of management practice effectiveness to include monitoring results from 2012 in the 2013 MPUR.

Due to additional funds available for structural management practices through a Proposition 84 (Prop 84) grant and other funding sources, it is anticipated that additional management practices may be implemented in these subwatersheds resulting in a reduction of discharges of management plan constituents. The Coalition believes continued MPM during 2012 will provide data to assess if additional funding and additional implemented management practices are improving water quality (see Coalition Wide Evaluation section of this report).

**Performance Goal 5: Consult with the CVRWQCB at least once to discuss Management Plan activities and consider if changes need to be made in the Management Plan strategy for high priority waterbodies.**

The Coalition met with the Regional Board quarterly to discuss Coalition activities in relation to the second high priority subwatersheds in February, May, September and November 2010. Quarterly meeting dates from 2010 were reported in the 2011 MPUR (Table 10, page 30). The Coalition continues to discuss Management Plan activities with the Regional Board during meetings; quarterly meetings held in 2011 are listed in Table 14.

**Table 11. High Priority Performance Goals status for 2010 - 2012 high priority subwatersheds (Cottonwood Creek @ Rd 20, Highline Canal @ Hwy 99, Duck Slough @ Gurr Rd and Bear Creek @ Kibby Rd), approved on June 8, 2010.**

| Performance Goal/Performance Measure                                                                                                                                                                   | Outputs                                                                                                                    | Who                    | STATUS AS OF APRIL 1, 2012 <sup>1</sup> |                                     |                                     |                                     |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------|------------------------|-----------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|
|                                                                                                                                                                                                        |                                                                                                                            |                        | COTTONWOOD CREEK @ Rd 20                | HIGHLINE CANAL @ Hwy 99             | DUCK SLOUGH @ GURR RD               | BEAR CREEK @ KIBBY RD               |
| <b>Performance Goal 1: Individually contact members on adjacent properties to waterways where discharges have been identified to fill out surveys.</b>                                                 |                                                                                                                            |                        |                                         |                                     |                                     |                                     |
| Performance Measure 1.1 – 100% of identified growers contacted to fill out surveys.                                                                                                                    | Report ratio of individual initial contacts made versus total growers identified to contact.                               | Parry Klassen          | 25 of 25 (100%)                         | 10 of 10 (100%)                     | 6 of 6 (100%)                       | 14 of 14 (100%)                     |
| Performance Measure 1.2 – Contact owners/operators representing at least 1,000 acre of membership acreage in the site subwatershed (if subwatershed is greater than 800 acres).                        | Report ratio of acreage represented by individual contacts versus subwatershed acreage determined to have direct drainage. | MLJ-LLC                | 5,768 of 12,940 <sup>2</sup> (45%)      | 368 of 1,106 <sup>2</sup> (33%)     | 2,656 of 5,761 <sup>2</sup> (46%)   | 1,292 of 4,179 <sup>2</sup> (31%)   |
| <b>Performance Goal 2: Establish current practices (beyond established baseline practices) on adjacent properties to waterways or where discharges are identified.</b>                                 |                                                                                                                            |                        |                                         |                                     |                                     |                                     |
| Performance Measure 2.1 – Document current management practices of 100% of identified growers during individual contacts and encourage the adoption of new practices not currently implemented.        | Record in an Access database current management practices used that may reduce agricultural impact on water quality.       | Parry Klassen          | 25 of 25 (100%)                         | 10 of 10 (100%)                     | 6 of 6 (100%)                       | 14 of 14 (100%)                     |
| Performance Measure 2.2 – Document management practices that the identified growers were encouraged to implement.                                                                                      | Summary of management practice evaluations on a site subwatershed level in the Management Plan update.                     | MLJ-LLC                | Complete                                | Complete                            | Complete                            | Complete                            |
| <b>Performance Goal 3: Encourage growers to implement additional management practices based on water quality results.</b>                                                                              |                                                                                                                            |                        |                                         |                                     |                                     |                                     |
| Performance Measure 3.1* –Document (e.g. assess number/type) new management practices implemented by identified growers.                                                                               | Record implemented management practices in an Access database.                                                             | Parry Klassen, MLJ-LLC | Complete                                | Complete                            | Complete                            | Complete                            |
|                                                                                                                                                                                                        | Summary of management practices implemented as a result of individual contacts.                                            | MLJ-LLC                |                                         |                                     |                                     |                                     |
| <b>Performance Goal 4: Evaluate effectiveness of the new management practices implemented during years that site is high priority.</b>                                                                 |                                                                                                                            |                        |                                         |                                     |                                     |                                     |
| Performance Measure 4.1 Update – Assess water quality results from Coalition monitoring location within the priority site subwatershed.                                                                | Summary of water quality data from Management Plan Monitoring.                                                             | MLJ-LLC                | 2011 Summary Complete April 1, 2012     | 2011 Summary Complete April 1, 2012 | 2011 Summary Complete April 1, 2012 | 2011 Summary Complete April 1, 2012 |
| <b>Performance Goal 5: Consult with CVRWQCB at least once to discuss Management Plan activities and consider if changes need to be made in Management Plan strategy for High Priority waterbodies.</b> |                                                                                                                            |                        |                                         |                                     |                                     |                                     |

<sup>1</sup>County overall direct drainage acreage has been updated; acreages has been updated to be more accurate by updating GIS parcel layers (actual parcels did not change).

<sup>2</sup> Overall irrigated direct drainage acreage for 2nd Priority Subwatersheds comes from 2009/2011 parcel data layers.

\*Contacts with growers to determine implemented practices will occur between February 1 and April 30; all information obtained by February 28th will be entered into an Access database and included in the following April 1 Management Plan Update Report; any additional information will be reported on during the quarterly meetings.

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### Third Priority Subwatersheds (2011 – 2013)

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The third high priority subwatersheds include Berenda Slough along Ave 18 ½, Dry Creek @ Rd 18, Livingston Drain @ Robin Ave and Lateral 2 ½ near Keyes Rd. Performance Goals follow the same format as the second high priority subwatershed Performance Goals and were approved on November 17, 2010 (Table 12).

#### **Performance Goal 1: Individually contact members on adjacent properties to waterways where discharges have been identified to fill out surveys.**

The Coalition contacted 100% of targeted growers in the third priority subwatersheds by March 30, 2011 as scheduled (Table 12). Letters were mailed informing growers of member responsibilities and management plan strategies (Table 16). Growers were encouraged to initiate the scheduling of individual contact meetings with the Coalition.

A total of 72 growers were contacted representing 10,974 acres or 44% of the acreage with the potential for direct drainage in the third priority subwatersheds (Table 12). Of the four subwatersheds, Dry Creek @ Rd 18 had the highest percentage of acreage represented by contacted growers (53%), followed by Lateral 2 ½ near Keyes Rd (47%), Berenda Slough along Ave 18 ½ (38%) and Livingston Drain @ Robin Ave (23%, Table 12).

#### **Performance Goal 2: Establish current practices (beyond established baseline practices) on adjacent properties to waterways or where discharges are identified.**

The Coalition met and documented current management practices for 100% of growers within the third priority subwatersheds (Table 12). One hundred percent of the management practices documented on the surveys filled out by growers during meetings are recorded in an Access database (Table 12).

A summary of currently implemented and recommended management practices is included in the Third Priority Subwatersheds Summary of Management Practices section of this report.

#### **Performance Goal 3: Encourage growers to implement additional management practices based on water quality results.**

One hundred percent of the management practices recommended to growers to implement in 2011 and 2012 are recorded in an Access database (Table 12). A summary of recommended management practices is included in the Third Priority Subwatersheds Summary of Management Practices section of this report.

The Coalition contacts growers who received recommendations for additional management practices for follow up between February 1 and April 30<sup>th</sup> to record newly implemented practices (Table 12).

#### **Performance Goal 4: Evaluate effectiveness of the new management practices implemented during years that site is high priority.**

The Coalition conducted Year 1 MPM in the third high priority subwatersheds during 2011. The Coalition Wide Evaluation section of this report discusses the water quality results from 2011 monitoring in the third priority subwatersheds during Year 1. The Coalition will also conduct MPM in the third priority subwatersheds in 2012 to assess changes in water quality.

The Coalition will evaluate the effectiveness of any new management practices implemented in 2011 and 2012 by reviewing monitoring results from previous years compared to results from 2011 and 2012. An interim evaluation of management practice effectiveness will be included in the 2013 MPUR (Table 12). It is anticipated that water quality will improve as new management practices are implemented in 2012 and 2013. If the Coalition is aware of structural management practices that will take longer than two years to implement, this information will be included in the annual updates and may result in an extension to the final evaluation of management practice effectiveness.

**Performance Goal 5: Consult with the CVRWQCB at least once to discuss Management Plan activities and consider if changes need to be made in the Management Plan strategy for high priority waterbodies.**

The Coalition met with the Regional Board quarterly to discuss Coalition activities in relation to the third priority subwatersheds in February, May, August and November 2011 (Table 14). The Coalition continues to discuss Management Plan activities with the Regional Board during meetings.

**Table 12. High Priority Performance Goals status for 2011 - 2013 high priority subwatersheds (Berenda Slough along Ave 18 ½, Dry Creek @ Rd 18, Lateral 2 ½ near Keyes Rd, Livingston Drain @ Robin Ave), approved on November 17, 2010.**

| Performance Goal/Performance Measure                                                                                                                                                            | Outputs                                                                                                                    | Who                   | STATUS AS OF APRIL 1, 2012       |                               |                               |                                 |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------|-----------------------|----------------------------------|-------------------------------|-------------------------------|---------------------------------|
|                                                                                                                                                                                                 |                                                                                                                            |                       | Berenda Slough<br>Along Ave 18 ½ | Dry Creek @ Rd<br>18          | Lateral 2 ½ Near<br>Keyes Rd  | Livingston Drain @<br>Robin Ave |
| Performance Goal 1: Individually contact members on adjacent properties to waterways where discharges have been identified to fill out surveys.                                                 |                                                                                                                            |                       |                                  |                               |                               |                                 |
| Performance Measure 1.1 – 100% of identified growers contacted to fill out surveys.                                                                                                             | Report ratio of individual initial contacts made versus total growers identified to contact.                               | Parry Klassen         | 19 of 19<br>(100%)               | 17 of 17<br>(100%)            | 25 of 25<br>(100%)            | 11 of 11<br>(100%)              |
| Performance Measure 1.2 – Contact owners/operators representing at least 1,000 acre of membership acreage in the site subwatershed (if subwatershed is greater than 800 acres).                 | Report ratio of acreage represented by individual contacts versus subwatershed acreage determined to have direct drainage. | MLJ-LLC               | 4,103 of 10,742<br>(38%)         | 4,710 of 8,914<br>(53%)       | 1,826 of 3,905<br>(47%)       | 335 of 1,430<br>(23%)           |
| Performance Goal 2: Establish current practices (beyond established baseline practices) on adjacent properties to waterways or where discharges are identified.                                 |                                                                                                                            |                       |                                  |                               |                               |                                 |
| Performance Measure 2.1 – Document current management practices of 100% of identified growers during individual contacts and encourage the adoption of new practices not currently implemented. | Record in an Access database current management practices used that may reduce agricultural impact on water quality.       | Parry Klassen         | 19 of 19<br>(100%)               | 17 of 17<br>(100%)            | 25 of 25<br>(100%)            | 11 of 11<br>(100%)              |
| Performance Measure 2.2 – Document management practices that the identified grower were encouraged to implement.                                                                                | Summary of management practice evaluations on a site subwatershed level in the Management Plan update.                     | MLJ-LLC               | Complete<br>April 1, 2012        | Complete<br>April 1, 2012     | Complete<br>April 1, 2012     | Complete<br>April 1, 2012       |
| Performance Goal 3: Encourage growers to implement additional management practices based on water quality results.                                                                              |                                                                                                                            |                       |                                  |                               |                               |                                 |
| Performance Measure 3.1 –Document (e.g. assess number/type) new management practices implemented by identified growers.                                                                         | Record implemented management practices in an Access database.                                                             | Parry Klassen/MLJ-LLC | Complete<br>Feb. 28, 2012*       | Complete<br>Feb. 28, 2012*    | Complete<br>Feb. 28, 2012*    | Complete<br>Feb. 28, 2012*      |
|                                                                                                                                                                                                 | Summary of management practices implemented as a result of individual contacts.                                            | MLJ-LLC               | In Progress:<br>April 1, 2013    | In Progress:<br>April 1, 2013 | In Progress:<br>April 1, 2013 | In Progress:<br>April 1, 2013   |
| Performance Goal 4: Evaluate effectiveness of the new management practices implemented during years that site is high priority.                                                                 |                                                                                                                            |                       |                                  |                               |                               |                                 |
| Performance Measure 4.1 Update – Assess water quality results from Coalition monitoring location within the priority site subwatershed.                                                         | Summary of water quality data from Management Plan Monitoring.                                                             | MLJ-LLC               | In Progress:<br>April 1, 2013    | In Progress:<br>April 1, 2013 | In Progress:<br>April 1, 2013 | In Progress:<br>April 1, 2013   |
| Performance Goal 5: Consult with CVRWQCB at least once to discuss Management Plan activities and consider if changes need to be made in Management Plan strategy for High Priority waterbodies. |                                                                                                                            |                       |                                  |                               |                               |                                 |

<sup>1</sup>Overall irrigated direct drainage acreage for 3rd Priority Subwatersheds comes from 2006-2011 parcel data layers.

\*Contacts with growers to determine implemented practices will occur between February 1 and April 30; all information obtained by February 28<sup>th</sup> will be entered into an Access database and included in the following April 1 Management Plan Update Report; any additional information will be reported on during the quarterly meetings.

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## Fourth Priority Subwatersheds (2012 – 2014)

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Performance Goals for the next high priority site subwatersheds (Black Rascal Creek @ Yosemite Rd, Deadman Creek @ Gurr Rd, Deadman Creek @ Hwy 59 and Hilmar Drain @ central Ave) were approved on November 14, 2011 and follow the same format as Performance Goals for the second and third set of high priority subwatersheds (Table 13).

### **Performance Goal 1: Individually contact members on adjacent properties to waterways where discharges have been identified to fill out surveys.**

On January 24, 2011, targeted growers in Black Rascal Creek @ Yosemite Rd (one grower), Deadman Creek @ Gurr Rd (two growers), Deadman Creek @ Hwy 59 (eight growers) and Hilmar Drain @ Central Ave (three growers) were mailed initial contact letters (Table 16). As outlined in the fourth Priority Subwatersheds Summary of Management Practices section of this report, the contact letters informed growers of member responsibilities, management plan strategies and initiated the scheduling of individual meetings. All initial contacts were complete before March 30, 2012 (Table 13).

### **Performance Goal 2: Establish current practices (beyond established baseline practices) on adjacent properties to waterways or where discharges are identified.**

The Coalition is in the process of meeting with fourth priority growers to complete surveys that record currently implemented and recommended management practices (Table 13). To address the water quality impairments in the fourth priority subwatersheds, the Coalition is concerned with management practices that apply to irrigation water management, storm water runoff, erosion and sediment management, pest management and dormant sprays (when applicable). Upon completion, all surveys will be entered into an Access database.

### **Performance Goal 3: Encourage growers to implement additional management practices based on water quality results.**

After the Coalition meets with targeted growers individually and discusses local water quality concerns, sufficient time is allowed for growers to implement new management practices before follow up. The Coalition will follow up with growers in the fourth priority subwatersheds between February 1 and April 30, 2013 to document newly implemented management practices and will report its findings in future MPURs submitted annually on April 1 (Table 13). If the Coalition is aware of structural management practices that will take longer than two years to implement, this information will be included in the annual updates and may result in an extension to the final evaluation of management practice effectiveness.

### **Performance Goal 4: Evaluate effectiveness of the new management practices implemented during years that site is high priority.**

The Coalition is conducting MPM in the fourth high priority sites during 2012 through 2014 to assess changes in water quality (Deadman Creek @ Hwy 59 is scheduled for Assessment Monitoring in 2012 during which all management plan constituents will be analyzed monthly). If management practices are implemented in time for 2012 MPM to document improved water quality, the Coalition will submit an interim evaluation for the third priority subwatersheds in the 2013 MPUR and a final evaluation will be

included in the 2014 MPUR (Table 13). It is anticipated that water quality will improve as new management practices are implemented. If the Coalition is aware of structural management practices that will take longer than two years to implement, this information will be included in the annual updates and may result in an extension to the final evaluation of management practice effectiveness.

**Performance Goal 5: Consult with the CVRWQCB at least once to discuss Management Plan activities and consider if changes need to be made in the Management Plan strategy for high priority waterbodies.**

Quarterly meetings with the Regional Board to discuss Coalition activities have been scheduled for 2012 (Table 15). The Coalition has already met with Regional Board staff on March 1, 2012 for its first quarterly meeting.

All Coalition activities related to outreach (including mailings, grower meetings, individual meetings, etc.), in the first, second, third and forth priority subwatersheds are listed in Table 16.



**Table 13. High Priority Performance Goals status for 2012 - 2014 high priority subwatersheds (Black Rascal Creek @ Yosemite Rd, Deadman Creek @ Gurr Rd, Deadman Creek @ Hwy 59 and Hilmar Drain @ Central Ave), approved on November 14, 2011.**

| Performance Goal/Performance Measure                                                                                                                                                                   | Outputs                                                                                                                    | Who                       | STATUS AS OF APRIL 1, 2012 <sup>1</sup>   |                                           |                                             |                                           |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------|---------------------------|-------------------------------------------|-------------------------------------------|---------------------------------------------|-------------------------------------------|
|                                                                                                                                                                                                        |                                                                                                                            |                           | BLACK RASCAL CREEK @ YOSEMITE RD          | DEADMAN CREEK @ GURR RD                   | DEADMAN CREEK @ HWY 59                      | HILMAR DRAIN @ CENTRAL AVE                |
| <b>Performance Goal 1: Individually contact members on adjacent properties to waterways where discharges have been identified to fill out surveys.</b>                                                 |                                                                                                                            |                           |                                           |                                           |                                             |                                           |
| Performance Measure 1.1 – 100% of identified growers contacted to fill out surveys.                                                                                                                    | Report ratio of individual initial contacts made versus total growers identified to contact.                               | Parry Klassen             | <b>1 of 1</b><br>(100%)<br>March 30, 2012 | <b>2 of 2</b><br>(100%)<br>March 30, 2012 | <b>8 of 8</b><br>(100%)<br>March 30, 2012   | <b>3 of 3</b><br>(100%)<br>March 30, 2012 |
| Performance Measure 1.2 – Contact owners/operators in the site subwatershed with direct drainage membership acreage.                                                                                   | Report ratio of acreage represented by individual contacts versus subwatershed acreage determined to have direct drainage. | MLJ-LLC                   | <b>301 of 1,844</b><br>(16%)              | <b>240 of 2,909</b><br>(8%)               | <b>3,414 of 11,501<sup>2</sup></b><br>(30%) | <b>455 of 1,230</b><br>(37%)              |
| <b>Performance Goal 2: Establish current practices (beyond established baseline practices) on adjacent properties to waterways or where discharges are identified.</b>                                 |                                                                                                                            |                           |                                           |                                           |                                             |                                           |
| Performance Measure 2.1 – Document current management practices of 100% of identified growers during individual contacts and encourage the adoption of new practices not currently implemented.        | Record in an Access database current management practices used that may reduce agricultural impact on water quality.       | Parry Klassen             | <b>In Progress:</b><br>July 30, 2012      | <b>In Progress:</b><br>July 30, 2012      | <b>In Progress:</b><br>July 30, 2012        | <b>In Progress:</b><br>July 30, 2012      |
| Performance Measure 2.2 – Document management practices that the identified grower were encouraged to implement.                                                                                       | Summary of management practice evaluations on a site subwatershed level in the Management Plan update.                     | MLJ-LLC                   | <b>In Progress:</b><br>August 30, 2012    | <b>In Progress:</b><br>August 30, 2012    | <b>In Progress:</b><br>August 30, 2012      | <b>In Progress:</b><br>August 30, 2012    |
| <b>Performance Goal 3: Encourage growers to implement additional management practices based on water quality results.</b>                                                                              |                                                                                                                            |                           |                                           |                                           |                                             |                                           |
| Performance Measure 3.1 –Document (e.g. assess number/type) new management practices implemented by identified growers.                                                                                | Record implemented management practices in an Access database.                                                             | Parry Klassen/<br>MLJ-LLC | <b>In Progress:</b><br>Feb. 28, 2013*     | <b>In Progress:</b><br>Feb. 28, 2013*     | <b>In Progress:</b><br>Feb. 28, 2013*       | <b>In Progress:</b><br>Feb. 28, 2013*     |
|                                                                                                                                                                                                        | Summary of management practices implemented as a result of individual contacts.                                            | MLJ-LLC                   | <b>In Progress:</b><br>April 1, 2013/2014 | <b>In Progress:</b><br>April 1, 2013/2014 | <b>In Progress:</b><br>April 1, 2013/2014   | <b>In Progress:</b><br>April 1, 2013/2014 |
| <b>Performance Goal 4: Evaluate effectiveness of the new management practices implemented during years that site is high priority.</b>                                                                 |                                                                                                                            |                           |                                           |                                           |                                             |                                           |
| Performance Measure 4.1 Update – Assess water quality results from Coalition monitoring location within the priority site subwatershed.                                                                | Summary of water quality data from Management Plan Monitoring.                                                             | MLJ-LLC                   | <b>In Progress:</b><br>April 1, 2013/2014 | <b>In Progress:</b><br>April 1, 2013/2014 | <b>In Progress:</b><br>April 1, 2013/2014   | <b>In Progress:</b><br>April 1, 2013/2014 |
| <b>Performance Goal 5: Consult with CVRWQCB at least once to discuss Management Plan activities and consider if changes need to be made in Management Plan strategy for High Priority waterbodies.</b> |                                                                                                                            |                           |                                           |                                           |                                             |                                           |

<sup>1</sup>Overall irrigated direct drainage acreage for 4th Priority Subwatersheds comes from 2011 parcel data layers.

<sup>2</sup>Overall irrigated direct drainage acreage for Deadman Creek @ Hwy 59 represents the Merced County portion of the subwatershed only.

\*Contacts with growers to determine implemented practices will occur between February 1 and April 30; all information obtained by February 28<sup>th</sup> will be entered into an Access database and included in the following April 1 Management Plan Update Report; any additional information will be reported on during the quarterly meetings.

**Table 14. 2011 Regional Board Quarterly Meeting dates.**

| <b>QUARTERLY MEETINGS</b> | <b>MEETING DATE</b> |
|---------------------------|---------------------|
| First Quarter Meeting     | February 8, 2011    |
| Second Quarter Meeting    | May 3, 2011         |
| Third Quarter Meeting     | August 2, 2011      |
| Fourth Quarterly Meeting  | November 2, 2011    |

**Table 15. 2012 Regional Board Quarterly Meeting dates (subject to change).**

| <b>QUARTERLY MEETINGS</b> | <b>MEETING DATE</b> |
|---------------------------|---------------------|
| First Quarter Meeting     | March 1, 2012       |
| Second Quarter Meeting    | June 5, 2012        |
| Third Quarter Meeting     | TBD                 |
| Fourth Quarterly Meeting  | TBD                 |

TBD-To be determined

**Table 16. Coalition outreach in high priority subwatersheds.**

Categories of outreach include Management Practice Tracking, Best Management Practice (BMP) Outreach and Education, Grower Notification, Collaborations and Special Studies.

| AREA                                                                      | DATE                  | CATEGORY                                                         | DETAILS                                                                                                                                                                                                                                                                                                                                                                                                    | WHO                                                                                                                                        |
|---------------------------------------------------------------------------|-----------------------|------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------|
| Dry Creek @ Wellsford (1st P)                                             | January - August 2009 | Management Practice Tracking, BMP Outreach and Education         | Individual contact with targeted growers in Dry Creek subwatershed (current management practice evaluation).                                                                                                                                                                                                                                                                                               | Parry Klassen, Wayne Zipser                                                                                                                |
| Duck Slough @ Hwy 99 (1st P)                                              | May - August 2009     | Management Practice Tracking, BMP Outreach and Education         | Individual contact with targeted growers in Duck Slough (above Hwy 99) subwatershed (current management practice evaluation).                                                                                                                                                                                                                                                                              | Parry Klassen, Wayne Zipser                                                                                                                |
| Prairie Flower Drain (1st P)                                              | June - September 2009 | Management Practice Tracking, BMP Outreach and Education         | Individual contact with targeted growers in Prairie Flower Drain subwatershed (current management practice evaluation).                                                                                                                                                                                                                                                                                    | Parry Klassen, Wayne Zipser                                                                                                                |
| Dry Creek @ Wellsford, Duck Slough @ Hwy 99, Prairie Flower Drain (1st P) | 4-Jun-09              | Management Practice Tracking, Grower Notification                | Mailing to 25 members in high priority site subwatersheds to notify members that individual meetings are required for 100% of growers near or adjacent to the waterways and members are responsible for scheduling individual contact meetings via provided contact information in mailing. Additionally, an email containing the same information was sent to 13 high priority members on June 1, 2009.   | Parry Klassen, Wayne Zipser                                                                                                                |
| Dry Creek @ Wellsford, Duck Slough @ Hwy 99, Prairie Flower Drain (1st P) | 23-Jun-09             | Management Practice Tracking, Grower Notification                | Follow-up mailing to June 4 mailing regarding scheduling individual meetings; sent to all growers who had not yet scheduled an individual meeting urging members to do so and providing in a supplementary Regional Board letter an explanation of the consequences for members and the Coalition if the meetings are not conducted.                                                                       | Parry Klassen, Wayne Zipser                                                                                                                |
| Stanislaus and Merced Counties                                            | 30-Jul-09             | Management Practice Tracking, Collaborations and Special Studies | USDA announced Jul. 30, 2009 an award of \$2 million annually over 5 years (\$10 million total) funded by the Agricultural Water Enhancement Program (AWEP) created in the 2008 Farm Bill. The money will aid in installation of Management Practices and be directed to farms and dairies with operations bordering waterways within subwatersheds covered by Management Plans in the two county regions. | Parry Klassen/CURES; ESJQWC; Westside San Joaquin River Watershed Coalition; NRCS; West and East Stanislaus Resource Conservation District |
| Dry Creek @ Wellsford, Duck Slough @ Hwy 99, Prairie Flower Drain (1st P) | 6-Aug-09              | Management Practice Tracking, Grower Notification                | Mailing to 226 members in high priority subwatersheds announcing that the USDA recently approved \$2 million annually in grants over the next 5 years for projects intended to improve water quality of waterways in Stanislaus and Merced counties; includes details of eligibility, requirements, and application process.                                                                               | Parry Klassen                                                                                                                              |
| Cottonwood Creek (2nd P)                                                  | 14-Oct-09             | Management Practice Tracking, Grower Notification                | Letter mailed to all members with parcels adjacent to Cottonwood Creek announcing two conference call meetings (Oct. 21st @ 11AM and Oct. 22nd @ 4PM) to inform growers about requirements for and initiate the scheduling of individual contact meetings.                                                                                                                                                 | Parry Klassen, Wayne Zipser                                                                                                                |
| Cottonwood Creek (2nd P)                                                  | 21 and 22-Oct-09      | Management Practice Tracking, BMP Outreach and Education         | Conference call meeting to inform growers about the Cottonwood Creek Management Plan, specifically member participation requirements and to initiate the scheduling of individual contact meetings. A total of four members were represented.                                                                                                                                                              | Parry Klassen                                                                                                                              |
| Cottonwood Creek, Highline Canal @ Hwy 99 (2nd P)                         | 10-Nov-09             | Management Practice Tracking, Grower Notification                | Mailing to all targeted Cottonwood Creek members who did not participate in the conference call and to all targeted Highline Canal @ Hwy 99 members to inform growers of the need to schedule individual meetings.                                                                                                                                                                                         | Parry Klassen, Wayne Zipser                                                                                                                |
| Duck Slough @ Hwy 99 (1st P)                                              | 9-Feb-10              | Management Practice Tracking, Grower Notification                | Duck Slough Follow-Up to 2009 Individual Contacts Meeting Announcement Mailing: sent to all members who participated in an individual meeting during 2009.                                                                                                                                                                                                                                                 | Parry Klassen                                                                                                                              |
| Dry Creek @ Wellsford (1st P)                                             | 15-Feb-10             | Management Practice Tracking, Grower Notification                | Dry Creek Follow-Up to 2009 Individual Contacts Meeting Announcement Mailing: sent to all members who participated in an individual meeting during 2009.                                                                                                                                                                                                                                                   | Parry Klassen                                                                                                                              |

| AREA                                                                                                                       | DATE                    | CATEGORY                                                 | DETAILS                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | WHO                         |
|----------------------------------------------------------------------------------------------------------------------------|-------------------------|----------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------|
| Prairie Flower Drain (1st P)                                                                                               | 17-Feb-10               | Management Practice Tracking, Grower Notification        | Prairie Flower Drain Follow-Up to 2009 Individual Contacts Meeting Announcement Mailing: sent to all members who participated in an individual meeting during 2009.                                                                                                                                                                                                                                                                                                                                       | Parry Klassen               |
| Duck Slough @ Hwy 99 (1st P)                                                                                               | 19-Feb-10               | Management Practice Tracking, BMP Outreach and Education | Duck Slough Follow-Up to 2009 Individual Contacts Grower Meeting: 11 members in attendance. By using the Turning Interactive Survey Devices, assessed implementation of management practices since individual contact meetings in 2009.                                                                                                                                                                                                                                                                   | Parry Klassen, Wayne Zipser |
| Dry Creek @ Wellsford (1st P)                                                                                              | 26-Feb-10               | Management Practice Tracking, BMP Outreach and Education | Dry Creek Follow-Up to 2009 Individual Contacts Grower Meeting: 13 members in attendance. By using the Turning Interactive Survey Devices, assessed implementation of management practices since individual contact meetings in 2009.                                                                                                                                                                                                                                                                     | Parry Klassen, Wayne Zipser |
| Dry Creek @ Wellsford, Duck Slough @ Hwy 99, Prairie Flower Drain (1st P)                                                  | 1-Mar through 4-Aug-10  | Management Practice Tracking, BMP Outreach and Education | Phone call to assess management practice implementation of all targeted members with recommended practices for 2009 that did not attend their respective subwatershed follow-up meeting (8 members total).                                                                                                                                                                                                                                                                                                | Parry Klassen               |
| Prairie Flower Drain (1st P)                                                                                               | 19-Mar-10               | Management Practice Tracking, BMP Outreach and Education | Prairie Flower Drain Follow-Up to 2009 Individual Contacts Grower Meeting: 3 members in attendance. By using the Turning Interactive Survey Devices, assessed implementation of management practices since individual contact meetings in 2009.                                                                                                                                                                                                                                                           | Parry Klassen, Wayne Zipser |
| Bear Creek @ Kibby, Duck Slough @ Gurr (2nd P)                                                                             | 28-Apr-10               | Management Practice Tracking, Grower Notification        | Individual Contacts Meeting Announcement Mailing: 13 growers in Bear Creek @ Kibby subwatershed and 6 growers in Duck Slough @ Gurr subwatershed. Letter mailed to notify growers of the management plan high priority tracking process and that they need to schedule an individual meeting with Parry Klassen or Wayne Zipser.                                                                                                                                                                          | Parry Klassen, Wayne Zipser |
| Dry Creek @ Wellsford, Duck Slough @ Hwy 99, Prairie Flower Drain (1st P)                                                  | 24-Aug-10               | Management Practice Tracking, Grower Notification        | Results from Individual Contact Meeting Confirmation Mailing: sent to all members whom participated in individual contacts. The mailing summarized management practice implementations and recommendations recorded during each grower's Individual Contact Meeting. Growers reviewed their responses for accuracy and made corrections if necessary.                                                                                                                                                     | Parry Klassen               |
| Lateral 2 1/2 @ Keyes Rd, Livingston Drain @ Robin Ave, Bear Creek @ Kibby, Dry Creek @ Wellsford Rd (1st, 2nd, and 3rd P) | 8-Nov-10                | Management Practice Tracking, Grower Notification        | Individual Contacts Meeting Announcement Mailing: 27 growers in Lateral 2 1/2 @ Keyes Rd subwatershed (1st portion), 11 growers in Livingston Drain @ Robin Ave subwatershed, 3 growers in Bear Creek @ Kibby subwatershed (additional members), and 2 growers in Dry Creek @ Wellsford subwatershed (additional members). Letter mailed to notify growers of the management plan high priority tracking process and that they need to schedule an individual meeting with Parry Klassen or Wayne Zipser. | Parry Klassen, Wayne Zipser |
| Dry Creek @ Rd 18 (3rd P)                                                                                                  | 22-Nov-10               | Management Practice Tracking, Grower Notification        | Individual Contacts Meeting Announcement Mailing: 18 growers in Dry Creek @ Road 18 subwatershed. Letter mailed to notify growers of the management plan high priority tracking process and that they need to schedule an individual meeting with Parry Klassen or Wayne Zipser.                                                                                                                                                                                                                          | Parry Klassen, Wayne Zipser |
| Dry Creek @ Wellsford and Duck Slough @ Hwy 99 (1st P)                                                                     | 5-Jan through 28-Feb-11 | Management Practice Tracking, BMP Outreach and Education | Phone call to assess management practice implementation of all targeted members with recommended practices for 2010 (8 members total).                                                                                                                                                                                                                                                                                                                                                                    | Wayne Zipser                |
| Highline Canal @ Hwy 99 (2nd P)                                                                                            | 1-Feb-11                | Management Practice Tracking, Grower Notification        | Highline Canal @ Hwy 99 Follow-Up to Individual Contacts (Initial) Meeting Announcement Mailing: sent to 9 members who participated in an individual meeting during 2009 and 2010. Meeting rescheduled to better accommodate growers' schedules.                                                                                                                                                                                                                                                          | Parry Klassen, Wayne Zipser |

| AREA                                                                                  | DATE      | CATEGORY                                                 | DETAILS                                                                                                                                                                                                                                                                                                                                                                                                                                 | WHO                         |
|---------------------------------------------------------------------------------------|-----------|----------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------|
| Cottonwood Creek (2nd P)                                                              | 15-Feb-11 | Management Practice Tracking, Grower Notification        | Cottonwood Creek Follow-Up to Individual Contacts (Initial) Meeting Announcement Mailing: sent to 24 members who participated in an individual meeting during 2009 and 2010. Meeting rescheduled to better accommodate growers' schedules.                                                                                                                                                                                              | Parry Klassen, Wayne Zipser |
| Bear Creek and Duck Slough @ Gurr (2nd P)                                             | 16-Feb-11 | Management Practice Tracking, Grower Notification        | Bear Creek and Duck Slough @ Gurr Follow-Up to Individual Contacts (Initial) Meeting Announcement Mailing: sent to 14 and 6 members, respectively, who participated in an individual meeting during 2009 and 2010. Meeting rescheduled to better accommodate growers' schedules.                                                                                                                                                        | Parry Klassen, Wayne Zipser |
| Berenda Slough (3rd P)                                                                | 9-Mar-11  | Management Practice Tracking, Grower Notification        | Berenda Slough Individual Contacts Meeting Announcement Mailing: sent to 22 targeted growers. Alerted targeted members of the Management Plan high priority tracking process and the need to schedule an individual meeting with Parry Klassen or Wayne Zipser.                                                                                                                                                                         | Parry Klassen, Wayne Zipser |
| Cottonwood Creek (2nd P)                                                              | 14-Apr-11 | Management Practice Tracking, Grower Notification        | Rescheduled Cottonwood Creek Follow-Up to Individual Contacts Meeting Announcement Mailing: sent to all members who participated in an individual meeting during 2009 and 2010.                                                                                                                                                                                                                                                         | Parry Klassen, Wayne Zipser |
| Bear Creek, Duck Slough @ Gurr, Highline Canal @ Hwy 99 (2nd P)                       | 14-Apr-11 | Management Practice Tracking, Grower Notification        | Rescheduled Bear Creek, Duck Slough @ Gurr, and Highline Canal @ Hwy 99 Follow-Up to Individual Contacts Meeting Announcement Mailing: sent to all members who participated in an individual meeting during 2009 and 2010.                                                                                                                                                                                                              | Parry Klassen, Wayne Zipser |
| Cottonwood Creek (2nd P)                                                              | 26-Apr-11 | Management Practice Tracking, BMP Outreach and Education | Rescheduled Cottonwood Creek Follow Up to Individual Contacts Grower Meeting: 14 growers were represented in attendance. By using the Turning Interactive Survey Devices, assessed implementation of management practices since individual contact meetings in 2009 and 2010.                                                                                                                                                           | Parry Klassen, Wayne Zipser |
| Bear Creek, Duck Slough @ Gurr, Highline Canal @ Hwy 99 (2nd P)                       | 28-Apr-11 | Management Practice Tracking, BMP Outreach and Education | Rescheduled Bear Creek, Duck Slough @ Gurr, and Highline Canal @ Hwy 99 Follow Up to Individual Contacts Grower Meeting: 3, 4, and 3 growers from each subwatershed were represented in attendance, respectively. By using the Turning Interactive Survey Devices, assessed implementation of management practices since individual contact meetings in 2009 and 2010.                                                                  | Parry Klassen, Wayne Zipser |
| Bear Creek, Cottonwood Creek, Duck Slough @ Gurr, and Highline Canal @ Hwy 99 (2nd P) | 11-May-11 | Management Practice Tracking, BMP Outreach and Education | Bear Creek, Cottonwood Creek, Duck Slough @ Gurr, and Highline Canal @ Hwy 99 Follow Up to Individual Contacts Email: 7, 3, 1, and 4 growers from each subwatershed, respectively, completed the Online Follow Up Survey Form assessing implementation of new management practices.                                                                                                                                                     | Parry Klassen, Wayne Zipser |
| Bear Creek, Cottonwood Creek, Duck Slough @ Gurr, and Highline Canal @ Hwy 99 (2nd P) | 20-May-11 | Management Practice Tracking, BMP Outreach and Education | Bear Creek, Cottonwood Creek, Duck Slough @ Gurr, and Highline Canal @ Hwy 99 Follow Up to Individual Contacts Mailing: 4, 5, 1, and 1 growers from each subwatershed, respectively, completed and returned the Follow Up Survey assessing implementation of new management practices.                                                                                                                                                  | Parry Klassen, Wayne Zipser |
| Bear Creek, Cottonwood Creek, Duck Slough @ Gurr, and Highline Canal @ Hwy 99 (2nd P) | 1-Jun-11  | Management Practice Tracking, Grower Notification        | Bear Creek, Cottonwood Creek, Duck Slough @ Gurr, and Highline Canal @ Hwy 99 Follow Up to Individual Contacts - Final Attempt to Contact Mailing: sent to 9, 7, 2, and 4 members, respectively. Letter reminded members of their responsibility to provide the Coalition with requested management practice information and indicated if a response was not received by July 31, 2011, the member would be dropped from the Coalition. | Parry Klassen, Wayne Zipser |

| AREA                                                                                       | DATE      | CATEGORY                                          | DETAILS                                                                                                                                                                                                                                                                                                                                                            | WHO                         |
|--------------------------------------------------------------------------------------------|-----------|---------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------|
| Livingston Drain @ Robin Ave (3rd P)                                                       | 7-Nov-11  | Management Practice Tracking, Grower Notification | Livingston Drain @ Robin Ave Initial Contact Grower Survey - Final Attempt to Contact Mailing: sent to 7 growers. Letter reminded members of their responsibility to provide the Coalition with requested management practice information and indicated if a response was not received by Nov. 30, 2011, the member would be dropped from the Coalition.           | Parry Klassen, Wayne Zipser |
| Berenda Slough, Dry Creek @ Rd 18, Lateral 2 1/2, and Livingston Drain (3rd P)             | 15-Nov-11 | Management Practice Tracking, Grower Notification | 3rd Priority Results from Individual Contact Meeting Confirmation Mailing: sent to all members whom participated in individual contacts. The mailing summarized management practice implementations and recommendations recorded during each grower's Individual Contact Meeting. Growers reviewed their responses for accuracy and made corrections if necessary. | Parry Klassen, Wayne Zipser |
| Black Rascal Creek, Deadman Creek @ Gurr, Deadman Creek @ Hwy 59, and Hilmar Drain (4th P) | 24-Jan-12 | Management Practice Tracking, Grower Notification | Individual Contacts Meeting Announcement Mailing: sent to 1, 2, 8, and 4 targeted growers in Black Rascal Creek, Deadman Creek @ Gurr, Deadman Creek @ Hwy 59, and Hilmar Drain, respectively. Alerted targeted members of the Management Plan high priority tracking process and the need to schedule an individual meeting with Parry Klassen or Wayne Zipser.   | Parry Klassen, Wayne Zipser |

## MANAGEMENT PRACTICES

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The Coalition documents current management practices, recommended management practices and newly implemented practices based on individual contacts and survey results for each high priority site subwatershed. The Coalition identified eight general classifications of management practices that would be effective at reducing the impacts of agricultural discharges on water quality including:

1. Reduction in application rates,
2. Spray drift management,
3. Change to low risk products,
4. Polyacrylamide (PAM),
5. Drip or microspray irrigation,
6. Recirculation/tailwater return system,
7. Retention pond/holding basin, and
8. Grass waterways or grass filter strips.

The non structural practices (practices 1-4) can be implemented sooner than structural practices (practices 5-8) as structural practices may require the grower secure additional resources for implementation. The Coalition makes various efforts to inform growers of resources available for management practice implementation (discussed in past AMRs in the Actions Taken to Address Exceedances sections and summarized briefly in the Evaluation of Management Practice Effectiveness). In addition, the Coalition was mindful of the practice implementation timeline as it planned its strategy and schedule to contact growers.

The Coalition successfully completed contacts and outreach in the first priority subwatersheds (Dry Creek @ Wellsford Rd, Duck Slough @ Hwy 99 and Prairie Flower Drain @ Crows Landing Rd). The 2011 MPUR contained a final evaluation of current and recommended practices for all three subwatersheds as well as a final evaluation of newly implemented practices in the Prairie Flower Drain @ Crows Landing Rd subwatershed. However, because additional follow up contacts had yet to be completed in the Dry Creek @ Wellsford Rd and Duck Slough @ Hwy 99, only a preliminary analysis of newly implemented practices for those two subwatersheds was included in the 2011 MPUR. The following sections contain the final analysis of newly implemented management practices in the Dry Creek @ Wellsford Rd and Duck Slough @ Hwy 99 subwatersheds as well as a brief summary of focused outreach in the Prairie Flower Drain @ Crows Landing Rd subwatershed.

In the fall of 2009, the Coalition began contacting members in the second priority subwatersheds (Bear Creek @ Kibby Rd, Cottonwood Creek @ Rd 20, Duck Slough @ Gurr Rd and Highline Canal @ Hwy 99). The Coalition reported a preliminary analysis of current and recommended management practices in the 2011 MPUR. Follow up meetings with growers to identify practices implemented in 2010 occurred during the spring of 2011 and were completed by end of the 2011 irrigation season. Per the Regional Board's request, the Coalition submitted an interim summary of follow up contacts in an amendment to

the 2011 MPUR (submitted June 27, 2011). The following sections contain a final analysis of the current, recommended and newly implemented management practices based on survey information and follow up contacts with growers in the second priority subwatersheds.

In the fall of 2010 and winter of 2011, the Coalition began individual contacts with members in the third priority subwatersheds (Berenda Slough along Ave 18 1/2, Dry Creek @ Rd 18, Lateral 2 ½ near Keyes Rd and Livingston Drain @ Robin Ave). Individual meetings with 100% of targeted growers were completed during 2011. The following sections provide a preliminary analysis of the current and recommended practices in third priority subwatersheds, and a complete analysis of the third priority subwatersheds implemented practices will be included in the 2013 MPUR.

The Coalition initiated focused outreach in the fourth priority subwatersheds (Black Rascal Creek @ Yosemite Rd, Deadman Creek @ Gurr Rd, Deadman Creek @ Hwy 59 and Hilmar Drain @ Central Ave). The Coalition compiled a targeted grower list of members who farm property with the potential to drain to the creek and who apply or have applied constituents of concern. In the winter of 2012, letters outlining the management plan process and responsibilities of Coalition members (including scheduling an on-site visit with a Coalition representative) were mailed to growers in the Black Rascal Creek @ Yosemite Rd (1), Deadman Creek @ Gurr Rd (2), Deadman Creek @ Hwy 59 (8) and Hilmar Drain @ Central Ave (3) subwatersheds. The Coalition is scheduling meetings with targeted growers to assess their current operations and discuss water quality concerns. Current and recommended management practices will be reported in the 2013 MPUR.

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## SUMMARY OF FOCUSED OUTREACH IN PRIORITY SUBWATERSHEDS

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The Coalition completed its focused outreach strategy in the first and second priority subwatersheds, which includes recommending applicable management practices to improve water quality and recording newly implemented practices.

The Coalition recommended growers implement management practices designed to address Pest Management / Dormant Spray Management (blue shades; accounted for 4,436 acres or 49% of all recommended acreage), Irrigation Water Management (green shades; accounted for 602 acres or 7% of all recommended acreage) and Irrigation Water Management / Storm Drainage / Erosion & Sediment Management (red/orange shades; accounted for 3,848 acres or 26% of all recommended acreage Figure 5). Several practices are designed to address multiple aspects of agricultural operations (i.e. filter strips aid in irrigation tailwater management and reducing erosion).

Pest Management / Dormant Spray Management practices were the most common practices implemented in the first and second priority subwatershed and accounted for 3,536 acres (39% of acreage with newly implemented practices; Figure 6, blue shades). Irrigation Water Management practices were implemented on 2,861 acres. These practices also indirectly affect storm drainage and erosion and sediment management (e.g. use of PAM to increase infiltration rates also reduces or eliminates irrigation tailwater; Figure 6, green shades). Practices designed to address Irrigation Water



Management / Storm Drainage / Erosion & Sediment Management were implemented to 2,516 acres (28% of acreage with newly implemented practices; Figure 6, red/orange shades).

During follow up contacts, particularly in the second priority subwatersheds, Coalition representatives noted the most common reason growers were unable to implement recirculation/tailwater return systems and drainage basins/sediment ponds (two of the more expensive recommended management practices) was due to the lack of resources. In an effort to assist growers in securing financial resources, the Coalition will continue to provide members with additional information regarding funding opportunities for management practice implementation (Agricultural Water Enhancement Program (AWEP), Environmental Incentives Program (EQIP), and Prop 84 money) and will continue to encourage growers to take advantage of such opportunities. In addition, growers that indicated on their follow up surveys that they were interested in additional information about funding (2011 MPUR, page 69 and Table 18, Question 19 and amendment to the 2011 MPUR, page 2 and Table 1, Question 23) will be contacted directly by a Coalition representative to assist in their individual operation's needs. More information regarding financial resources for management practice implementation is contained in the Coalition Wide Evaluation section.

**Figure 5. First and second priority subwatershed percentage of acreage associated with each recommended management practice.**

Pest Management / Dormant Spray Management practices (blue shades); Irrigation Water Management practices (green shades) Irrigation Water Management / Storm Drainage / Erosion & Sediment Management practices (red/orange shades) are included. Figure does not include the acreages associated with "Other" which reflect a management practices not listed in the follow up survey; refer to each site subwatershed's analysis of implemented practices in the sections below.

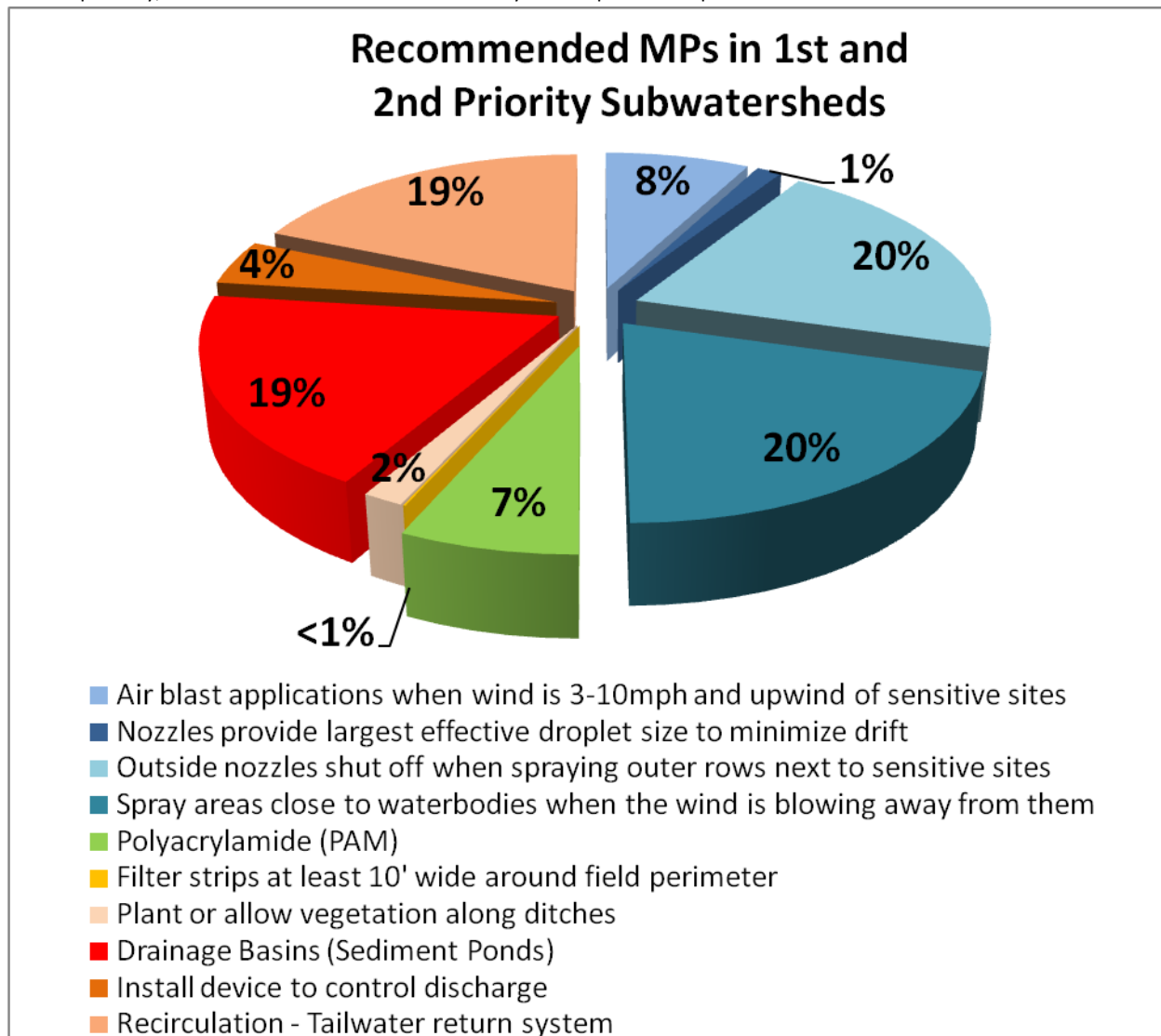
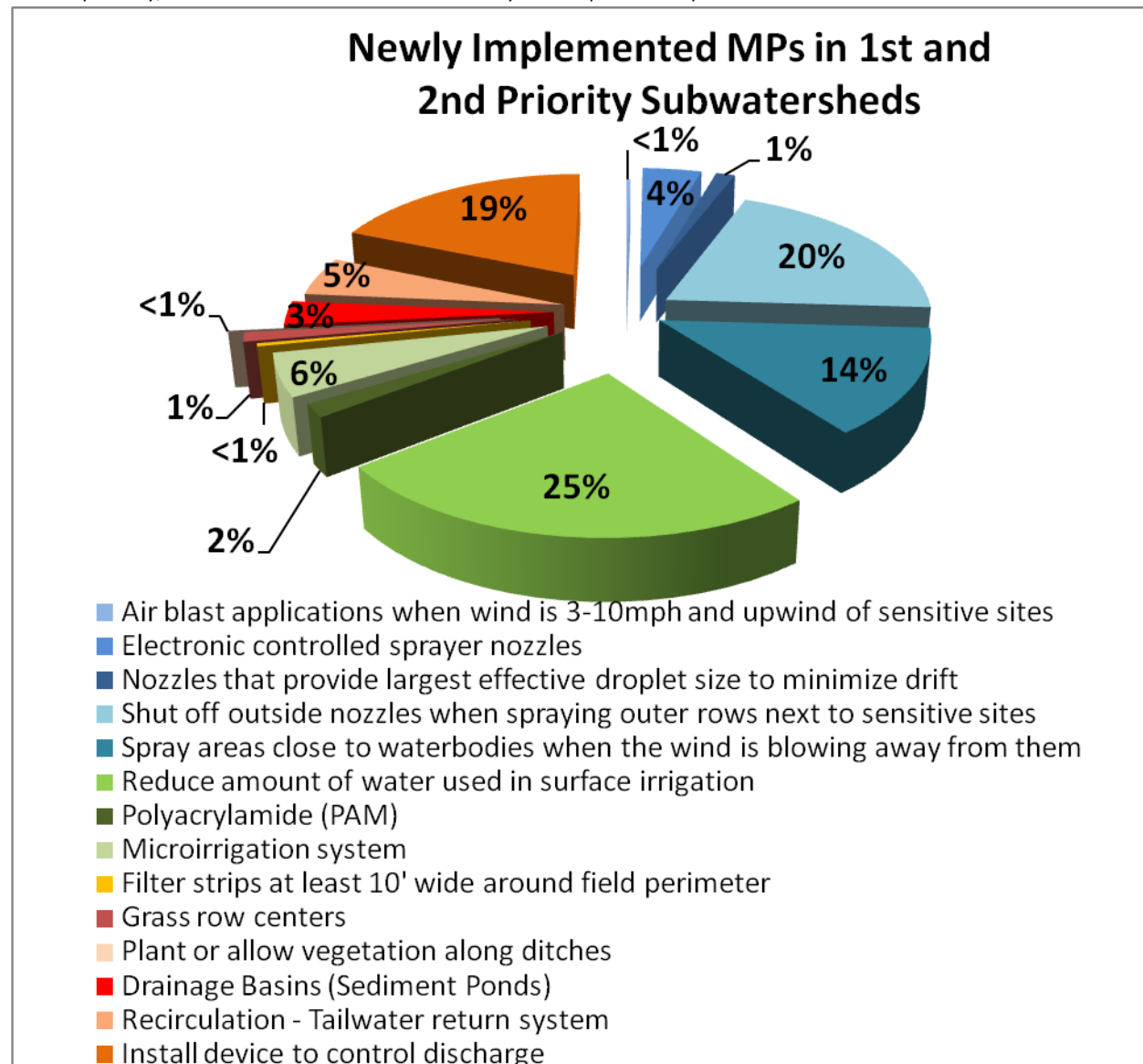


**Figure 6. First and second priority subwatershed percentage of acreage associated with each newly implemented management practice.**

Pest Management / Dormant Spray Management practices (blue shades); Irrigation Water Management practices (green shades) Irrigation Water Management / Storm Drainage / Erosion & Sediment Management practices (red/orange shades) are included. Figure does not include the acreages associated with "Other" which reflect a management practices not listed in the follow up survey; refer to each site subwatershed's analysis of implemented practices in the sections below.



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## FIRST PRIORITY SUBWATERSHEDS SUMMARY OF MANAGEMENT PRACTICES (2008-2010)

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Focused outreach to document current management practices and track implementation of additional management practices in first priority subwatersheds began in 2009 and continued through 2011. The first priority subwatersheds are Dry Creek @ Wellsford Rd, Duck Slough @ Hwy 99 and Prairie Flower Drain @ Crows Landing Rd. The Coalition completed initial and follow up contacts with 100% of targeted growers in the first priority subwatersheds (Table 17).

All targeted growers completed surveys documenting current and recommended management practices in Dry Creek (25), Duck Slough (24), and Prairie Flower Drain (11) subwatersheds (Table 17). The management practice surveys were divided into checklists for various management subjects, including Irrigation Water Management, Storm Drainage, Erosion and Sediment Management, Pest Management and Dormant Spray Management. Based on survey results, the Coalition reported a final analysis of current and recommended practices in the 2011 MPUR (pages 50–68).

Follow up contacts were completed with 100% of targeted growers in the first priority subwatersheds in Dry Creek (23), Duck Slough (22) and Prairie Flower Drain (10) subwatersheds (Table 17). Contacts were conducted via three methods: follow up group meetings, mailings, and emails. As a part of each contact, growers completed follow up surveys to record newly implemented management practices (2011 MPUR, page 69 and Table 18). The Coalition reported a full evaluation of newly implemented management practices for the Prairie Flower Drain subwatersheds in the 2011 MPUR (pages 74-80). Follow up contacts were not complete in 2010 for Dry Creek @ Wellsford Rd and Duck Slough @ Hwy 99 subwatersheds due to a new members being initially contacted in 2010 (Dry Creek @ Wellsford) and delayed responses from two members in Duck Slough @ Hwy 99. In 2011, additional follow ups occurred in Dry Creek @ Wellsford (1) and Duck Slough @ Hwy 99 (2).

**Table 17. Tally of growers contacted for follow up in the first set of high priority subwatersheds (2008 -2010) including number of growers and reasons for not needing follow up.**

|                                 | DRY CREEK @<br>WELLSFORD RD | DUCK SLOUGH @<br>HWY 99 | PRAIRIE FLOWER DRAIN @<br>CROWS LANDING RD |
|---------------------------------|-----------------------------|-------------------------|--------------------------------------------|
| Completed Individual Survey     | 25                          | 24                      | 11                                         |
| Follow Up Not Required          | 2                           | 2                       | 1                                          |
| Dropped Due to Lack of Response | 0                           | 0                       | 0                                          |
| Completed Follow Up Contact     | 23                          | 22                      | 10                                         |
| PERCENT COMPLETE                | 100%                        | 100%                    | 100%                                       |

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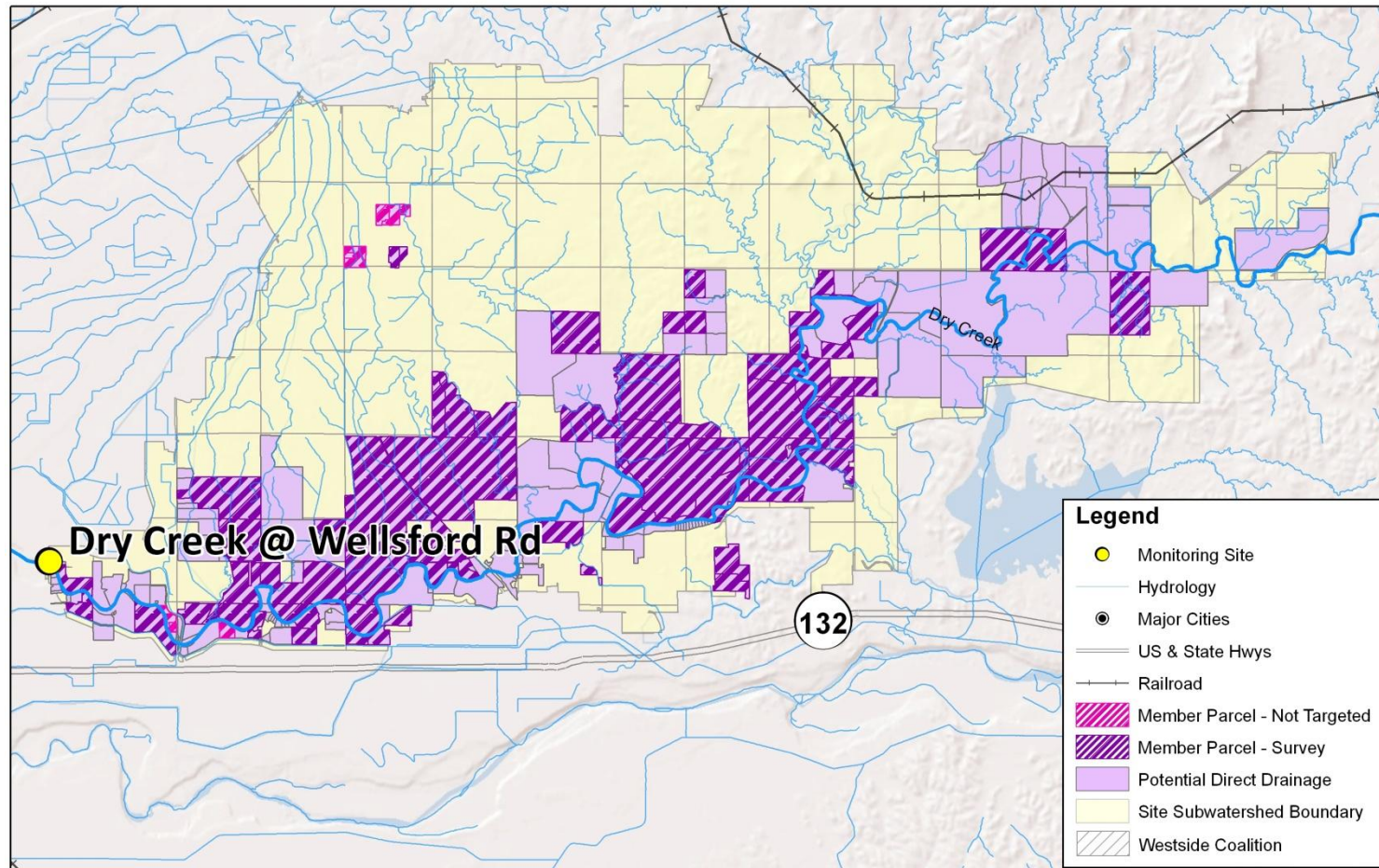
### Dry Creek @ Wellsford Rd

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Between 2009 and 2010, the Coalition contacted 25 targeted growers representing 6,392 acres within the Dry Creek @ Wellsford subwatershed (Figure 7). This includes a single grower who had recently joined the Coalition and was added to the targeted grower list in 2010 although the Coalition completed initial contacts with all other growers. A summary of currently implemented and recommended management practices for the Dry Creek @ Wellsford Rd subwatershed can be found in the 2011 MPUR (pages 57-60).

Twenty-three growers participated in follow up contacts. Two of the 25 targeted growers who participated in initial contacts no longer claimed their parcel(s) and no follow up contacts were conducted with these growers (Table 17). A preliminary analysis of follow up contacts with 22 growers can be located in the 2011 MPUR (pages 71-73). However, the single grower that was initially contacted in 2010 was contacted in 2011 to determine if new management practices were implemented in 2010 and/or 2011.

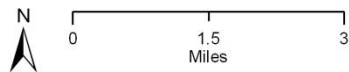
**Figure 7. Dry Creek @ Wellsford member parcels with direct drainage potential.**



Source of Layers:  
 Hydrology - NHD hydrodata, 1:24,000-scale, <http://nhd.usgs.gov/>  
 Roads, highways, railroads, county boundary, city outlines - California Spatial Information Library  
 TRS - Teale Public Land Survey System, Pub. date, 20090101, California Spatial Information Library  
 Parcel Layer - Stanislaus County: 2010, Merced: 2011, Madera: 2011  
 Basemap, Shaded Relief - ESRI  
 GSC North America 1983

Date Prepared: 03/15/11

ESJWQC



### Dry Creek @ Wellsford Rd 1st Priority Subwatershed Parcels



### *Summary of Implemented Management Practices (2009-2011)*

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Table 18 includes acreage totals for recommended management practices compared to newly implemented management practices from 2009, 2010 and 2011 for the Dry Creek @ Wellsford Rd subwatershed. Figure 8 includes each newly implemented management practice as a percentage of the overall acreage. All recommended practices were for parcels with no irrigation drainage; implemented practices occurred on land with and without drainage (Table 18). Overall, newly implemented management practices include shutting off outside nozzles when spraying outer rows next to sensitive sites, constructing drainage basins/sediment ponds, maintaining filter strips at least 10 feet wide around field perimeters, allowing grass to grow in the centers of orchard rows, using recirculation/tailwater return systems, and using less water during surface irrigation for operations with no irrigation drainage (Table 18, Figure 8). In addition, some growers indicated they implemented other management practices that were not specified by the Coalition's survey. These practices account for 2,586 acres with no irrigation drainage within the Dry Creek subwatershed (Table 18).

All recommended practices in the Dry Creek @ Wellsford Rd subwatershed were either implemented or are no longer applicable for a grower's operation. Three growers representing 524 acres received the recommendation to shut off outside nozzles when spraying outer rows next to sensitive sites, and all three growers implemented this additional practice (Table 18). One member representing 45 acres of orchards indicated in the follow up contact that the drainage ditches around the fields were removed and therefore the management practice to plant or allow vegetation to grow along the ditches is no longer applicable. The same grower informed Coalition representatives during follow up contact that he continues to maintain vegetation buffer strips around the perimeter of fields.

In addition to recommended management practices, several other members indicated that they implemented new management practices between 2009 and 2011 without any specific recommendations from the Coalition (Table 18). One grower, farming 107 acres, now allows grass to grow in the center of his orchard rows as a result of discussions with Coalition representatives. Two growers, accounting for 443 acres, installed recirculation/tailwater return systems on their properties. A single grower operating 121 acres constructed a drainage basin/sediment pond. Another grower farming 28 acres installed filter strips at least 10 feet wide around their field perimeter, and one grower representing 162 acres reduced the amount of water used during surface irrigation.

Question 17 of the follow up survey allows growers the opportunity to record additional implemented management practices that were not specifically recommended by the Coalition (2011 MPUR, page 69 and Table 18). Five growers representing 1,201 acres of no irrigation drainage specified that they implemented new management practices between 2009 and 2011. One of these growers, representing 121 acres, increased the size of berms between his fields and Dry Creek to better manage storm runoff. The other four growers did not specify the type of management practice implemented. In addition, one grower farming 2,450 acres with irrigation drainage also indicated they implemented new management practices not specifically discussed with the Coalition during 2009 through 2011 (Table 18). All five of these growers operate orchards, predominantly walnuts and almonds.

**Table 18. Comparison of recommended MPs and implemented MPs in Dry Creek @ Wellsford Rd subwatershed.**

| MANAGEMENT PRACTICE<br>(SEPARATED BY NO DRAINAGE VS DRAINAGE)                                         | RECOMMENDED PRACTICES |       | IMPLEMENTED PRACTICES |                    | % RECOMMENDED ACREAGE WITH IMPLEMENTED PRACTICES <sup>4</sup> |
|-------------------------------------------------------------------------------------------------------|-----------------------|-------|-----------------------|--------------------|---------------------------------------------------------------|
|                                                                                                       | # GROWERS             | ACRES | # GROWERS             | ACRES              |                                                               |
| No irrigation drainage from property                                                                  |                       |       |                       |                    |                                                               |
| Shut off outside nozzles when spraying outer rows next to sensitive sites                             | 3                     | 524   | 3                     | 524                | 100%                                                          |
| Vegetation is planted along or allowed to grow in ditches                                             | 1                     | 45    | 0                     | 0                  | 0%                                                            |
| Drainage Basins (Sediment Ponds) <sup>1</sup>                                                         | 0                     | 0     | 1 <sup>2</sup>        | 121 <sup>2</sup>   | NA                                                            |
| Filter strips at least 10' wide around field perimeter                                                | 0                     | 0     | 1 <sup>2</sup>        | 28 <sup>2</sup>    | NA                                                            |
| Grass row centers                                                                                     | 0                     | 0     | 1 <sup>2</sup>        | 107 <sup>2</sup>   | NA                                                            |
| Recirculation - Tailwater return system <sup>1</sup>                                                  | 0                     | 0     | 2 <sup>2</sup>        | 443 <sup>2</sup>   | NA                                                            |
| Reduce amount of water used in surface irrigation                                                     | 0                     | 0     | 1 <sup>2</sup>        | 162 <sup>2</sup>   | NA                                                            |
| Other (Not specified) <sup>3</sup>                                                                    | NA                    | NA    | 5 <sup>2</sup>        | 1,201 <sup>2</sup> | NA                                                            |
| Yes, irrigation drainage from property                                                                |                       |       |                       |                    |                                                               |
| Other (Not specified) <sup>3</sup>                                                                    | NA                    | NA    | 1                     | 2,450              | NA                                                            |
| TOTAL ACREAGE WITH 1 OR MORE RECOMMENDED PRACTICES                                                    |                       |       |                       |                    | 569                                                           |
| TOTAL ACREAGE WITH 1 OR MORE IMPLEMENTED PRACTICES                                                    |                       |       |                       |                    | 5,036                                                         |
| PERCENT OF IMPLEMENTED PRACTICES COMPARED TO RECOMMENDED ACREAGE WITH 1 OR MORE IMPLEMENTED PRACTICES |                       |       |                       |                    | 885%                                                          |

<sup>1</sup> Practices apply to storm drainage

<sup>2</sup> Management practice not specifically recommended by Coalition representative for grower's operation

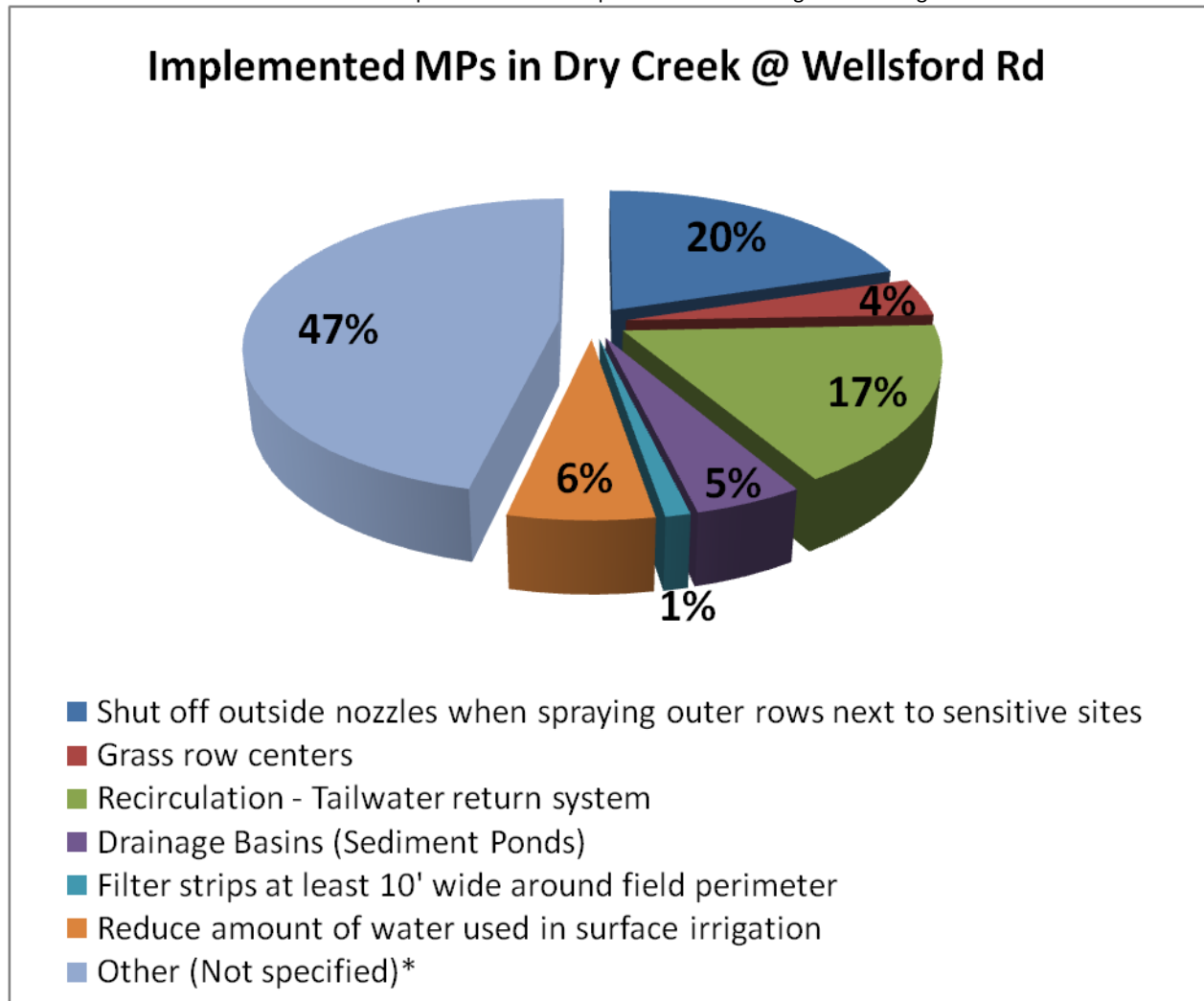
<sup>3</sup> If growers implemented management practices other than those asked about during Coalition follow-up, they were instructed to indicate so and provide a summary/explanation.

<sup>4</sup> Compared to the acreage associated with recommended practices. If there were no recommended practices but a grower implemented the new practice, this is noted with an NA for Not Applicable.



**Figure 8. Percentage of acreage represented by newly implemented (2009/2010) management practices (MPs) for Dry Creek @ Wellsford.**

All members that were recommended to implement additional practices have no irrigation drainage.



\*Other (Not specified) – Refers to implemented MPs other than those specifically asked about during Coalition follow-up.

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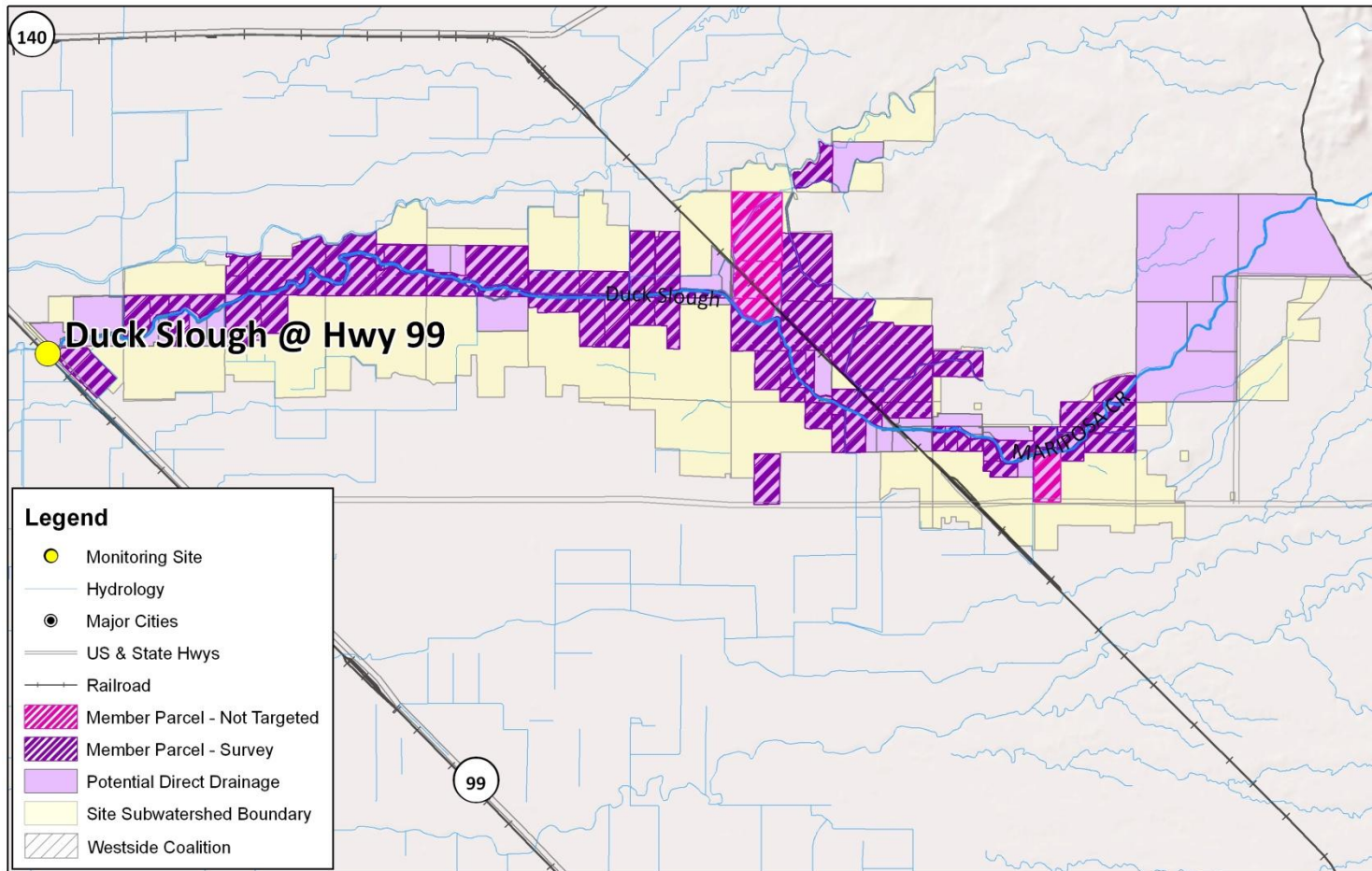
### Duck Slough @ Hwy 99

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The Coalition contacted 24 targeted members within the Duck Slough @ Hwy 99 subwatershed between 2009 and 2011 (Figure 9). The 24 members farm approximately 4,016 acres within the Duck Slough subwatershed (Table 9). Current and recommended management practices were documented in the 2011 MPUR (pages 61-65).

Twenty-two of the 24 members were identified for follow up contacts. One targeted grower who participated in initial contacts no longer claimed their parcel(s), and another targeted grower no longer irrigates their parcel(s); therefore, no follow up contacts were conducted for these two members (Table 19). Prior to the 2011 MPUR, two targeted growers were unresponsive to the Coalitions repeated attempts to conduct follow ups; therefore, the Coalition initiated the process of dropping these growers from ESJWQC membership. These two growers have since elected to remain in the Coalition and completed their follow up surveys.

**Figure 9. Duck Slough @ Hwy 99 member parcels with direct drainage potential.**



Source of Layers:  
 Hydrology - NHD hydrodata, 1:24,000-scale, <http://nhd.usgs.gov/>  
 Roads, highways, railroads, county boundary, city outlines - California Spatial Information Library  
 TRS - Teale Public Land Survey System, Pub. date, 20090101, California Spatial Information Library  
 Parcel Layer - Stanislaus County: 2010, Merced: 2011, Madera: 2011  
 Basemap, Shaded Relief - ESRI  
 GSC North America 1983

Date Prepared: 02/15/11

ESJWQC



### Duck Slough @ Hwy 99 1st Priority Subwatershed Parcels

### *Summary of Implemented Management Practices (2010/2011)*

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Table 19 provides a comparison of recommended management practices and newly implemented management practices in 2010 and 2011 in the Duck Slough @ Hwy 99 subwatershed. Overall, new management practices were implemented across 3,252 acres which is 96% of the acreage for which practices were recommended (Table 19) and 81% of the targeted member acreage (4016 targeted acres, Table 9).

Newly implemented management practices associated with fields with no irrigation drainage include shutting off outside nozzles when spraying outer rows next to sensitive sites and installing devices to control storm water runoff (Table 19, Figure 10). For fields with irrigation drainage, newly implemented management practices included shutting off outside nozzles when spraying outer rows next to sensitive sites, installing devices to control discharge, installing microirrigation systems, and using less water during surface irrigation (Table 19, Figure 11). Growers accounting for 451 acres with irrigation drainage indicated that they implemented other management practices that were not specified in the Coalition's survey (Table 19, Figure 11).

#### **Parcels with No Irrigation Drainage**

The Coalition made recommendations to three growers farming a total of 914 acres with no irrigation drainage. Two of the growers received recommendations to shut off outside nozzles when spraying outer rows next to sensitive sites; one grower representing 210 acres implemented the practice whereas the other grower accounting for 662 acres plans to implement the practice in the future (Table 19). The same grower farming the 662 acres received a recommendation to only make air blast applications when wind is between three to 10 miles per hour (mph) and upwind of a sensitive site; however, this particular management practice was not asked about during follow up. The grower indicated that he was able to install a device to control the timing of storm water runoff from the 662 acre property (Table 19). The third grower was initially unresponsive to attempts by Coalition representatives to schedule a follow up phone interview and returned their survey in 2011 after the ESJWQC threatened to terminate their membership for being unresponsive to management practice information requests. The grower was told to complete a recirculation/tailwater return system, install a device to control discharge, and construct a drainage basin/sediment pond on his 42 acre property to aid in storm water management (no irrigation drainage; Table 19). The grower removed his orchards and did not irrigate in 2011 (when the follow up was completed). The grower anticipates replanting the orchard in two to three years, at which time he will consider implementing applicable management practices.

#### **Parcels with Irrigation Drainage**

The Coalition recommended management practices to five growers associated with parcels with irrigation runoff.

Two growers farming 415 acres indicated that they now shut off outside nozzles when spraying outer rows per the Coalition's recommendation (Table 19). In addition, a third grower also indicated in their follow up survey that they shut off outside nozzles when spraying outer rows next to sensitive sites; this

management practices was not recommended at the time of initial contact (Table 21). Between the three members, 436 acres are associated with shutting off outside nozzles as a new management practices (Table 21). This third grower received a recommendation to allow vegetation to grow along drainage ditches near their 21 acre property. Their survey response indicated that they did not implement this practice. Instead, the grower began to shut off outside nozzles when spraying outer rows next to sensitive sites and installed a device to control the timing of discharge, neither of which was specifically recommended by the Coalition (Table 19).

A single grower representing 596 acres with irrigation drainage received a recommendation to spray areas close to waterbodies only when the wind is blowing away from them (Table 19). The practice was not specifically asked about during follow up meetings/interviews. However, the grower did indicate they have shut off outside nozzles when spraying outer rows next to sensitive sites and they allowed grass to grow in orchard row centers and along drainage ditches since before 2005. The grower also laser leveled fields in the past and employs a recirculation/tailwater return system as well as utilizing a drainage basin/sediment pond.

Eight growers with irrigation drainage implemented new management practices during 2010 and 2011 without specific recommendations from the Coalition (Table 19). Three of the eight growers (associated with 764 acres) reduced the amount of water used in surface irrigation. One grower installed microirrigation to his 279-acre property. A grower farming 195 acres did not apply pesticides during 2010 and 2011 (except Round-Up for weeds). Two growers representing 465 acres installed devices to control the timing of discharge. One grower responded that they did implement additional practices to their 415 acre property which were not specified on the follow up survey; they did not give additional information regarding those practices (2011 MPUR, page 69 and Table 18).

Some management practices were recommended but were not implemented within this subwatershed. One grower farming 40 acres indicated they did not install a device to control timing of discharge because they are no longer farming the parcel and have leased out the land. Two growers were unable to implement recommended practices due to a lack of resources; management practices included installing a recirculation/tailwater return system, constructing a drainage basin/sediment pond, adding a device to control timing of discharge and using PAM to reduce furrow erosion (Table 19). Growers indicating a lack of resources for structural management practices may be eligible to receive Prop 84, AWEF and/or EQIP funding. The Coalition will continue to notify growers of funding opportunities for management practice implementation and will continue to encourage growers to take advantage of such opportunities.

**Table 19. Comparison of recommended MPs and implemented MPs in Duck Slough @ Highway 99 subwatershed.**

Recommended and implemented practices cannot be added across practices since one parcel may have more than one practice recommended/implemented. Therefore, comparisons of overall management practice implementation are done on acreages from parcels with one or more management practice.

| MANAGEMENT PRACTICE<br>(SEPARATED BY NO DRAINAGE VS DRAINAGE)                                         | RECOMMENDED PRACTICES |       | IMPLEMENTED PRACTICES |                  | % RECOMMENDED ACREAGE WITH IMPLEMENTED PRACTICES |
|-------------------------------------------------------------------------------------------------------|-----------------------|-------|-----------------------|------------------|--------------------------------------------------|
|                                                                                                       | # GROWERS             | ACRES | # GROWERS             | ACRES            |                                                  |
| No irrigation drainage from property                                                                  |                       |       |                       |                  |                                                  |
| Drainage basins (sediment ponds)                                                                      | 1                     | 42    | 0                     | 0                | 0%                                               |
| Install device to control discharge <sup>1</sup>                                                      | 1                     | 42    | 1                     | 662 <sup>2</sup> | 1,576%                                           |
| Recirculation - Tailwater return system                                                               | 1                     | 42    | 0                     | 0                | 0%                                               |
| Shut off outside nozzles when spraying outer rows next to sensitive sites                             | 2                     | 872   | 1                     | 210              | 24%                                              |
| Use air blast applications when wind is between 3-10 mph and upwind of a sensitive site               | 1                     | 662   | UA                    | UA               | UA                                               |
| Yes, irrigation drainage from property                                                                |                       |       |                       |                  |                                                  |
| Drainage basins (sediment ponds)                                                                      | 2                     | 142   | 0                     | 0                | 0%                                               |
| Install device to control discharge                                                                   | 3                     | 269   | 3                     | 486 <sup>2</sup> | 181%                                             |
| Recirculation - Tailwater return system                                                               | 2                     | 142   | 0                     | 0                | 0%                                               |
| Shut off outside nozzles when spraying outer rows next to sensitive sites                             | 2                     | 415   | 3                     | 436 <sup>2</sup> | 105%                                             |
| Spray areas close to waterbodies when the wind is blowing away from them                              | 1                     | 596   | UA                    | UA               | UA                                               |
| Use Polyacrylamide(PAM)                                                                               | 1                     | 142   | 0                     | 0                | 0%                                               |
| Vegetation is planted or allowed to grow along ditches                                                | 1                     | 21    | 0                     | 0                | 0%                                               |
| Microirrigation system                                                                                | 0                     | 0     | 1                     | 279 <sup>2</sup> | NA                                               |
| Reduce amount of water used in surface irrigation                                                     | 0                     | 0     | 3                     | 764 <sup>2</sup> | NA                                               |
| Other (Not specified) <sup>3</sup>                                                                    | 0                     | 0     | 2                     | 451 <sup>2</sup> | NA                                               |
| TOTAL ACREAGE WITH 1 OR MORE RECOMMENDED PRACTICES                                                    |                       |       |                       |                  | 3,387                                            |
| TOTAL ACREAGE WITH 1 OR MORE IMPLEMENTED PRACTICES                                                    |                       |       |                       |                  | 3,252                                            |
| PERCENT OF IMPLEMENTED PRACTICES COMPARED TO RECOMMENDED ACREAGE WITH 1 OR MORE IMPLEMENTED PRACTICES |                       |       |                       |                  | 96%                                              |

<sup>1</sup> Practices apply to storm drainage

<sup>2</sup> Management practice not specifically recommended by Coalition representative for grower's operation

<sup>3</sup> If growers implemented management practices other than those asked about during Coalition follow-up, they were instructed to indicate so and provide a summary/explanation.

UA – Unanswered; Coalition did not ask about specific practice during follow up contact

NA – Not applicable; no recommendations for the management practice in the subwatershed and was not indicated as implemented by surveyed growers

**Figure 10. Percentage of acreage represented by newly implemented (2009/2010/2011) management practices for Duck Slough @ Hwy 99 (parcels with no irrigation drainage).**

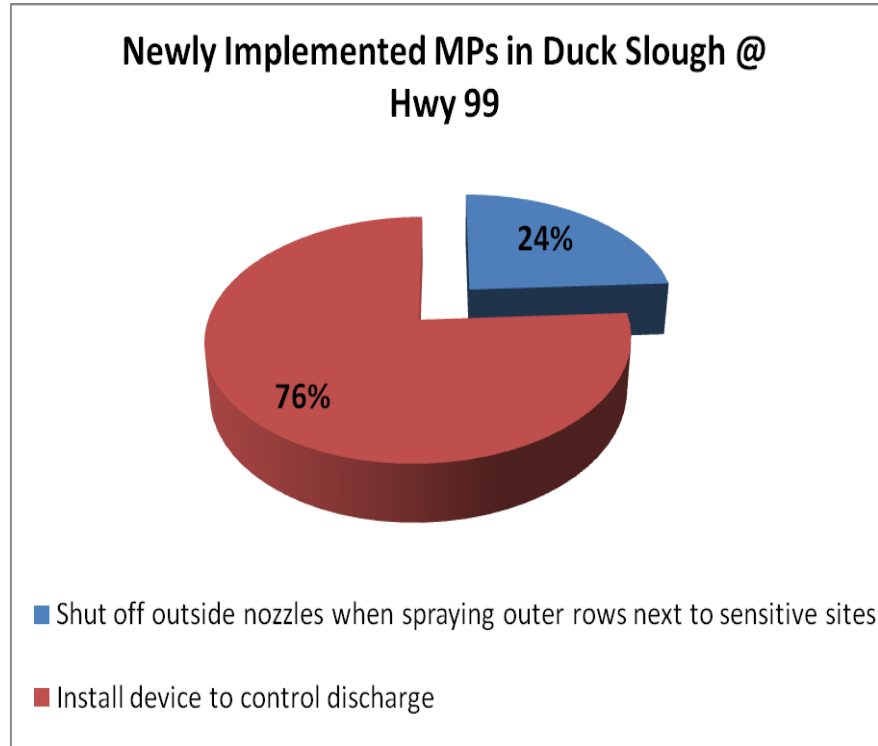
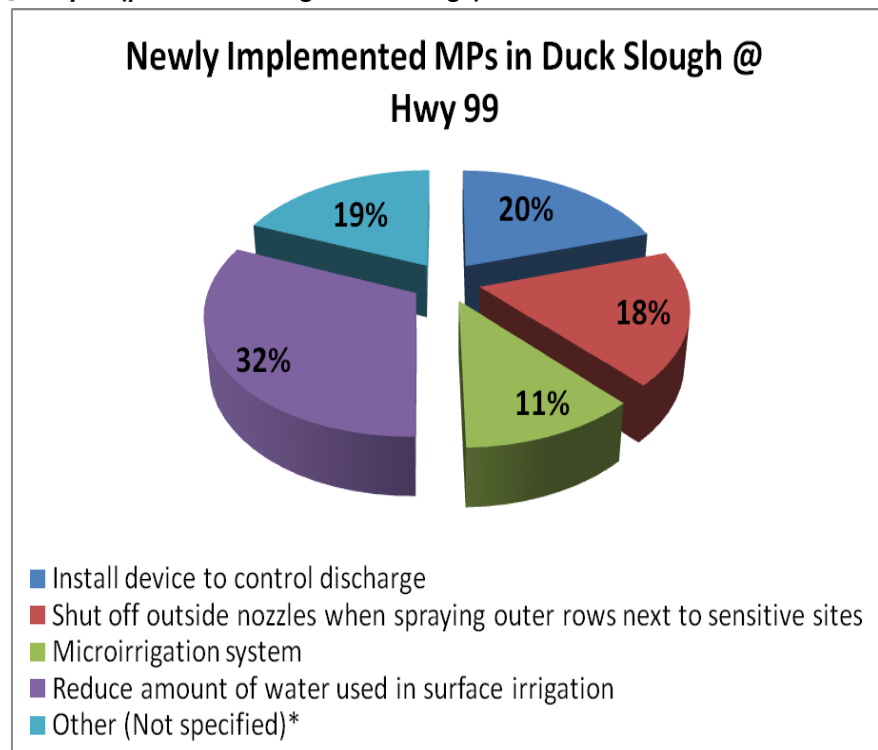


**Figure 11. Percentage of acreage represented by newly implemented (2009/2010/2011) management practices for Duck Slough @ Hwy 99 (parcels with irrigation drainage).**



\*Other (Not specified) – Refers to implemented MPs other than those specifically asked about during Coalition follow-up.

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### Prairie Flower Drain @ Crows Landing Rd

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The Coalition contacted 11 targeted growers within the Prairie Flower Drain @ Crows Landing Rd subwatershed with the potential to discharge directly to the drain, were currently farming, and reported pesticide use of high priority constituents (2011 MPUR, page 67 and Figure 12). The 11 members farm approximately 865 acres within the Prairie Flower Drain subwatershed which includes 3,611 irrigated acres—the majority of which is primarily dairies (Table 9). Current and recommended management practices were documented in the 2011 MPUR (pages 66-68).

Ten growers participated in follow up contacts. One targeted grower who participated in initial contacts no longer claims their parcel(s) and no follow up contact was required. The 2011 MPUR contains a full summary and evaluation of follow up contacts (pages 78-80).



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## SECOND PRIORITY SUBWATERSHEDS SUMMARY OF MANAGEMENT PRACTICES (2010-2012)

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All initial contacts in the second priority subwatersheds were complete in the fall of 2010. Targeted growers filled out surveys documenting current and recommended management practices for Bear Creek @ Kibby Rd (14), Cottonwood Creek @ Rd 20 (25), Duck Slough @ Gurr Rd (6) and Highline Canal @ Hwy 99 (10) subwatersheds (Table 11). The management practice surveys completed by growers in the second priority subwatersheds were similar to those used for first priority subwatershed contacts. Based on survey results, the Coalition reported a preliminary analysis of current and recommended practices in the 2011 MPUR (pages 81–103).

Continued contact with growers since the submission of the 2011 MPUR provided further information regarding the growing operations of second priority members, and a few responses were updated regarding currently implemented and recommended management practices. The final results from the second priority subwatershed initial contacts are provided in the sections below.

Follow up contacts in the second priority subwatersheds were completed by the fall of 2011. Follow ups with growers occurred via three methods: group meetings, mailings, and emails. As a part of each contact, growers completed follow up surveys to record newly implemented management practices (amendment to the 2011 MPUR, page 2 and Table 1).

The second priority follow up meetings were held on April 26, 2011 (Cottonwood Creek @ Rd 20) and April 28, 2011 (Bear Creek @ Kibby Rd, Duck Slough @ Gurr Rd and Highline Canal @ Hwy 99). Similar to follow up meetings held for first priority subwatersheds, interactive hand held devices to document grower responses based on questions posed in a Power Point presentation were utilized. This allowed instantaneous responses at an individual grower level to be conducted in a grower group setting. Growers from Bear Creek (3), Cottonwood Creek (14), Duck Slough (4), and Highline Canal (3) attended the follow up meetings (Table 20).

**Table 20. Tally of growers contacted for follow up in the second set of high priority subwatersheds (2010-2012).**

|                                 | BEAR CREEK @<br>KIBBY RD | COTTONWOOD<br>CREEK @ RD 20 | DUCK SLOUGH @<br>GURR RD | HIGHLINE CANAL<br>@ HWY 99 |
|---------------------------------|--------------------------|-----------------------------|--------------------------|----------------------------|
| Completed Individual Survey     | 14                       | 25                          | 6                        | 10                         |
| Follow Up Not Required          | 0                        | 1                           | 0                        | 2                          |
| Dropped Due to Lack of Response | 0                        | 0                           | 0                        | 0                          |
| Completed Follow Up Contact     | 14                       | 24                          | 6                        | 8                          |
| PERCENT COMPLETE                | 100%                     | 100%                        | 100%                     | 100%                       |

The remaining targeted growers in each of the subwatersheds were either sent a mailing on May 11 or an email on May 20, 2011 with a cover letter detailing the high priority Management Plan tracking strategy as well as instructions for the growers to complete their follow up survey. The mailings included a survey to be completed and returned whereas the email included an Internet address to an online survey that could be completed and submitted electronically by the grower. All growers except

for two in Cottonwood Creek returned follow up survey information either electronically or by postal mail.

The Coalition provided the Regional Board with an interim summary of newly implemented management practices for the second priority subwatersheds in the 2011 MPUR amendment (submitted on June 27, 2011). At that time, the amendment contained all of the surveys received to date and the results of the follow up contacts for Bear Creek (14), Cottonwood Creek (22), Duck Slough (6), and Highline Canal (8).

The Coalition received follow up surveys from the remaining targeted growers (two growers in Cottonwood Creek) and therefore completed 100% of follow up contacts in the second priority subwatersheds. In the 2011 MPUR amendment, it was noted that three of the targeted growers who participated in initial contacts did not require follow up contacts. Two growers either sold or no longer claimed the targeted parcels (one grower in Cottonwood Creek and one grower in Highline Canal) and one grower in Highline Canal dropped their Coalition membership (Table 20). Consequently, Table 20 includes the total number of completed follow up contacts for members in Bear Creek (14), Cottonwood Creek (24), Duck Slough (6), and Highline Canal (8) subwatersheds.

The following sections summarize currently implemented, recommended and newly implemented management practices in the second priority subwatersheds. Results vary from those submitted in the 2011 MPUR and the 2011 MPUR amendment since 100% of follow up results are now included. Some results have been updated based on continued Coalition outreach and communications with growers.

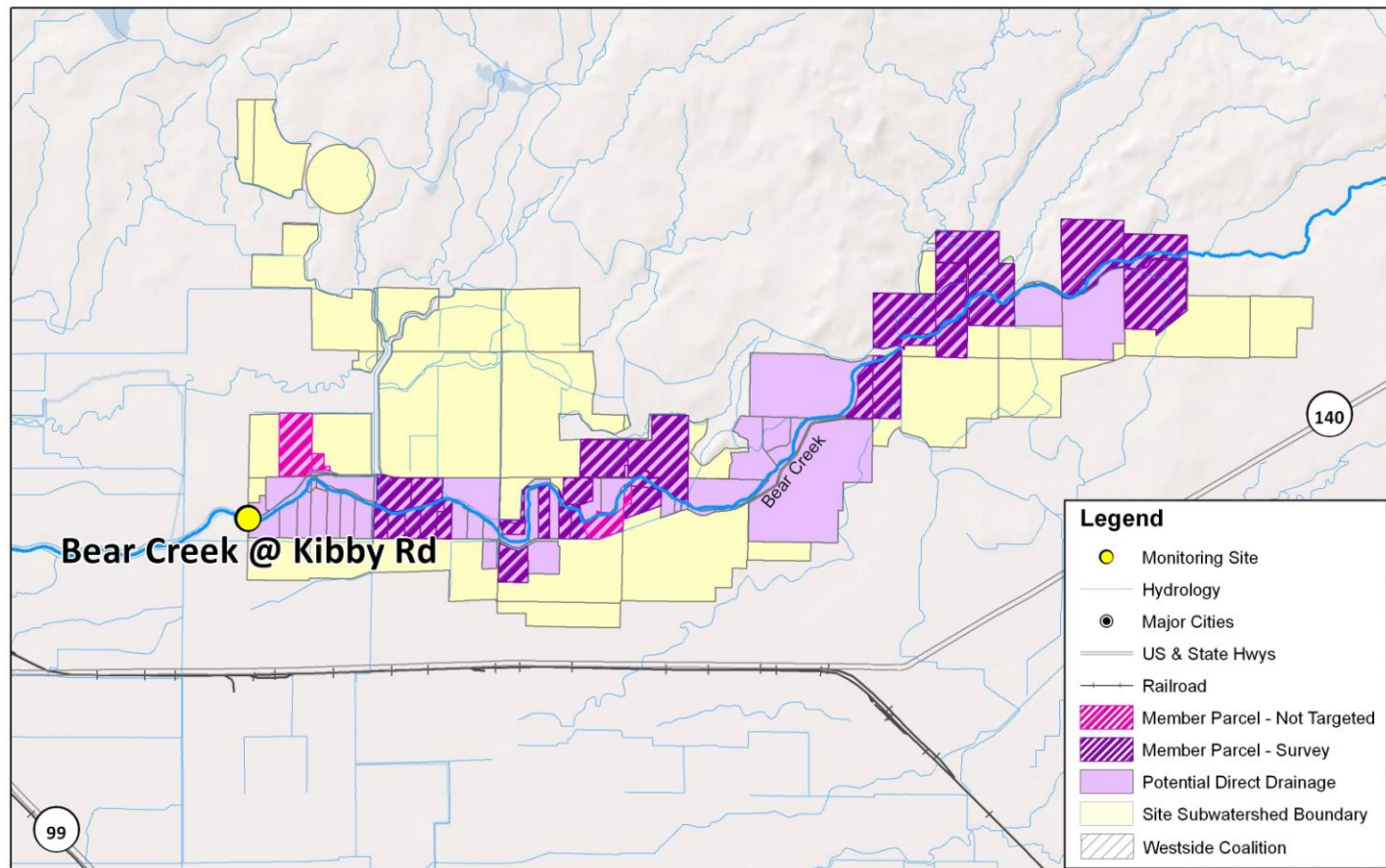
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#### Bear Creek @ Kibby Rd

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The Coalition contacted 14 targeted growers representing 31% of the total direct drainage within the Bear Creek @ Kibby Rd subwatershed (Table 11). The 14 members were determined to irrigate with the potential to drain directly to the creek, were currently farming, and reported pesticide use of high priority constituents (Figure 12). All 14 growers completed initial contact surveys and follow up surveys (Table 21).

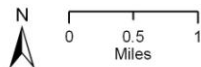
**Figure 12. Bear Creek @ Kibby Rd member parcels with direct drainage potential.**



Source of Layers:  
 Hydrology - NHD hydrodata, 1:24,000-scale, <http://nhd.usgs.gov/>  
 Roads, highways, railroads, county boundary, city outlines - California Spatial Information Library  
 TRS - Teale Public Land Survey System, Pub. date, 20090101, California Spatial Information Library  
 Parcel Layer - Stanislaus County, 2010, Merced, 2011, Madera, 2011  
 Basemap, Shaded Relief - ESRI  
 GSC North America 1983

Date Prepared: 03/01/11

ESJWQC



### Bear Creek @ Kibby Rd 2nd Priority Subwatershed Parcels

### *Summary of Current and Recommended Management Practices (2009/2010)*

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Initial survey contact results for the Bear Creek @ Kibby Rd subwatershed reported in the 2011 MPUR were updated with information obtained during follow up contact with targeted growers. Table 21 lists the management practice survey questions, associated answers, number of surveys with a specific response, the percentage of respondents with a specific response and the sum of acreage associated with a specific response for Bear Creek. The sum of acreages in Table 21 across management practices may exceed the total number of acres in the watershed since a parcel and its associated acreage may be included under multiple management practices. Table 21 can be used to evaluate number of acres for a particular practice with the overall acreage of the subwatershed, or in relation to another management practice.

Land use is varied in the Bear Creek subwatershed. Approximately half of the land use is pasture, while the remainder is split almost evenly between pasture/orchard, orchard, and field row crop (Figure 13). The majority of property in the subwatershed has irrigation drainage (93%). Consequently, Coalition representatives recommended growers in this subwatershed improve the management of their irrigation discharge by installing recirculation/tailwater return systems and constructing drainage basins/sediment ponds (Figure 14). The recommended management practices are associated with 1,014 acres (with irrigation drainage) in the Bear Creek subwatershed.

#### **Irrigation Water Management**

Of the targeted growers who filled out surveys in the Bear Creek @ Kibby Rd subwatershed, 93% of the respondents with slightly over 97% of the acreage used flood irrigation in 2009 and 2010. A single grower representing 40 acres indicated use of microirrigation systems. Sixty-four percent of respondents laser leveled their fields while 21% used recirculation/tailwater return systems. The majority of respondents (93%) irrigated based on soil moisture levels; only one grower bases irrigation schedules on irrigation district deliveries (Table 21).

#### **Storm Water Drainage**

Three respondents reported storm water drainage when the soil is saturated (21%) and seven in 100 year storms (50%). Four respondents (29%) indicated that there was no storm water drainage from their property. Only one grower indicated they pump storm water to surface waters and could control the timing. Two growers use recirculation/tailwater return systems and one grower uses a settling pond to hold storm water (Table 24).

#### **Erosion & Sediment Management**

All respondents indicated they controlled sediment erosion/runoff by some means, including utilizing vegetative filter strips, vegetated ditches, settling ponds and recirculation/tailwater return systems (Table 21). Four growers reported they either remove cattle from pastureland when water is present or have riparian vegetation and/ or fences to prevent livestock access to waterways. One grower has both fences and vegetation along waterways and one grower with 15 acres indicated livestock are permitted to drink from the creek (Table 21). The remaining growers do not have livestock.

### **Pest Management / Dormant Spray Management**

Seventy-nine percent of respondents indicated they apply various forms of herbicides during the winter; the most commonly applied herbicide is glyphosate (71%). One respondent indicated they considered alternatives to using diazinon or chlorpyrifos during the growing season and 13 respondents indicated that the question is not applicable to their operation. Only one respondent uses dormant sprays and always applies to orchards with vegetated cover, checks the weather conditions prior to spraying, and maintains setback zones during application (Table 24).

The majority took numerous steps to manage their spray drift including adjusting spray nozzles to match the canopy profile (86%), shutting outside nozzles off when spraying the outer two rows (57%), spraying areas close to waterbodies when the wind is blowing away from them (79%), using air blast applications when wind is between three and 10 mph (43%), and (86%) using nozzles that provide the largest effective droplet size to minimize drift (Table 21). Eight respondents indicated they calibrate their nozzles prior to each application, whereas two respondents calibrate once a month, three calibrate once a year, and one respondent never calibrates their spray equipment (Table 21).

**Table 21. Bear Creek @ Kibby Rd subwatershed current management practices (2010).**

| CHECKLIST                                | QUESTION                                                          | ANSWER                                                                    | COUNT OF ANSWERS | % RESPONDENTS | SUM OF ASSOCIATED ACREAGE |
|------------------------------------------|-------------------------------------------------------------------|---------------------------------------------------------------------------|------------------|---------------|---------------------------|
| Section 1: Irrigation Water Management   | Irrigation management practices:                                  | Laser leveled fields                                                      | 9                | 64%           | 679                       |
|                                          |                                                                   | Recirculation - Tailwater return system                                   | 3                | 21%           | 538                       |
|                                          |                                                                   | Use drainage basins (sediment ponds) to capture and retain runoff         | 2                | 14%           | 52                        |
|                                          | Irrigation System                                                 | Microirrigation                                                           | 1                | 7%            | 40                        |
|                                          |                                                                   | Surface                                                                   | 13               | 93%           | 1252                      |
|                                          | Which do you base your irrigation schedule on:                    | Actual Moisture Levels in soil/crop needs                                 | 13               | 93%           | 1272                      |
|                                          |                                                                   | Irrigation District Deliveries                                            | 1                | 7%            | 20                        |
| Section 2: Storm Drainage                | How are you able to manage storm drainage?                        | No Storm Drainage                                                         | 2                | 14%           | 30                        |
|                                          |                                                                   | Pump/Drain into waterway & able to control timing                         | 1                | 7%            | 20                        |
|                                          |                                                                   | Pump/Drain into waterway & unable to control timing                       | 8                | 57%           | 942                       |
|                                          |                                                                   | Recirculation - Tailwater return system                                   | 2                | 14%           | 52                        |
|                                          |                                                                   | Settling Pond                                                             | 1                | 7%            | 20                        |
|                                          | When do you have storm water draining from your field?            | After soil is saturated-late winter                                       | 3                | 21%           | 533                       |
|                                          |                                                                   | No Storm Drainage                                                         | 4                | 29%           | 101                       |
|                                          |                                                                   | Only in heavy (100 year) storms                                           | 7                | 50%           | 658                       |
| Section 3: Erosion & Sediment Management | Sediment management practices:                                    | Grass Row Centers (Orchards, Vineyards)                                   | 6                | 43%           | 495                       |
|                                          |                                                                   | Maintain vegetated filter strips around field perimeter at least 10' wide | 11               | 79%           | 1128                      |
|                                          |                                                                   | Vegetation is planted along or allowed to grow along ditches              | 7                | 50%           | 885                       |
|                                          | Do you apply herbicides during winter months?                     | Do not apply                                                              | 3                | 21%           | 130                       |
|                                          |                                                                   | Glyphosate (Round-Up)                                                     | 10               | 71%           | 1056                      |
|                                          |                                                                   | Goal                                                                      | 4                | 29%           | 102                       |
|                                          |                                                                   | Other                                                                     | 8                | 57%           | 1084                      |
|                                          |                                                                   | Simazine (Princep)                                                        | 1                | 7%            | 32                        |
|                                          | If waterway crosses or borders pasture, how is livestock managed? | N/A - Not Pasture                                                         | 9                | 64%           | 503                       |
|                                          |                                                                   | Other: Livestock drink in creek                                           | 1                | 7%            | 15                        |
|                                          |                                                                   | Riparian vegetation prevents livestock access to water                    | 1                | 7%            | 45                        |
|                                          |                                                                   | Water not present when livestock is in pasture                            | 3                | 21%           | 729                       |
|                                          |                                                                   | Waterway is fenced                                                        | 1                | 7%            | 45                        |
| Section 4: Pest Management               | Spray management practices:                                       | Adjust spray nozzles to match crop canopy profile                         | 12               | 86%           | 1232                      |

| CHECKLIST                           | QUESTION                                                                                                                  | ANSWER                                                                                  | COUNT OF ANSWERS | % RESPONDENTS | SUM OF ASSOCIATED ACREAGE |
|-------------------------------------|---------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------|------------------|---------------|---------------------------|
|                                     |                                                                                                                           | Outside nozzles shut off when spraying outer rows next to sensitive sites               | 8                | 57%           | 584                       |
|                                     |                                                                                                                           | Spray areas close to waterbodies when the wind is blowing away from them                | 11               | 79%           | 746                       |
|                                     |                                                                                                                           | Use air blast applications when wind is between 3-10 mph and upwind of a sensitive site | 6                | 43%           | 495                       |
|                                     |                                                                                                                           | Uses of nozzles that provide largest effective droplet size to minimize drift           | 12               | 86%           | 1232                      |
|                                     | Have you considered alternative strategies to using diazinon or chlorpyrifos either during the dormant or growing season? | N/A                                                                                     | 13               | 93%           | 1252                      |
|                                     |                                                                                                                           | Yes                                                                                     | 1                | 7%            | 40                        |
|                                     | How often is spray equipment calibrated?                                                                                  | Never                                                                                   | 1                | 7%            | 486                       |
|                                     |                                                                                                                           | Once per month                                                                          | 2                | 14%           | 205                       |
|                                     |                                                                                                                           | Once per year                                                                           | 3                | 21%           | 50                        |
|                                     |                                                                                                                           | Prior to each application                                                               | 8                | 57%           | 551                       |
| Section 5: Dormant Spray Management | Dormant spray management practices:                                                                                       | Check weather conditions prior to spraying (i.e. storm status)                          | 1                | 7%            | 40                        |
|                                     |                                                                                                                           | Maintain setback zones                                                                  | 1                | 7%            | 40                        |
|                                     | Do you apply when soil moisture is at field capacity?                                                                     | No                                                                                      | 1                | 7%            | 40                        |
|                                     | Have you been informed of DPR's Dormant Spray Regulations?                                                                | Yes                                                                                     | 1                | 7%            | 40                        |
|                                     | How many acres are sprayed with dormant pesticides?                                                                       | 40 Acres                                                                                | 1                | 7%            | 40                        |
|                                     |                                                                                                                           | No Dormant Sprays                                                                       | 13               | 93%           | 1252                      |
|                                     | Prior to applying winter dormant sprays, what is the condition of your orchard floor?                                     | Vegetated Cover w/Sprayed Berms                                                         | 1                | 7%            | 40                        |
|                                     |                                                                                                                           | Vegetative cover                                                                        | 1                | 7%            | 40                        |

**Figure 13. Bear Creek @ Kibby Rd crop acreage information from member surveys (2010).**

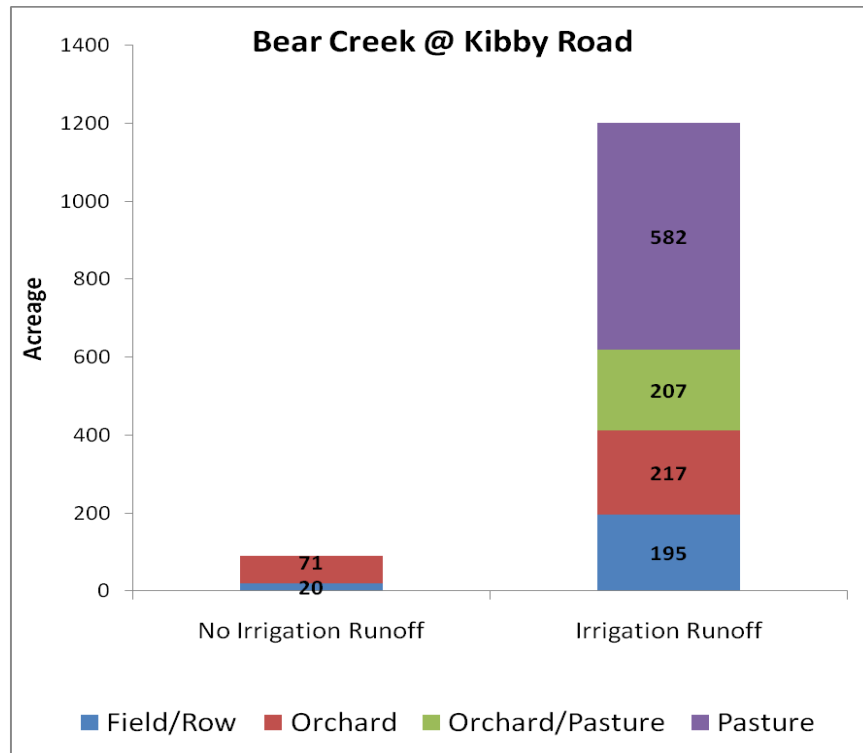
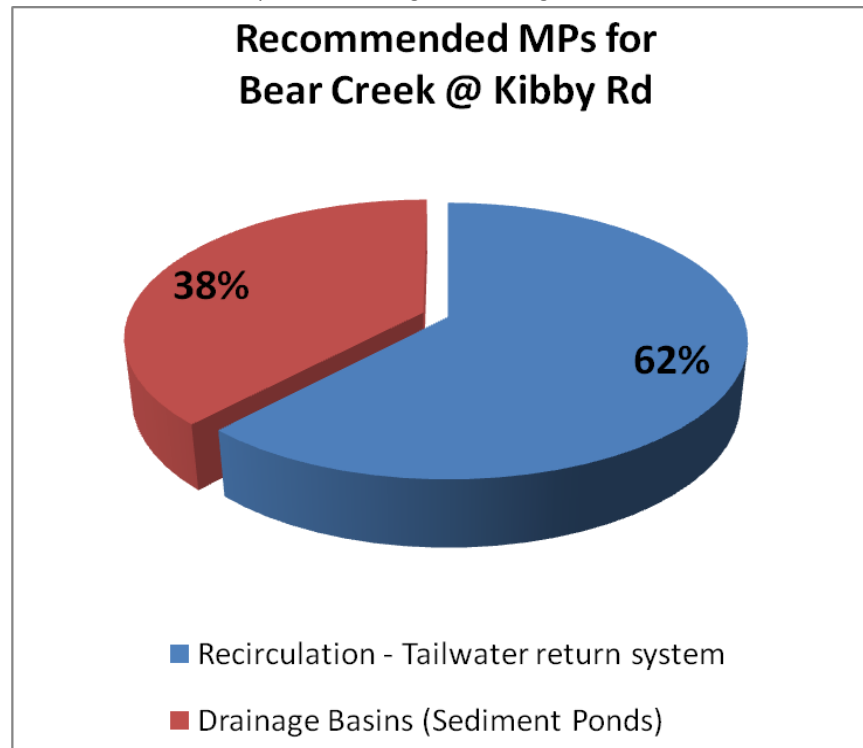


**Figure 14. Percent of acreage represented by recommended management practices for Bear Creek @ Kibby Rd.**  
Recommended practices are associated with parcels with irrigation drainage.





### *Summary of Implemented Management Practices (2010/2011)*

Table 22 presents a comparison of the Bear Creek @ Kibby Rd subwatershed 2010 recommended management practices and newly implemented management practices. There were two newly implemented management practices within Bear Creek: microirrigation system installation and reducing the amount of water used during surface irrigation. These practices were implemented over 611 acres with irrigation drainage; 66% of that acreage received new microirrigation systems while 34% is now flood irrigated using less water (Figure 15). These management practices were not specifically recommended by Coalition representatives to growers in the subwatershed (Table 22).

**Table 22. Comparison of recommended MPs and implemented MPs in Bear Creek @ Kibby Rd subwatershed.**

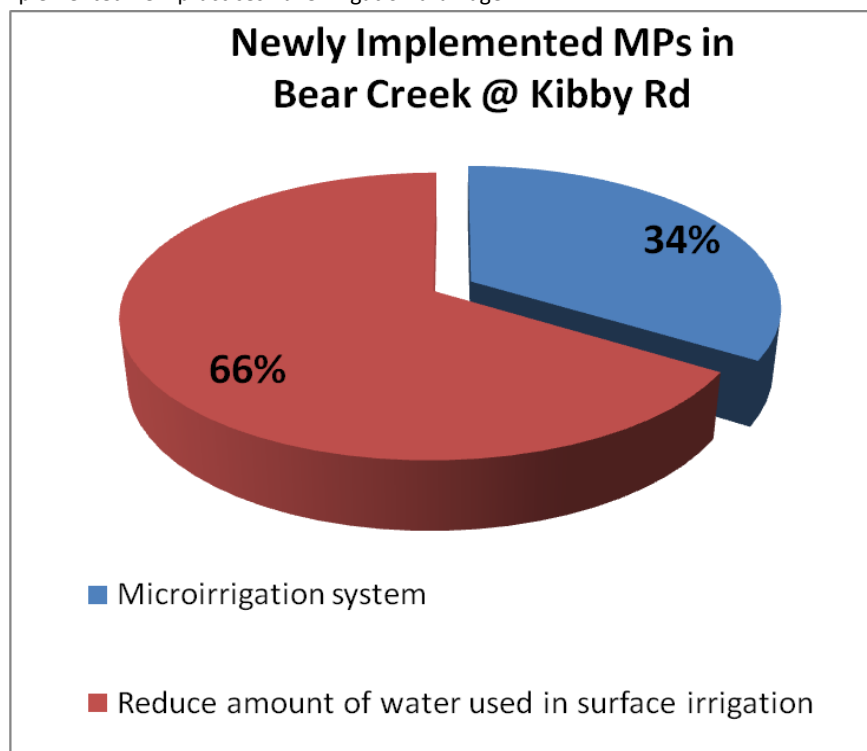
| MANAGEMENT PRACTICE<br>(SEPARATED BY NO DRAINAGE VS DRAINAGE)                                         | RECOMMENDED PRACTICES |       | IMPLEMENTED PRACTICES |                  | % RECOMMENDED ACREAGE WITH IMPLEMENTED PRACTICES |
|-------------------------------------------------------------------------------------------------------|-----------------------|-------|-----------------------|------------------|--------------------------------------------------|
|                                                                                                       | # GROWERS             | ACRES | # GROWERS             | ACRES            |                                                  |
| No irrigation drainage from property                                                                  |                       |       |                       |                  |                                                  |
| Recirculation - Tailwater return system                                                               | 1                     | 10    | 0                     | 0                | 0%                                               |
| Yes, irrigation drainage from property                                                                |                       |       |                       |                  |                                                  |
| Drainage Basins (Sediment Ponds)                                                                      | 3                     | 387   | 0                     | 0                | 0%                                               |
| Recirculation - Tailwater return system                                                               | 7                     | 617   | 0                     | 0                | 0%                                               |
| Microirrigation system                                                                                | 0                     | 0     | 1                     | 207 <sup>1</sup> | NA                                               |
| Reduce amount of water used in surface irrigation                                                     | 0                     | 0     | 3                     | 404 <sup>1</sup> | NA                                               |
| TOTAL ACREAGE WITH 1 OR MORE RECOMMENDED PRACTICES                                                    |                       |       |                       |                  | 1,014                                            |
| TOTAL ACREAGE WITH 1 OR MORE IMPLEMENTED PRACTICES                                                    |                       |       |                       |                  | 611                                              |
| PERCENT OF IMPLEMENTED PRACTICES COMPARED TO RECOMMENDED ACREAGE WITH 1 OR MORE IMPLEMENTED PRACTICES |                       |       |                       |                  | 60%                                              |

<sup>1</sup>Management practice not specifically recommended by Coalition representative for grower's operation.

NA – Not applicable; no recommendations for the management practice in the subwatershed.

**Figure 15. Percentage of acreage represented by newly implemented management practices for Bear Creek @ Kibby Rd.**

All members that implemented new practices have irrigation drainage.



The management practices recommended by Coalition representatives to 1,014 acres were not implemented in 2010 for various reasons. One grower, farming 45 acres with irrigation drainage, indicated that he plans to install a recirculation/tailwater return system by the 2011 irrigation season (Table 22). At the time of the follow up survey in 2010, the grower was waiting on equipment.

Another grower did not implement the recommended recirculation/tailwater return system because it is no longer applicable to his property. The grower was recommended during initial contact to install the system to 10-acres of property to better manage irrigation drainage. However, during follow up contacts, the grower informed the Coalition he leased the property to a neighbor who does not irrigate and reported no irrigation drainage (Table 22). Consequently, the management practice is not necessary at this time.

All of the remaining growers in the Bear Creek subwatershed indicated they would like to install the recirculation/tailwater return systems and/or drainage basins/sediment ponds that were recommended for their operations, but have no resources to do so (Table 22). The Coalition will continue its strategy of notifying its members about available funding opportunities and encourage them to take advantage of the application process (which is discussed in more detail under the Evaluation of Management Practice Effectiveness section).

Of the five growers who indicated they did not have the resources to implement structural management practices, two growers implemented other management practices not specifically recommended. Despite the lack of resources, two growers unable to afford implementing the structural management practices still improved their management of irrigation tailwater by implementing other practices not specifically recommended. The two growers, associated with 207 and 165 acres, both received recommendations to install a recirculation/tailwater return system and a drainage basin/sediment pond; together, their acreage accounts for 744 of the acres with recommended practices in the Bear Creek subwatershed (372 acres associated with both a recirculation/tailwater return system and a drainage basin/sediment pond). The grower farming 207 acres installed a microirrigation system and reduced the amount of water used during surface irrigation; the grower operating 165 acres reduced the amount of water used during surface irrigation (Table 22).

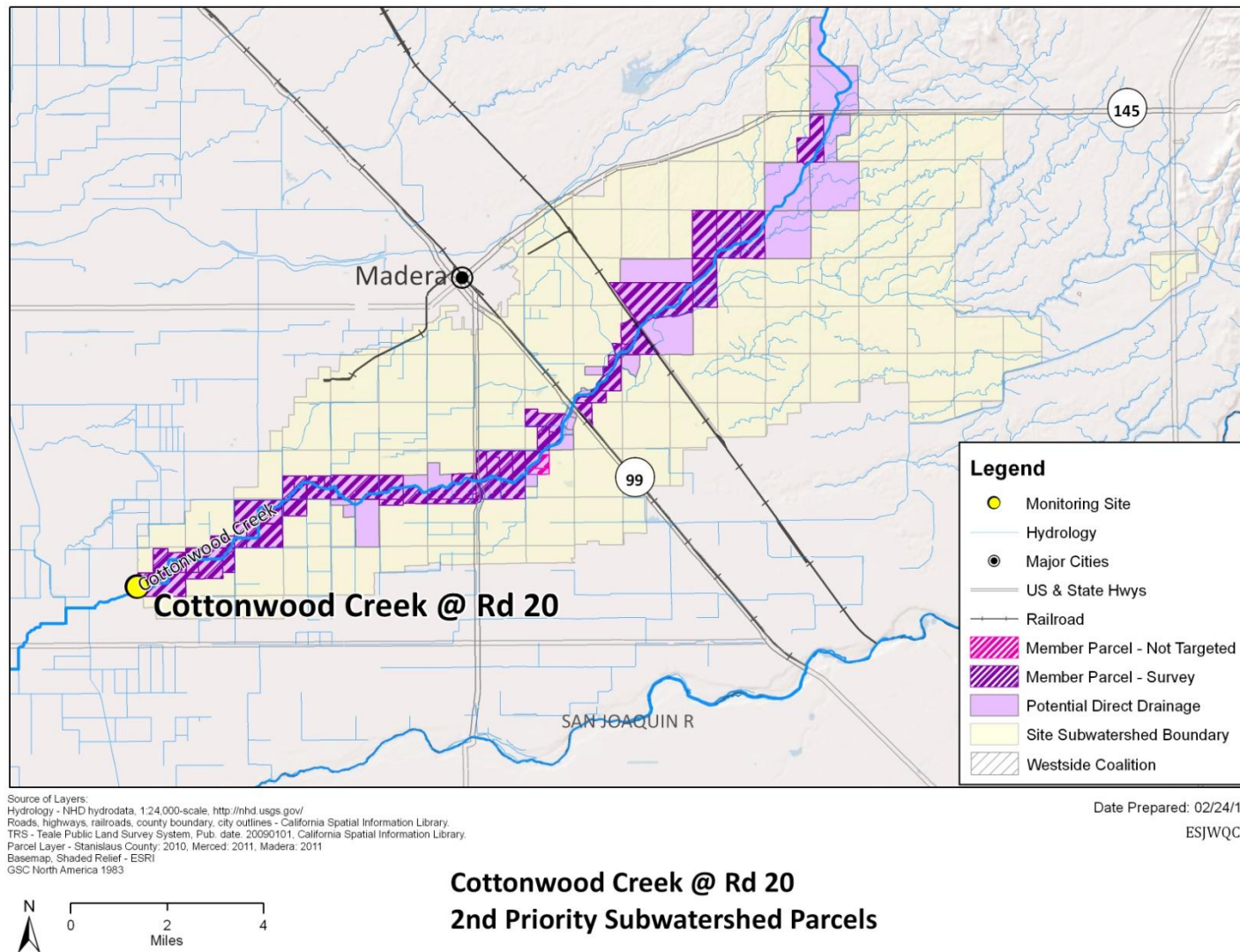
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### Cottonwood Creek @ Rd 20

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The Coalition received completed surveys from 25 targeted growers representing 45% of the total direct drainage acreage (Table 11, Figure 16). The 25 members were surveyed for management practices currently implemented across 5,768 acres within the Cottonwood Creek subwatershed (Table 11). One grower sold their property and therefore follow up surveys were completed by 24 of the 25 initial contacts (Table 23).

Figure 16. Cottonwood Creek@ Rd 20 member parcels with direct drainage potential.



### *Summary of Current and Recommended Management Practices (2009/2010)*

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Coalition members in Cottonwood Creek primarily farm orchards and vineyards, the majority of which have no irrigation runoff (Figure 17). A large portion of the creek is bordered by large berms, which prevent discharge to the creek and less than 20% of the acreage surveyed has irrigation runoff (Figure 17). The vast majority of recommended practices address spray drift management; however, Coalition representatives also recommended storm water runoff management and prevention practices, including installation of 10 foot wide filter strips around field perimeters (Figure 18).

#### **Irrigation Water Management**

As listed in Table 23, growers were almost evenly split between those who reported utilizing microirrigation and/or sprinklers to irrigate (56%) and who reported utilizing surface (flood) irrigation (52%). However, the 52% of respondents using flood irrigation accounted for only 36% of the acreage. In addition, a single grower farming 695 acres uses surface, sprinkler, and microirrigation techniques (all irrigation systems are associated with the enrolled acreage). All respondents irrigate based on actual moisture levels and crop needs rather than on a set schedule, and the majority of growers (80%) farm laser leveled fields (Table 23).

#### **Storm Water Drainage**

The majority of respondents indicated no storm water drainage (68%) from their property. Five respondents indicated storm water drainage only in 100 year storms, and three growers reported storm water drainage when the soil is saturated. Several growers implemented management practices designed to address storm water drainage, including growers who indicated no drainage from their property (Table 23, How are you able to manage storm drainage?). Six growers pump or drain discharge into waterways and are unable to control timing, two growers are able to control timing of pumping or discharge, two growers utilize a recirculation/tailwater return system, and one grower utilizes a settling pond. Herbicides are applied by most growers, with only 8% indicating no applications (Table 23). Glyphosate and Goal are the most commonly applied herbicides.

#### **Erosion & Sediment Management**

All respondents indicated that they control erosion and sediment delivery by some means.

#### **Pest Management**

Three respondents indicated they considered alternatives to using diazinon or chlorpyrifos during the growing season while the remaining 22 respondents indicated alternative are not applicable (Table 23). Over 96% of the acreage is sprayed with equipment that is calibrated prior to each application and the majority took numerous steps to manage their spray drift. One hundred percent of the growers adjust spray nozzles to match the canopy profile and use nozzles that provide the largest effective droplet size. Ninety-two percent of the growers shut outside nozzles when spraying outer two rows and spray areas close to waterbodies when the wind is blowing away and 80% of the growers use air blast applications when wind is between three to 10 mph (Table 23).

### **Dormant Spray Management**

The majority of respondents (92%) indicated that they do not use dormant sprays. The two respondents who do apply during the dormant season indicated vegetation covers their fields in the winter, they check weather conditions prior to application and maintain setback zone while spraying.

**Table 23. Cottonwood Creek@ Rd 20 subwatershed current management practices (2010).**

| CHECKLIST                                | QUESTION                                                          | ANSWER                                                                    | COUNT OF ANSWERS | % RESPONDENTS | SUM OF ASSOCIATED ACREAGE |
|------------------------------------------|-------------------------------------------------------------------|---------------------------------------------------------------------------|------------------|---------------|---------------------------|
| Section 1: Irrigation Water Management   | Irrigation management practices:                                  | Laser leveled fields                                                      | 20               | 80%           | 4283                      |
|                                          |                                                                   | Recirculation - Tailwater return system                                   | 2                | 8%            | 510                       |
|                                          |                                                                   | Use drainage basins (sediment ponds) to capture and retain runoff         | 1                | 4%            | 96                        |
|                                          | Irrigation System                                                 | Microirrigation                                                           | 11               | 44%           | 4126                      |
|                                          |                                                                   | Sprinkler                                                                 | 3                | 12%           | 938                       |
|                                          |                                                                   | Surface                                                                   | 13               | 52%           | 2096                      |
|                                          | Which do you base your irrigation schedule on:                    | Actual Moisture Levels in soil/crop needs                                 | 25               | 100%          | 5770                      |
| Section 2: Storm Drainage                | How are you able to manage storm drainage?                        | No Storm Drainage                                                         | 12               | 48%           | 2167                      |
|                                          |                                                                   | Pump/Drain into waterway & able to control timing                         | 2                | 8%            | 944                       |
|                                          |                                                                   | Pump/Drain into waterway & unable to control timing                       | 6                | 24%           | 2194                      |
|                                          |                                                                   | Recirculation - Tailwater return system                                   | 2                | 8%            | 510                       |
|                                          |                                                                   | Settling Pond                                                             | 1                | 4%            | 414                       |
|                                          | When do you have storm water draining from your field?            | After soil is saturated-late winter                                       | 3                | 12%           | 1127                      |
|                                          |                                                                   | No Storm Drainage                                                         | 17               | 68%           | 2467                      |
|                                          |                                                                   | Only in heavy (100 year) storms                                           | 5                | 20%           | 2176                      |
| Section 3: Erosion & Sediment Management | Sediment management practices:                                    | Grass Row Centers (Orchards, Vineyards)                                   | 21               | 84%           | 5326                      |
|                                          |                                                                   | Maintain vegetated filter strips around field perimeter at least 10' wide | 13               | 52%           | 2849                      |
|                                          |                                                                   | Vegetation is planted along or allowed to grow along ditches              | 6                | 24%           | 2332                      |
|                                          | Do you apply herbicides during winter months?                     | Diuron (Karmex)                                                           | 1                | 4%            | 80                        |
|                                          |                                                                   | Do not apply                                                              | 2                | 8%            | 130                       |
|                                          |                                                                   | Glyphosate (Round-Up)                                                     | 19               | 76%           | 4899                      |
|                                          |                                                                   | Goal                                                                      | 13               | 52%           | 3592                      |
|                                          |                                                                   | Other                                                                     | 9                | 36%           | 1278                      |
|                                          |                                                                   | Paraquat (Gramaxone)                                                      | 9                | 36%           | 3561                      |
|                                          |                                                                   | Simazine (Princep)                                                        | 6                | 24%           | 773                       |
|                                          | If waterway crosses or borders pasture, how is livestock managed? | N/A - Not Pasture                                                         | 23               | 92%           | 5630                      |
|                                          |                                                                   | Riparian vegetation prevents livestock access to water                    | 1                | 4%            | 80                        |
|                                          |                                                                   | Waterway is fenced                                                        | 1                | 4%            | 80                        |

| CHECKLIST                           | QUESTION                                                                                                                  | ANSWER                                                                                  | COUNT OF ANSWERS | % RESPONDENTS | SUM OF ASSOCIATED ACREAGE |
|-------------------------------------|---------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------|------------------|---------------|---------------------------|
| Section 4: Pest Management          | Spray management practices:                                                                                               | Adjust spray nozzles to match crop canopy profile                                       | 25               | 100%          | 5770                      |
|                                     |                                                                                                                           | Outside nozzles shut off when spraying outer rows next to sensitive sites               | 23               | 92%           | 5606                      |
|                                     |                                                                                                                           | Spray areas close to waterbodies when the wind is blowing away from them                | 23               | 92%           | 4663                      |
|                                     |                                                                                                                           | Use air blast applications when wind is between 3-10 mph and upwind of a sensitive site | 20               | 80%           | 5195                      |
|                                     |                                                                                                                           | Uses of nozzles that provide largest effective droplet size to minimize drift           | 25               | 100%          | 5770                      |
|                                     | Have you considered alternative strategies to using diazinon or chlorpyrifos either during the dormant or growing season? | N/A                                                                                     | 22               | 88%           | 4831                      |
|                                     |                                                                                                                           | Yes                                                                                     | 3                | 12%           | 939                       |
|                                     | How often is spray equipment calibrated?                                                                                  | Once per month                                                                          | 3                | 12%           | 107                       |
|                                     |                                                                                                                           | Once per year                                                                           | 3                | 12%           | 149                       |
|                                     |                                                                                                                           | Prior to each application                                                               | 19               | 76%           | 5514                      |
| Section 5: Dormant Spray Management | Dormant spray management practices:                                                                                       | Check weather conditions prior to spraying                                              | 2                | 8%            | 614                       |
|                                     |                                                                                                                           | Maintain setback zones                                                                  | 2                | 8%            | 614                       |
|                                     | Do you apply when soil moisture is at field capacity?                                                                     | No                                                                                      | 2                | 8%            | 614                       |
|                                     | Have you been informed of DPR's Dormant Spray Regulations?                                                                | Yes                                                                                     | 2                | 8%            | 614                       |
|                                     | How many acres are sprayed with dormant pesticides?                                                                       | 461 Acres                                                                               | 1                | 4%            | 461                       |
|                                     |                                                                                                                           | 56 Acres                                                                                | 1                | 4%            | 153                       |
|                                     |                                                                                                                           | No Dormant Sprays                                                                       | 23               | 92%           | 5156                      |
|                                     | Prior to applying winter dormant sprays, what is the condition of your orchard floor?                                     | Some vegetation                                                                         | 1                | 4%            | 153                       |
|                                     |                                                                                                                           | Vegetated Cover w/Sprayed Berms                                                         | 1                | 4%            | 461                       |



**Figure 17. Cottonwood Creek@ Rd 20 crop acreage information from member surveys (2010).**

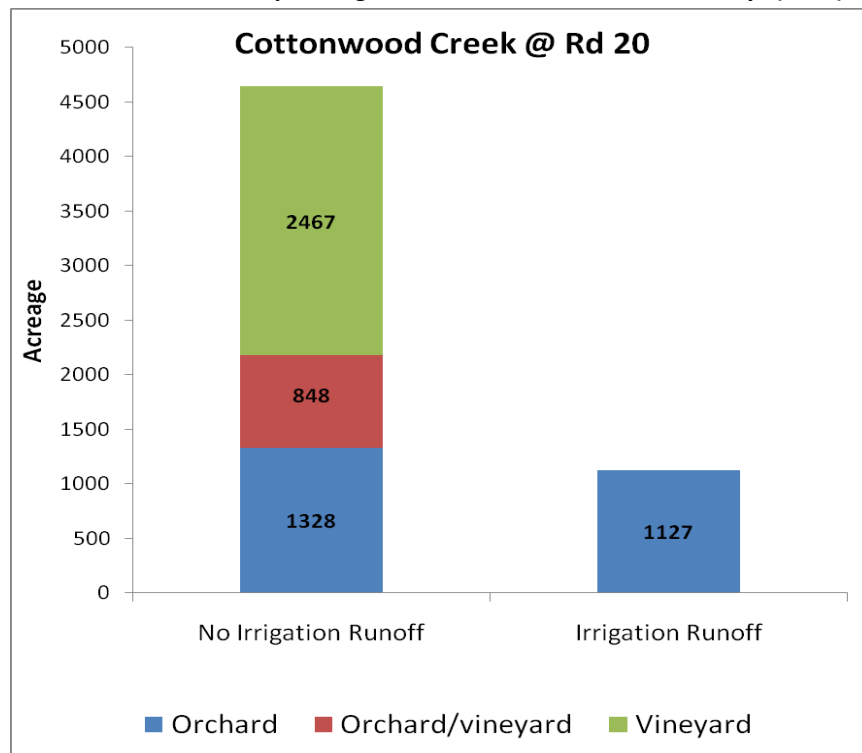
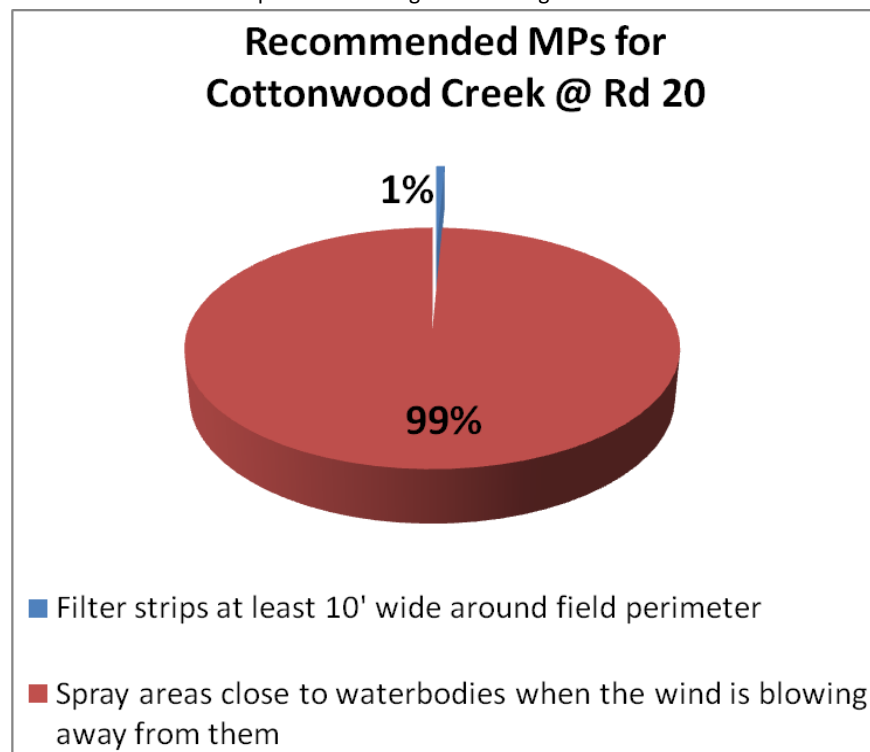


**Figure 18. Percent of acreage represented by recommended management practices for Cottonwood Creek@ Rd 20.**

Recommended practices are associated with parcels with irrigation drainage.



*Summary of Implemented Management Practices (2010/2011)*

Table 24 presents a comparison of Coalition recommended management practices and newly implemented management practices for the Cottonwood Creek @ Rd 20 subwatershed. Newly implemented management practices within Cottonwood Creek include maintaining filter strips at least 10 feet wide around field perimeters, spraying areas close to waterbodies when the wind is blowing away from them, using electronic controlled sprayer nozzles, and using less water during surface irrigation. Growers implemented all recommended practices as well as practices that were not specifically recommended for their operations, accounting for 1,917 acres without irrigation drainage within the Cottonwood Creek subwatershed (Table 24). Figure 19 provides each of the newly implemented management practices as a percentage of the overall acreage.

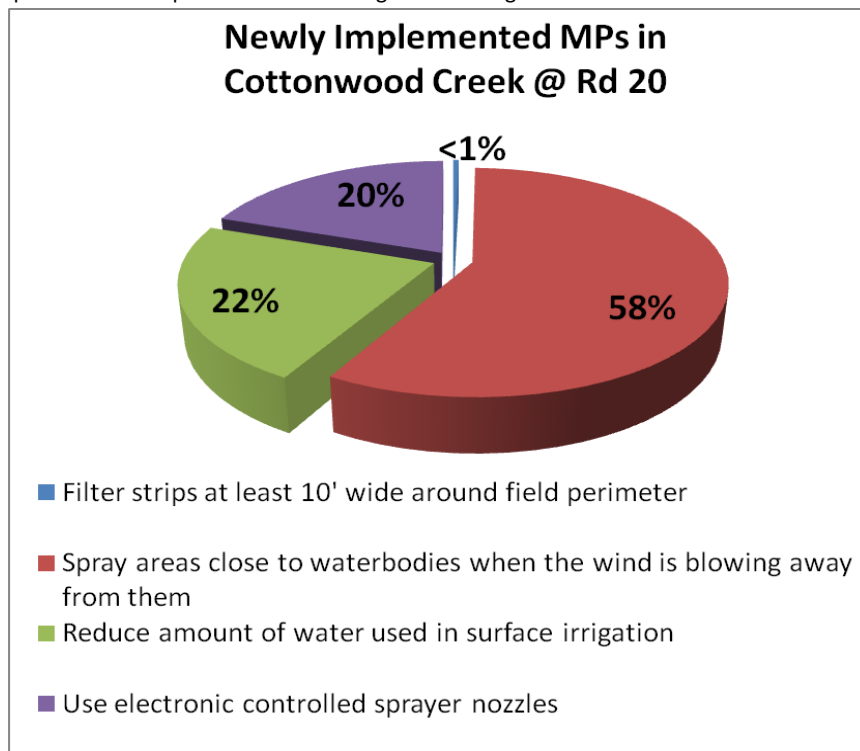
**Table 24. Comparison of recommended MPs and implemented MPs in Cottonwood Creek @ Rd 20 subwatershed.**

| MANAGEMENT PRACTICE<br>(SEPARATED BY NO DRAINAGE VS DRAINAGE)                                         | RECOMMENDED PRACTICES |       | IMPLEMENTED PRACTICES |                  | % RECOMMENDED ACREAGE WITH IMPLEMENTED PRACTICES |
|-------------------------------------------------------------------------------------------------------|-----------------------|-------|-----------------------|------------------|--------------------------------------------------|
|                                                                                                       | # GROWERS             | ACRES | # GROWERS             | ACRES            |                                                  |
| No irrigation drainage from property                                                                  |                       |       |                       |                  |                                                  |
| Filter strips at least 10' wide around field perimeter                                                | 1                     | 8     | 1                     | 8                | 100%                                             |
| Spray areas close to waterbodies when the wind is blowing away from them                              | 2                     | 1,107 | 2                     | 1,107            | 100%                                             |
| Use electronic controlled sprayer nozzles                                                             | 0                     | 0     | 3                     | 375 <sup>1</sup> | NA                                               |
| Reduce amount of water used in surface irrigation                                                     | 0                     | 0     | 1                     | 427 <sup>1</sup> | NA                                               |
|                                                                                                       |                       |       |                       |                  |                                                  |
| TOTAL ACREAGE WITH 1 OR MORE RECOMMENDED PRACTICES                                                    |                       |       |                       |                  | 1,115                                            |
| TOTAL ACREAGE WITH 1 OR MORE IMPLEMENTED PRACTICES                                                    |                       |       |                       |                  | 1,917                                            |
| PERCENT OF IMPLEMENTED PRACTICES COMPARED TO RECOMMENDED ACREAGE WITH 1 OR MORE IMPLEMENTED PRACTICES |                       |       |                       |                  | 172%                                             |

<sup>1</sup>Management practice not specifically recommended by Coalition representative for grower's operation.  
NA – Not applicable; no recommendations for the management practice in the subwatershed.

**Figure 19. Percentage of acreage represented by newly implemented management practices for Cottonwood Creek @ Rd 20.**

All members that implemented new practices have no irrigation drainage.



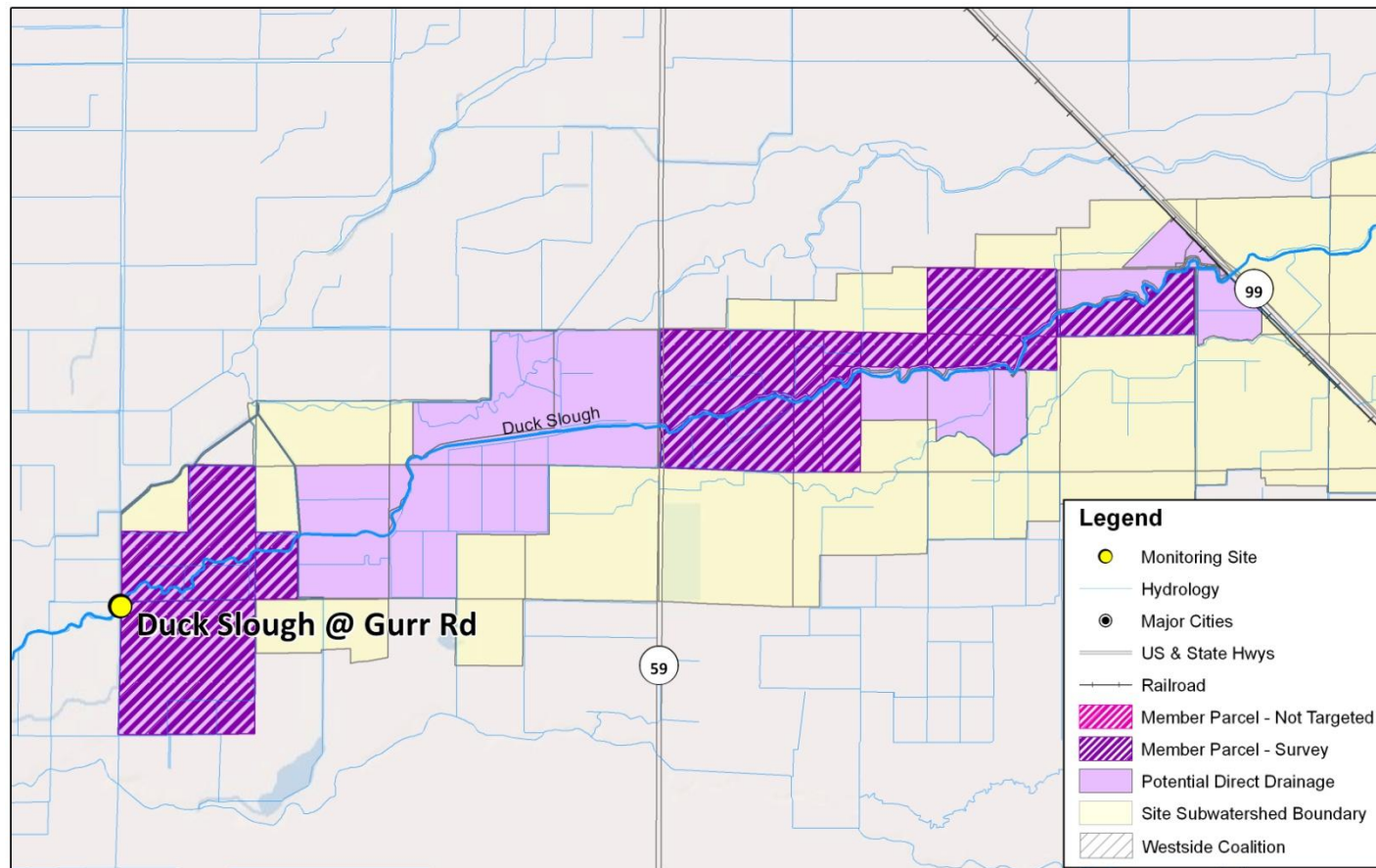
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#### Duck Slough @ Gurr Rd

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The Coalition contacted six targeted growers representing 46% of the total direct drainage area within the Duck Slough @ Gurr Rd subwatershed (Table 11). The six members could drain directly to Duck Slough (including spray drift potential), were currently farming and reported pesticide use of high priority constituents (Figure 20). All six growers completed initial contact and follow up surveys (Table 25).

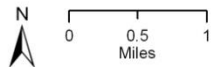
**Figure 20. Duck Slough @ Gurr Rd member parcels with direct drainage potential.**



Source of Layers:  
 Hydrology - NHD hydrodata, 1:24,000-scale, <http://nhd.usgs.gov/>  
 Roads, highways, railroads, county boundary, city outlines - California Spatial Information Library  
 TRS - Teale Public Land Survey System, Pub. date: 20090101, California Spatial Information Library  
 Parcel Layer - Stanislaus County, 2010; Merced, 2011; Madera, 2011  
 Basemap, Shaded Relief - ESRI  
 GSC North America 1983

Date Prepared: 02/28/11

ESJWQC



### Duck Slough @ Gurr Rd 2nd Priority Subwatershed Parcels

### *Summary of Current and Recommended Management Practices (2009/2010)*

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The Duck Slough @ Gurr Rd subwatershed is dominated by field/row crops 80% of which could return irrigation tailwater to Duck Slough (Figure 21). Coalition representatives recommended management practices to those growers. These practices include installing a recirculation/tailwater return system, constructing a drainage basin/sediment pond to reduce runoff and using PAM during irrigation to reduce furrow erosion (Figure 22). When applicable, additional recommendations (including spraying areas close to waterbodies when wind is blowing away from them) were made by the Coalition to further aid in reducing water quality impairments (Figure 22).

#### **Irrigation Water Management**

All growers surveyed in the Duck Slough watershed indicated they surface irrigate (Table 25). All growers laser level their fields, 67% use recirculation/tailwater return systems and 50% use sediment retention ponds to prevent discharges to surface waters (Table 25).

#### **Storm Water Drainage**

Thirty-three percent of respondents reported no storm water drainage and 67% drain only during 100 year storms. Half of growers representing 66% of the acreage indicated they pump storm water to surface waters and are able to control the timing; one grower pumps to surface waters but cannot control the timing. Fifty percent of the acreage in Duck Slough @ Gurr Rd has a recirculation/tailwater return system and/or settling pond installed (Table 25).

#### **Erosion & Sediment Management**

All respondents indicated they control erosion and sediment delivery by some means (Table 25).

#### **Pest Management / Dormant Spray Management**

All but one grower indicated that they apply herbicides during the winter; 50% apply paraquat and 33% apply glyphosate (Table 25). None of the targeted members apply dormant sprays. The majority of respondents (83%) calibrate prior to application of pesticides and one grower calibrates once per month. Every respondent takes numerous steps to manage their spray drift including adjusting spray nozzles to match the canopy profile (100%), spraying areas close to waterbodies when the wind is blowing away from them (83%), and using nozzles that provide the largest effective droplet size to minimize drift (100%, Table 25).

**Table 25. Duck Slough @ Gurr Rd subwatershed current management practices (2010).**

| CHECKLIST                                | QUESTION                                                          | ANSWER                                                                    | COUNT OF ANSWERS | % RESPONDENTS | SUM OF ASSOCIATED ACREAGE |
|------------------------------------------|-------------------------------------------------------------------|---------------------------------------------------------------------------|------------------|---------------|---------------------------|
| Section 1: Irrigation Water Management   | Irrigation management practices:                                  | Laser leveled fields                                                      | 6                | 100%          | 2656                      |
|                                          |                                                                   | Recirculation - Tailwater return system                                   | 4                | 67%           | 1845                      |
|                                          |                                                                   | Use drainage basins (sediment ponds) to capture and retain runoff         | 3                | 50%           | 1754                      |
|                                          | Irrigation System                                                 | Surface                                                                   | 6                | 100%          | 2656                      |
|                                          | Which do you base your irrigation schedule on:                    | Actual Moisture Levels in soil/crop needs                                 | 6                | 100%          | 2656                      |
| Section 2: Storm Drainage                | How are you able to manage storm drainage?                        | No Storm Drainage                                                         | 2                | 33%           | 280                       |
|                                          |                                                                   | Pump/Drain into waterway & able to control timing                         | 3                | 50%           | 1754                      |
|                                          |                                                                   | Pump/Drain into waterway & unable to control timing                       | 1                | 17%           | 91                        |
|                                          |                                                                   | Recirculation - Tailwater return system                                   | 2                | 33%           | 1309                      |
|                                          |                                                                   | Settling Pond                                                             | 2                | 33%           | 1309                      |
|                                          | When do you have storm water draining from your field?            | No Storm Drainage                                                         | 2                | 33%           | 811                       |
|                                          |                                                                   | Only in heavy (100 year) storms                                           | 4                | 67%           | 1845                      |
| Section 3: Erosion & Sediment Management | Sediment management practices:                                    | Maintain vegetated filter strips around field perimeter at least 10' wide | 1                | 17%           | 189                       |
|                                          |                                                                   | Vegetation is planted along or allowed to grow along ditches              | 5                | 83%           | 2211                      |
|                                          | Do you apply herbicides during winter months?                     | Diuron (Karmex)                                                           | 1                | 17%           | 484                       |
|                                          |                                                                   | Do not apply                                                              | 1                | 17%           | 622                       |
|                                          |                                                                   | Glyphosate (Round-Up)                                                     | 2                | 33%           | 536                       |
|                                          |                                                                   | Other                                                                     | 4                | 67%           | 1845                      |
|                                          |                                                                   | Paraquat (Gramaxone)                                                      | 3                | 50%           | 1105                      |
|                                          | If waterway crosses or borders pasture, how is livestock managed? | N/A - Not Pasture                                                         | 6                | 100%          | 2656                      |
| Section 4: Pest Management               | Spray management practices:                                       | Adjust spray nozzles to match crop canopy profile                         | 6                | 100%          | 2656                      |
|                                          |                                                                   | Outside nozzles shut off when spraying outer rows next to sensitive sites | 1                | 17%           | 445                       |
|                                          |                                                                   | Spray areas close to waterbodies when the wind is blowing away from them  | 5                | 83%           | 2565                      |
|                                          |                                                                   | Uses of nozzles that provide largest effective droplet                    | 6                | 100%          | 2656                      |

| CHECKLIST                           | QUESTION                                                                                                                  | ANSWER                    | COUNT OF<br>ANSWERS | %<br>RESPONDENTS | SUM OF<br>ASSOCIATED<br>ACREAGE |
|-------------------------------------|---------------------------------------------------------------------------------------------------------------------------|---------------------------|---------------------|------------------|---------------------------------|
|                                     |                                                                                                                           | size to minimize drift    |                     |                  |                                 |
|                                     | Have you considered alternative strategies to using diazinon or chlorpyrifos either during the dormant or growing season? | N/A                       | 6                   | 100%             | 2656                            |
|                                     | How often is spray equipment calibrated?                                                                                  | Once per month            | 1                   | 17%              | 445                             |
|                                     |                                                                                                                           | Prior to each application | 5                   | 83%              | 2211                            |
| Section 5: Dormant Spray Management | How many acres are sprayed with dormant pesticides?                                                                       | No Dormant Sprays         | 6                   | 100%             | 2656                            |

**Figure 21. Duck Slough @ Gurr Rd crop acreage information from member surveys (2010).**

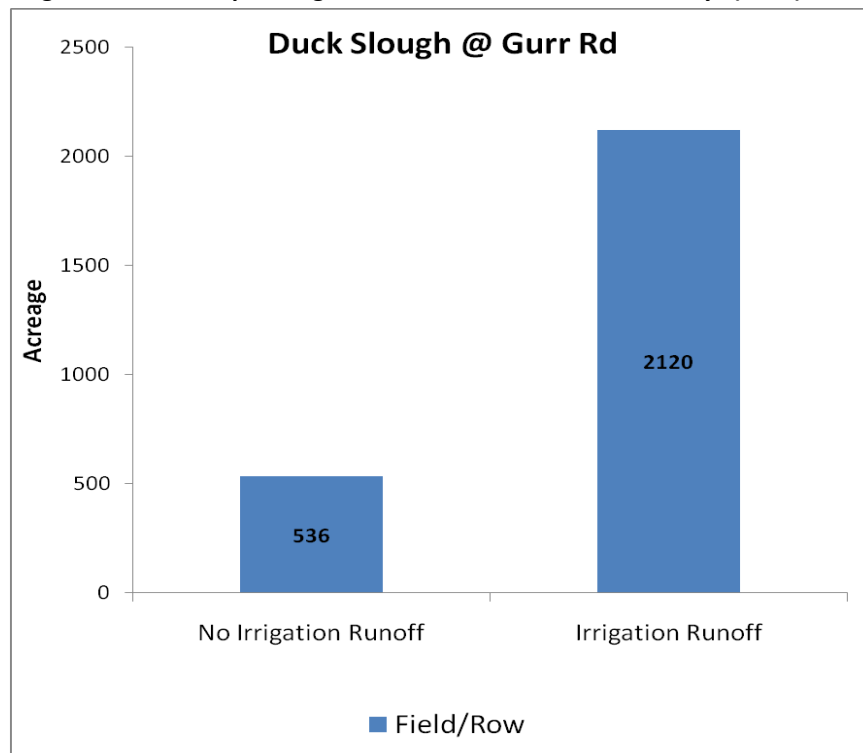
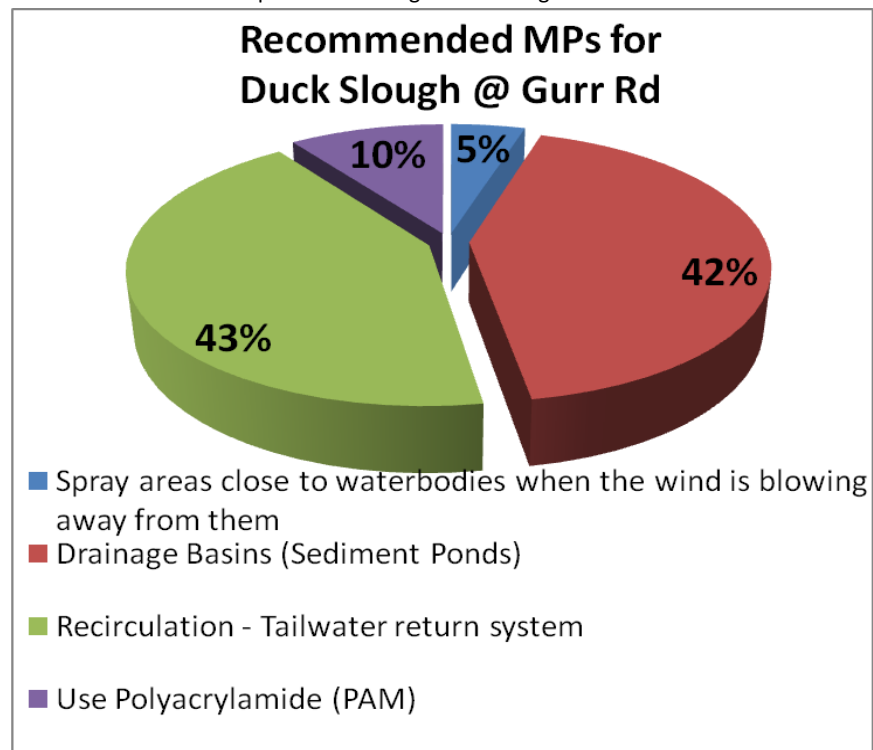


**Figure 22. Percent of acreage represented by recommended management practices for Duck Slough @ Gurr Rd.**  
Recommended practices are associated with parcels with irrigation drainage.





### *Summary of Implemented (2010/2011) Management Practices*

Table 26 is a comparison of recommended management practices and newly implemented management practices for the Duck Slough subwatershed. Growers in the Duck Slough subwatershed were able to implement management practices that focused on spray drift management including spraying areas close to waterbodies when the wind is blowing away from them and shutting off outside nozzles when spraying outer rows next to sensitive sites (Table 26, Figure 23). Growers implemented recommended practices as well as practices that were not specifically recommended for their operations (accounting for 713 acres of land with and without irrigation drainage). Figure 23 displays each of the newly implemented management practices as a percentage of the overall acreage.

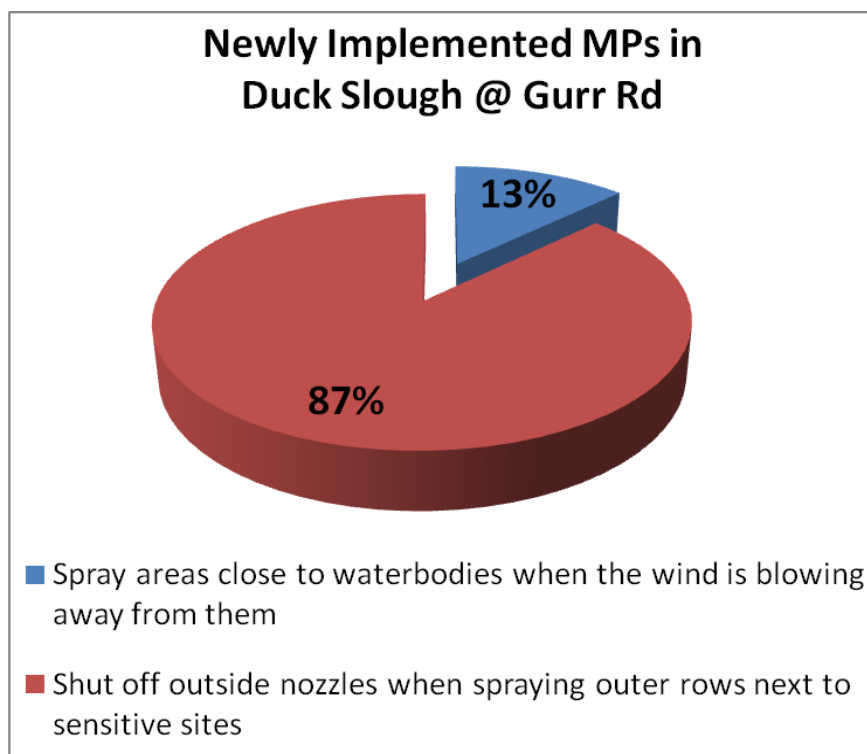
**Table 26. Comparison of recommended MPs and implemented MPs in Duck Slough @ Gurr Rd subwatershed.**

| MANAGEMENT PRACTICE<br>(SEPARATED BY NO DRAINAGE VS DRAINAGE)                                         | RECOMMENDED PRACTICES |       | IMPLEMENTED PRACTICES |                  | % RECOMMENDED ACREAGE WITH IMPLEMENTED PRACTICES |
|-------------------------------------------------------------------------------------------------------|-----------------------|-------|-----------------------|------------------|--------------------------------------------------|
|                                                                                                       | # GROWERS             | ACRES | # GROWERS             | ACRES            |                                                  |
| No irrigation drainage from property                                                                  |                       |       |                       |                  |                                                  |
| Spray areas close to waterbodies when the wind is blowing away from them                              | 1                     | 91    | 1                     | 91               | 100%                                             |
| Yes, irrigation drainage from property                                                                |                       |       |                       |                  |                                                  |
| Drainage Basins (Sediment Ponds)                                                                      | 2                     | 811   | 0                     | 0                | 0%                                               |
| Recirculation - Tailwater return system                                                               | 2                     | 811   | 0                     | 0                | 0%                                               |
| Use Polyacrylamide (PAM)                                                                              | 1                     | 189   | 0                     | 0                | 0%                                               |
| Shut off outside nozzles when spraying outer rows next to sensitive sites                             | 0                     | 0     | 1                     | 622 <sup>1</sup> | NA                                               |
| TOTAL ACREAGE WITH 1 OR MORE RECOMMENDED PRACTICES                                                    |                       |       |                       |                  | 1,902                                            |
| TOTAL ACREAGE WITH 1 OR MORE IMPLEMENTED PRACTICES                                                    |                       |       |                       |                  | 713                                              |
| PERCENT OF IMPLEMENTED PRACTICES COMPARED TO RECOMMENDED ACREAGE WITH 1 OR MORE IMPLEMENTED PRACTICES |                       |       |                       |                  | 37%                                              |

<sup>1</sup> Management practice not specifically recommended by Coalition representative for grower's operation.

NA – Not applicable; no recommendations for the management practice in the subwatershed.

**Figure 23. Percentage of acreage represented by newly implemented management practices for Duck Slough @ Gurr Rd.**



All growers who did not implement recommended management practices indicated they had no available resources to do so. One grower was unable to install the recommended recirculation/tailwater return system and drainage basin/sediment pond on his 622-acre property. However, the same grower indicated on his follow up survey that he began to shut off outside nozzles when spraying outer rows next to sensitive sites (Table 26).

Similar to the strategy for members without available resources in the Bear Creek @ Kibby Rd subwatershed, the Coalition will continue to notify its members about accessible funding and encourage them to take advantage of the opportunities.

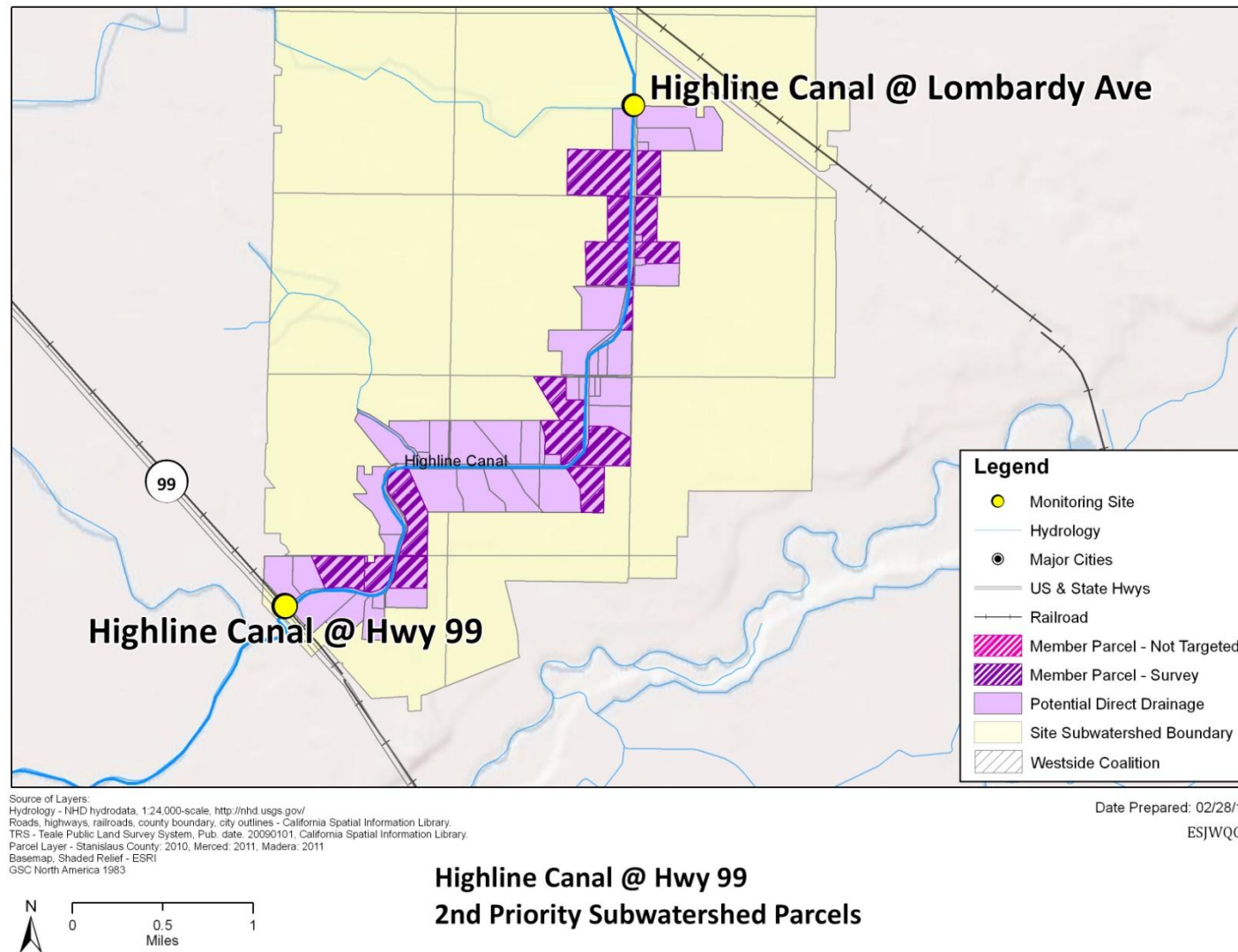
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#### Highline Canal @ Hwy 99

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The Coalition contacted and received completed surveys from 10 targeted growers representing 33% of the direct drainage acreage within the Highline Canal @ Hwy 99 subwatershed (Table 11, Figure 24). Of the 10 targeted growers, one grower dropped their Coalition membership and one grower discontinued enrolling parcels within the Highline Canal subwatershed. Consequently, eight growers completed follow up surveys (Table 27).

Figure 24. Highline Canal @ Hwy 99 member parcels with direct drainage potential.



### *Summary of Current and Recommended Management Practices (2009/2010)*

Targeted growers in the Highline Canal @ Hwy 99 subwatershed primarily farm orchards, with some field/row crops. All growers reported no irrigation drainage from their properties in 2009 and 2010 (Figure 25). Highline Canal is a raised canal and only a few parcels are able to pump water into the canal. Therefore, Coalition representatives recommended three spray drift management practices to growers: spraying areas close to waterbodies when the wind is blowing away from them, using air blast applications when wind is between three and 10 mph, and using nozzles that provide the largest effective droplet size to minimize drift (Figure 26). Since targeted parcels in the Highline Canal do not drain, the Coalition believes eliminating spray drift is the most effective method to improve water quality in the canal.

#### **Irrigation Water Management**

Growers in the Highline Canal @ Hwy 99 subwatershed reported a variety of irrigation systems in use on their fields, and some growers reported they employ more than one system on their property. Only two growers accounting for 49% of the acreage indicated they use surface (flood) irrigation techniques. Eight of the 10 growers use sprinklers; some members have a combination of sprinkler and microirrigation (Table 27). One grower, farming 121 acres, employs surface, sprinkler, and microirrigation on his operation. Thirty percent of the respondents irrigate based on soil moisture levels, 60% allow the irrigation district deliveries to dictate their watering schedule and one grower did not respond to the question.

#### **Erosion & Sediment Management / Storm Drainage**

All respondents indicated they control erosion and sediment discharge by some means. Two growers indicated they have storm water discharge only in the case of a heavy 100-year storm (Table 27).

#### **Dormant Sprays**

Three of the seven members farming 215 acres, apply dormant sprays (Table 30). All three were informed of DPRs Dormant Spray Regulations and allow vegetation cover to grow prior to spraying.

#### **Pest Management**

Half of respondents, representing 38% of the acreage, indicated they do not apply herbicides in the winter. Of the growers with winter herbicide applications, 30% apply glyphosate, 20% apply paraquat, 10% apply Goal and 10% indicated they apply herbicides but do not know which ones (Table 27). Half of the respondents indicated they considered alternatives to using diazinon or chlorpyrifos during the growing season, and the other half indicated the question is not applicable to their operation. Seven respondents indicated they calibrate their nozzles prior to each application, and two growers calibrate their nozzles once a year; one grower did not respond. The majority of growers took numerous steps to manage their spray drift including adjusting spray nozzles to match the canopy profile (90%), shutting outside nozzles when spraying outer two rows (90%), spraying areas close to waterbodies when the wind is blowing away from them (80%), using air blast applications when wind is between three to 10 mph (30%), and using nozzles that provide the largest effective droplet size to minimize drift (80%, Table 27).

**Table 27. Highline Canal @ Hwy 99 subwatershed current management practices (2010).**

| CHECKLIST                                | QUESTION                                                          | ANSWER                                                                                  | COUNT OF ANSWERS | % RESPONDENTS | SUM OF ASSOCIATED ACREAGE |
|------------------------------------------|-------------------------------------------------------------------|-----------------------------------------------------------------------------------------|------------------|---------------|---------------------------|
| Section 1: Irrigation Water Management   | Irrigation management practices:                                  | Laser leveled fields                                                                    | 6                | 60%           | 201                       |
|                                          | Irrigation System                                                 | Microirrigation                                                                         | 4                | 40%           | 226                       |
|                                          |                                                                   | Sprinkler                                                                               | 8                | 80%           | 277                       |
|                                          |                                                                   | Surface                                                                                 | 2                | 20%           | 181                       |
|                                          | Which do you base your irrigation schedule on:                    | Actual Moisture Levels in soil/crop needs                                               | 3                | 30%           | 90                        |
|                                          |                                                                   | Irrigation District Deliveries                                                          | 6                | 60%           | 253                       |
| Section 2: Storm Drainage                | How are you able to manage storm drainage?                        | No Storm Drainage                                                                       | 8                | 80%           | 218                       |
|                                          | When do you have storm water draining from your field?            | No Storm Drainage                                                                       | 8                | 80%           | 323                       |
|                                          |                                                                   | Only in heavy (100 year) storms                                                         | 2                | 20%           | 45                        |
|                                          |                                                                   | Grass Row Centers (Orchards, Vineyards)                                                 | 6                | 60%           | 247                       |
| Section 3: Erosion & Sediment Management | Sediment management practices:                                    | Maintain vegetated filter strips around field perimeter at least 10' wide               | 4                | 40%           | 169                       |
|                                          |                                                                   | Vegetation is planted along or allowed to grow along ditches                            | 5                | 50%           | 153                       |
|                                          |                                                                   | Do not apply                                                                            | 5                | 50%           | 140                       |
|                                          | Do you apply herbicides during winter months?                     | Glyphosate (Round-Up)                                                                   | 3                | 30%           | 148                       |
|                                          |                                                                   | Goal                                                                                    | 1                | 10%           | 121                       |
|                                          |                                                                   | Other (product unknown)                                                                 | 1                | 10%           | 60                        |
|                                          |                                                                   | Paraquat (Gramaxone)                                                                    | 2                | 20%           | 141                       |
|                                          | If waterway crosses or borders pasture, how is livestock managed? | N/A - Not Pasture                                                                       | 10               | 100%          | 368                       |
| Section 4: Pest Management               | Spray management practices:                                       | Adjust spray nozzles to match crop canopy profile                                       | 9                | 90%           | 337                       |
|                                          |                                                                   | Outside nozzles shut off when spraying outer rows next to sensitive sites               | 9                | 90%           | 337                       |
|                                          |                                                                   | Spray areas close to waterbodies when the wind is blowing away from them                | 8                | 80%           | 312                       |
|                                          |                                                                   | Use air blast applications when wind is between 3-10 mph and upwind of a sensitive site | 3                | 30%           | 47                        |
| Section 4: Pest Management               | Spray management practices:                                       | Use electronic controlled sprayer nozzles                                               | 1                | 10%           | 20                        |

| CHECKLIST                           | QUESTION                                                                                                                  | ANSWER                                                                        | COUNT OF ANSWERS | % RESPONDENTS | SUM OF ASSOCIATED ACREAGE |
|-------------------------------------|---------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------|------------------|---------------|---------------------------|
|                                     |                                                                                                                           | Uses of nozzles that provide largest effective droplet size to minimize drift | 8                | 80%           | 216                       |
|                                     | Have you considered alternative strategies to using diazinon or chlorpyrifos either during the dormant or growing season? | N/A                                                                           | 5                | 50%           | 102                       |
|                                     |                                                                                                                           | Yes                                                                           | 5                | 50%           | 266                       |
|                                     | How often is spray equipment calibrated?                                                                                  | Once per year                                                                 | 2                | 20%           | 70                        |
|                                     |                                                                                                                           | Prior to each application                                                     | 7                | 70%           | 267                       |
| Section 5: Dormant Spray Management | Dormant spray management practices:                                                                                       | Check weather conditions prior to spraying (i.e. storm status)                | 2                | 20%           | 181                       |
|                                     |                                                                                                                           | Maintain setback zones                                                        | 2                | 20%           | 181                       |
|                                     | Do you apply when soil moisture is at field capacity?                                                                     | N/A                                                                           | 1                | 10%           | 20                        |
|                                     |                                                                                                                           | No                                                                            | 2                | 20%           | 181                       |
|                                     | Have you been informed of DPR's Dormant Spray Regulations?                                                                | Yes                                                                           | 3                | 30%           | 201                       |
|                                     | How many acres are sprayed with dormant pesticides?                                                                       | 120 Acres                                                                     | 1                | 10%           | 121                       |
|                                     |                                                                                                                           | 35 Acres                                                                      | 1                | 10%           | 20                        |
|                                     |                                                                                                                           | 60 Acres                                                                      | 1                | 10%           | 60                        |
|                                     |                                                                                                                           | No Dormant Sprays                                                             | 7                | 70%           | 167                       |
|                                     | Prior to applying winter dormant sprays, what is the condition of your orchard floor?                                     | Vegetative cover                                                              | 3                | 30%           | 201                       |

Figure 25. Highline Canal @ Hwy 99 crop acreage information from member surveys (2010).

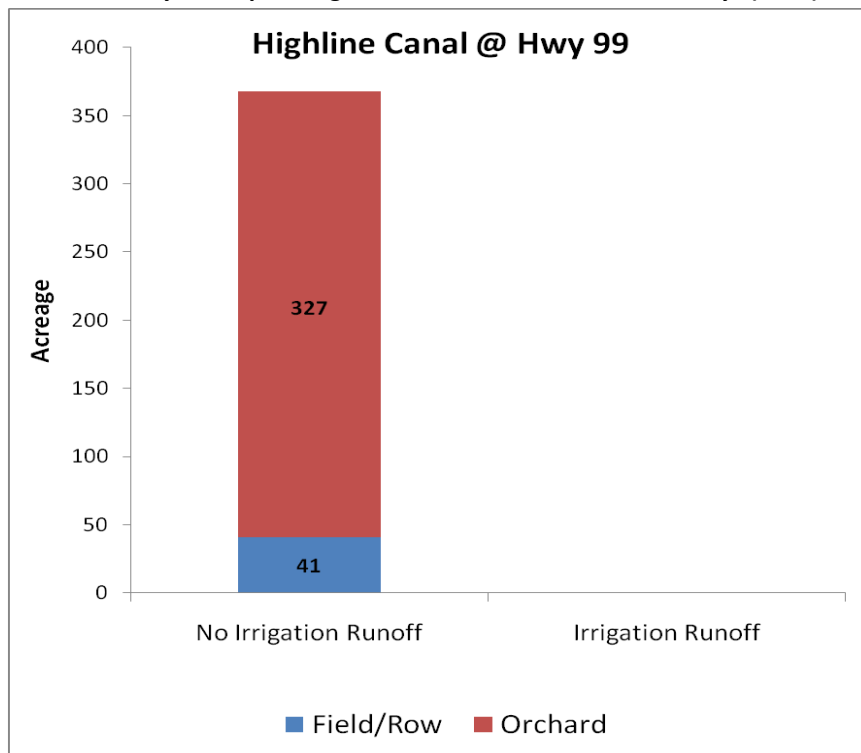
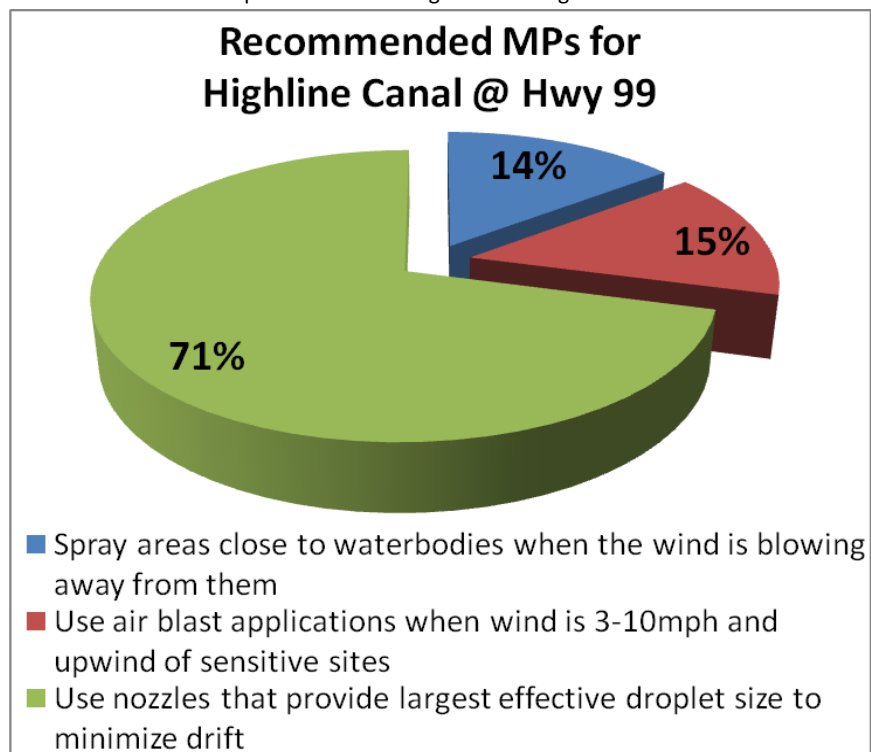


Figure 26. Percent of acreage represented by recommended management practices for Highline Canal @ Hwy 99.

Additional practices were recommended to parcels without irrigation drainage.



### *Summary of Implemented Management Practices (2010/2011)*

Table 28 presents a comparison of Coalition recommended management practices and newly implemented management practices for the Highline Canal @ Hwy 99 subwatershed. Newly implemented management practices include all recommended practices including practices not specifically recommended by the Coalition (Table 31). New practices were implemented on 368 acres and include spraying areas close to waterbodies when the wind is blowing away from them, using air blast applications when wind is between three and 10 mph and upwind of sensitive sites, using nozzles that provide largest effective droplet size to minimize drift, and using less water during surface irrigation (Table 28).

During initial contacts, all growers indicated no irrigation drainage from their operations in 2009. A single grower reported irrigation drainage during 2010. For parcels without irrigation drainage, newly implemented practices include reducing the amount of water used in surface irrigation, using air blast applications when the wind is 3-10 mph and upwind of sensitive sites and spraying areas close to waterbodies when the wind is blowing away from them (Figure 27). For parcels with irrigation drainage, growers reduced water use during irrigation and utilized nozzles that provided the largest effective droplet size (Figure 28).

**Table 28. Comparison of recommended MPs and implemented MPs in Highline Canal @ Hwy 99 subwatershed.**

| MANAGEMENT PRACTICE                                                                                   | RECOMMENDED PRACTICES |       | IMPLEMENTED PRACTICES |                  | % RECOMMENDED ACREAGE WITH IMPLEMENTED PRACTICES |
|-------------------------------------------------------------------------------------------------------|-----------------------|-------|-----------------------|------------------|--------------------------------------------------|
|                                                                                                       | # GROWERS             | ACRES | # GROWERS             | ACRES            |                                                  |
| No irrigation drainage from property                                                                  |                       |       |                       |                  |                                                  |
| Spray areas close to waterbodies when the wind is blowing away from them                              | 1                     | 25    | 1                     | 25               | 100%                                             |
| Use air blast applications when wind is 3-10 mph and upwind of sensitive sites                        | 1                     | 25    | 1                     | 25               | 100%                                             |
| Reduce amount of water used in surface irrigation                                                     | 0                     | 0     | 2                     | 76 <sup>1</sup>  | NA                                               |
| Yes, irrigation drainage from property                                                                |                       |       |                       |                  |                                                  |
| Use nozzles that provide largest effective droplet size to minimize drift                             | 1                     | 121   | 1                     | 121              | 100%                                             |
| Reduce amount of water used in surface irrigation                                                     | 0                     | 0     | 1                     | 121 <sup>1</sup> | NA                                               |
| TOTAL ACREAGE WITH 1 OR MORE RECOMMENDED PRACTICES                                                    |                       |       |                       |                  | 171                                              |
| TOTAL ACREAGE WITH 1 OR MORE IMPLEMENTED PRACTICES                                                    |                       |       |                       |                  | 368                                              |
| PERCENT OF IMPLEMENTED PRACTICES COMPARED TO RECOMMENDED ACREAGE WITH 1 OR MORE IMPLEMENTED PRACTICES |                       |       |                       |                  | 215%                                             |

<sup>1</sup>Management practice not specifically recommended by Coalition representative for grower's operation.

NA – Not applicable; no recommendations for the management practice in the subwatershed.



Figure 27. Percentage of acreage represented by newly implemented management practices for Highline Canal @ Hwy 99 for parcels with no irrigation drainage.

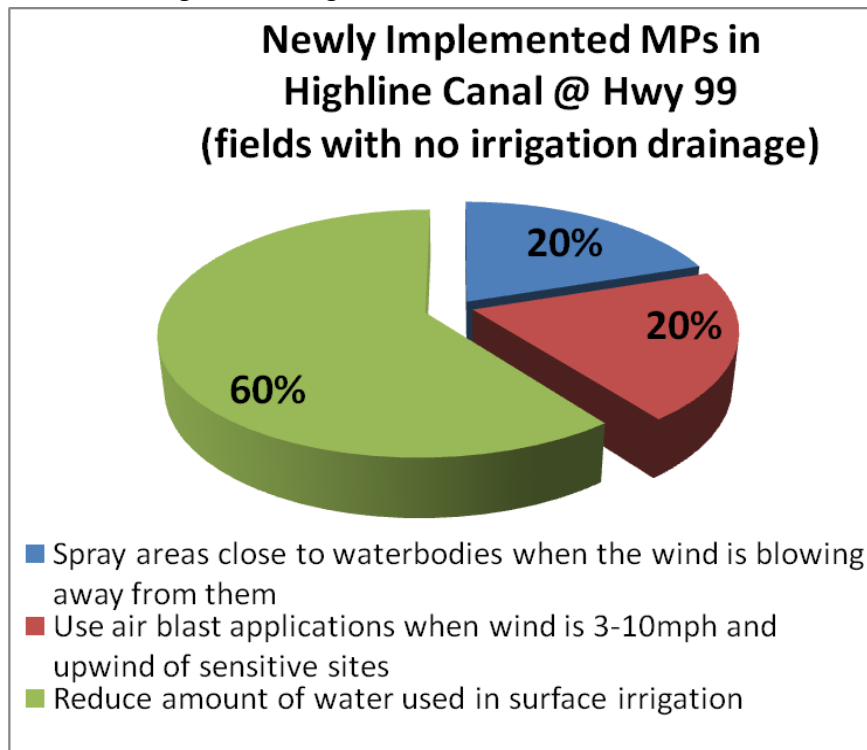
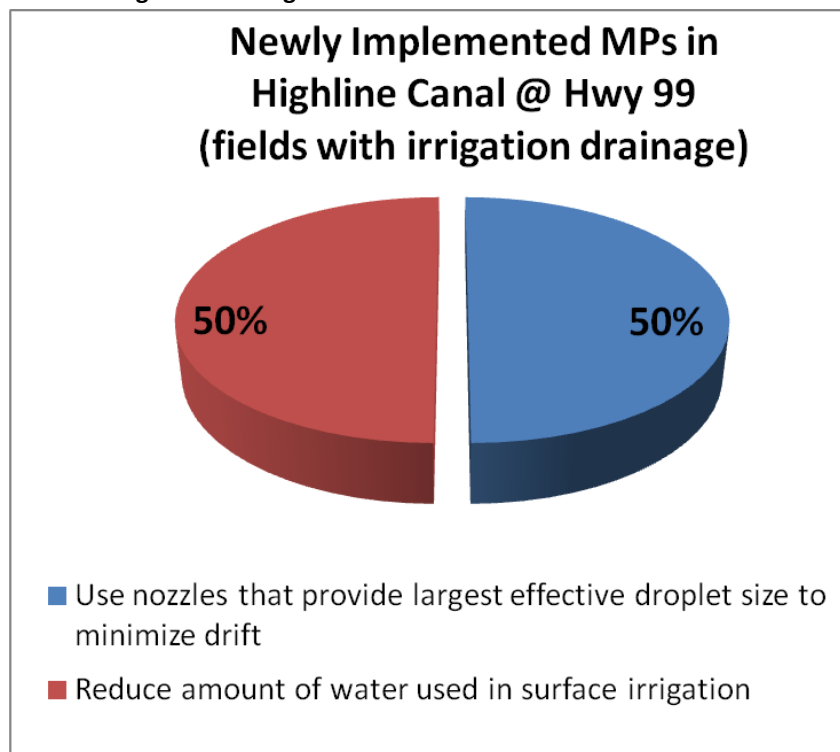


Figure 28. Percentage of acreage represented by newly implemented management practices for Highline Canal @ Hwy 99 for parcels with irrigation drainage.



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## THIRD PRIORITY SUBWATERSHEDS SUMMARY OF MANAGEMENT PRACTICES (2011-2013)

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Focused outreach in third priority subwatersheds began in the fall of 2010 and will continue through 2013. The third priority subwatersheds include Berenda Slough along Ave 18 1/2 , Dry Creek @ Rd 18, Lateral 2 ½ near Keyes Rd and Livingston Drain @ Robin. The Coalition completed individual meetings and documented current management practices for 100% of targeted growers in the third priority subwatersheds (Table 12). In addition, the Coalition discussed water quality concerns with targeted growers and recommended management practices designed to address water quality exceedances that occurred within these waterbodies.

The Coalition met with a total of 72 members within the third priority subwatersheds (Table 29). Individual grower meetings with targeted members began in the fall of 2010 and continued through 2011. During the meetings, growers completed management practices surveys to document current and recommended practices. The surveys utilized for the third priority subwatersheds were similar to those used in the first and second priority subwatersheds. A preliminary analysis of current and recommended practices was conducted based on survey information obtained for practices in 2010 and/or 2011. This report includes a final summary of the initial surveys from all four third priority subwatersheds.

Follow up surveys will be conducted in 2012 to document any additional practices implemented in 2011 and/or 2012. Only growers who were specifically recommended to implement a management practice will be followed up with by the Coalition. A summary of the results of follow up contacts will be included in the 2013 MPUR.

**Table 29. Tally of growers contacted for individual grower meetings in third set of high priority subwatersheds (2011-2013).**

|                                           | BERENDA SLOUGH<br>ALONG AVE 18 ½ | DRY CREEK<br>@ RD 18 | LATERAL 2 ½<br>NEAR KEYES RD | LIVINGSTON DRAIN<br>@ ROBIN AVE |
|-------------------------------------------|----------------------------------|----------------------|------------------------------|---------------------------------|
| Contacted to Schedule Individual Meeting  | 19                               | 17                   | 25                           | 11                              |
| Dropped due to Lack of Response           | 0                                | 0                    | 0                            | 0                               |
| <b>PERCENT COMPLETE (INITIAL CONTACT)</b> | <b>100%</b>                      | <b>100%</b>          | <b>100%</b>                  | <b>100%</b>                     |

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## Berenda Slough along Ave 18 ½

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The Coalition contacted 19 targeted growers representing 4,103 acres, which is 38% of the direct drainage within the Berenda Slough along Ave 18 ½ subwatershed (Table 12, Table 30, Figure 29).

### *Summary of Current Management Practices (2010/2011)*

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Targeted growers within the Berenda Slough subwatershed are primarily orchard and vineyard operators; more than two thirds of which are properties with no irrigation drainage (Figure 30). The Berenda Slough subwatershed is in the southern portion of the Coalition region where well-drained, sandy soils dominate the landscape (Cottonwood Creek Zone, Zone 6).

#### **Irrigation Water Management**

Of those surveyed in the Berenda Slough subwatershed, 84% of the respondents accounting for 95% of the acreage use microirrigation (Table 30). Although three growers use flood irrigation (representing 199 acres), each of the three growers has implemented management practices to prevent offsite movement of pesticides via irrigation runoff, including laser leveling their fields (161 acres), installing recirculation/tailwater return systems (142 acres) and constructing drainage basin/sediment ponds (104 acres). Several growers throughout the subwatershed laser leveled fields (559 acres), operate recirculation/tailwater return systems (1,727 acres) or use drainage basin/sediment ponds (1,615 acres). The majority of respondents (89%) representing a majority of the acreage (98%) irrigate based on soil moisture levels. Five growers consider irrigation district deliveries when determining irrigation schedules; two of these five growers base irrigation schedules entirely on district deliveries (Table 30).

#### **Storm Water Drainage**

Eight of the 19 targeted growers report storm water drainage; 63% of the acreage can experience storm water drainage every year once soil is saturated (Table 30). Of the growers with storm drainage, four are able to control the timing of drainage to ditches/waterways (1,360 acres) and six growers installed both recirculation/tailwater return systems and settling ponds (1,472 acres) (Table 33).

#### **Erosion & Sediment Management**

All targeted growers implement at least one management practice to control sediment erosion. Grass row centers are utilized in vineyards and orchards representing 91% of the targeted acreage (Table 30). Growers representing 63% of the acreage maintain vegetated filter strips around field perimeters at least 10 feet wide, and growers farming 65% of the acreage allow or plant vegetation along ditches (Table 30). Eighteen of the 19 growers apply one or more herbicides during the winter; glyphosate is the most commonly used product (Table 33).

#### **Pest Management**

Targeted growers in the Berenda Slough subwatershed employ numerous spray management practices including: adjusting spray nozzles to match crop canopy profile (89% of respondents), shutting off outside nozzles when spraying outer rows next to sensitive sites (89% of respondents), spraying areas close to waterbodies when the wind is blowing away from them (95% of respondents), using air blast applications when wind is between three and 10 mph and upwind of a sensitive site (84% of

respondents), and using nozzles that provide largest effective droplet size to minimize drift (95% of respondents). Eighty-four percent of respondents calibrate sprayers before every application (Table 30).

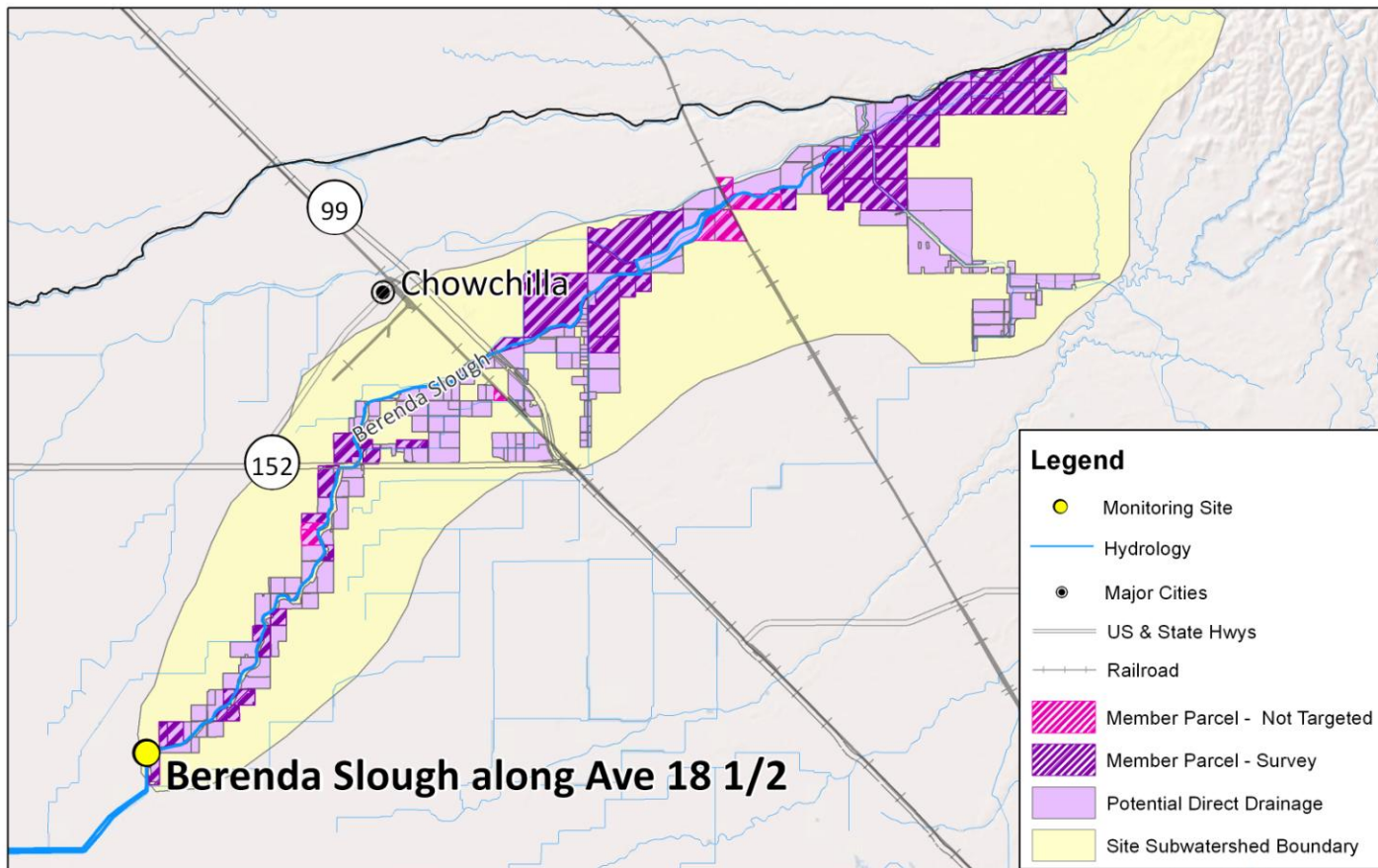
### **Dormant Spray Management**

Only three targeted growers farming 323 acres in the Berenda Slough subwatershed apply dormant sprays (Table 33). All three growers always check weather conditions prior to spraying and maintain set back zones. Two of the growers maintain vegetation cover with sprayed berms (Table 30).

### **Recommended Management Practices**

Coalition representatives made several recommendations to one grower, including utilizing grass row centers, shutting off outside nozzles when spraying outer rows next to sensitive sites , and spraying areas close to waterbodies when the wind is blowing away from them (Figure 31). The Coalition recommended to one grower with storm water runoff to install a settling pond. A second grower with storm runoff received recommendations to install and/or improve berms along field perimeters and install a device to control the timing of storm water runoff (Figure 31).

**Figure 29. Berenda Slough @ along Ave 18 ½ member parcels with direct drainage potential.**



Source of Layers:  
 Hydrology - NHD hydrodata, 1:24,000-scale, <http://nhd.usgs.gov/>  
 Roads, highways, railroads, county boundary, city outlines - California Spatial Information Library  
 TRS - Teale Public Land Survey System, Pub. date. 20090101, California Spatial Information Library  
 Parcel Layer - Stanislaus 2010, Merced 2011, Madera 2011  
 Basemap, Shaded Relief - ESRI  
 GSC North America 1983

Date Prepared: 02/23/12  
 ESJWQC



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**Table 30. Berenda Slough @ along Ave 18 ½ subwatershed current management practices (2010/2011).**

| CHECKLIST                                | QUESTION                                                          | ANSWER                                                                    | COUNT OF ANSWERS | % RESPONDENTS | SUM OF ASSOCIATED ACREAGE |
|------------------------------------------|-------------------------------------------------------------------|---------------------------------------------------------------------------|------------------|---------------|---------------------------|
| Section 1: Irrigation Water Management   | Irrigation management practices:                                  | Laser leveled fields                                                      | 8                | 42%           | 559                       |
|                                          |                                                                   | Recirculation - Tailwater return system                                   | 8                | 42%           | 1,727                     |
|                                          |                                                                   | Use drainage basins (sediment ponds) to capture and retain runoff         | 6                | 32%           | 1,615                     |
|                                          | Irrigation System                                                 | Microirrigation                                                           | 16               | 84%           | 3,905                     |
|                                          |                                                                   | Sprinkler                                                                 | 1                | 5%            | 166                       |
|                                          |                                                                   | Surface                                                                   | 3                | 16%           | 199                       |
|                                          | Which do you base your irrigation schedule on:                    | Actual Moisture Levels in soil/crop needs                                 | 17               | 89%           | 4,009                     |
|                                          |                                                                   | Irrigation District Deliveries                                            | 5                | 26%           | 371                       |
| Section 2: Storm Drainage                | How are you able to manage storm drainage?                        | No Storm Drainage                                                         | 11               | 58%           | 801                       |
|                                          |                                                                   | Pump/Drain into waterway & able to control timing                         | 4                | 21%           | 1,360                     |
|                                          |                                                                   | Pump/Drain into waterway & unable to control timing                       | 4                | 21%           | 1,943                     |
|                                          |                                                                   | Recirculation - Tailwater return system                                   | 6                | 32%           | 1,472                     |
|                                          |                                                                   | Settling Pond                                                             | 6                | 32%           | 1,472                     |
|                                          | When do you have storm water draining from your field?            | After soil is saturated-late winter                                       | 5                | 26%           | 2,573                     |
|                                          |                                                                   | No Storm Drainage                                                         | 11               | 58%           | 801                       |
|                                          |                                                                   | Only in heavy (100 year) storms                                           | 3                | 16%           | 730                       |
| Section 3: Erosion & Sediment Management | Do you apply herbicides during winter months?                     | Do not apply                                                              | 1                | 5%            | 57                        |
|                                          |                                                                   | Glyphosate (Round-Up)                                                     | 17               | 89%           | 3,881                     |
|                                          |                                                                   | Goal                                                                      | 10               | 53%           | 1,223                     |
|                                          |                                                                   | Other (including Prowl, Chateau, Surflan, others)                         | 6                | 32%           | 1,569                     |
|                                          |                                                                   | Paraquat (Gramaxone)                                                      | 5                | 26%           | 1,500                     |
|                                          |                                                                   | Simazine (Princep)                                                        | 1                | 5%            | 1,214                     |
|                                          | If waterway crosses or borders pasture, how is livestock managed? | N/A - Not Pasture                                                         | 19               | 100%          | 4,104                     |
|                                          | Sediment management practices:                                    | Grass Row Centers (Orchards, Vineyards)                                   | 14               | 74%           | 3,754                     |
|                                          |                                                                   | Maintain vegetated filter strips around field perimeter at least 10' wide | 14               | 74%           | 2,592                     |
|                                          |                                                                   | Vegetation is planted along or allowed to grow along ditches              | 7                | 37%           | 2,656                     |
| Section 4: Pest                          | Have you considered alternative                                   | N/A                                                                       | 16               | 84%           | 3,767                     |

| CHECKLIST                           | QUESTION                                                                                  | ANSWER                                                                                  | COUNT OF ANSWERS | % RESPONDENTS | SUM OF ASSOCIATED ACREAGE |
|-------------------------------------|-------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------|------------------|---------------|---------------------------|
| Management                          | strategies to using diazinon or chlorpyrifos either during the dormant or growing season? | Yes                                                                                     | 3                | 16%           | 337                       |
|                                     | How often is spray equipment calibrated?                                                  | Once per month                                                                          | 2                | 11%           | 681                       |
|                                     |                                                                                           | Once per year                                                                           | 1                | 5%            | 50                        |
|                                     |                                                                                           | Prior to each application                                                               | 16               | 84%           | 3,373                     |
|                                     | Spray management practices:                                                               | Adjust spray nozzles to match crop canopy profile                                       | 17               | 89%           | 4,009                     |
|                                     |                                                                                           | Outside nozzles shut off when spraying outer rows next to sensitive sites               | 17               | 89%           | 4,011                     |
|                                     |                                                                                           | Spray areas close to waterbodies when the wind is blowing away from them                | 18               | 95%           | 4,068                     |
|                                     |                                                                                           | Use air blast applications when wind is between 3-10 mph and upwind of a sensitive site | 16               | 84%           | 2,795                     |
|                                     |                                                                                           | Use electronic controlled sprayer nozzles                                               | 2                | 11%           | 216                       |
|                                     |                                                                                           | Uses of nozzles that provide largest effective droplet size to minimize drift           | 18               | 95%           | 4,047                     |
|                                     |                                                                                           |                                                                                         |                  |               |                           |
| Section 5: Dormant Spray Management | Do you apply when soil moisture is at field capacity?                                     | No                                                                                      | 1                | 5%            | 166                       |
|                                     |                                                                                           | Yes                                                                                     | 2                | 11%           | 157                       |
|                                     | Dormant spray management practices:                                                       | Check weather conditions prior to spraying (i.e. storm status)                          | 3                | 16%           | 323                       |
|                                     |                                                                                           | Maintain setback zones                                                                  | 3                | 16%           | 323                       |
|                                     | Have you been informed of DPR's Dormant Spray Regulations?                                | N/A                                                                                     | 3                | 16%           | 323                       |
|                                     | How many acres are sprayed with dormant pesticides?                                       | 104.43 Acres                                                                            | 1                | 5%            | 104                       |
|                                     |                                                                                           | 166 Acres                                                                               | 1                | 5%            | 166                       |
|                                     |                                                                                           | 53 Acres                                                                                | 1                | 5%            | 53                        |
|                                     |                                                                                           | No Dormant Sprays                                                                       | 16               | 84%           | 3,781                     |
|                                     | Prior to applying winter dormant sprays, what is the condition of your orchard floor?     | No Vegetation & Not Disked                                                              | 1                | 5%            | 166                       |
|                                     |                                                                                           | Vegetated Cover w/Sprayed Berms                                                         | 2                | 11%           | 157                       |

Figure 30. Berenda Slough @ along Ave 18 ½ crop acreage information from member surveys (2010/ 2011).

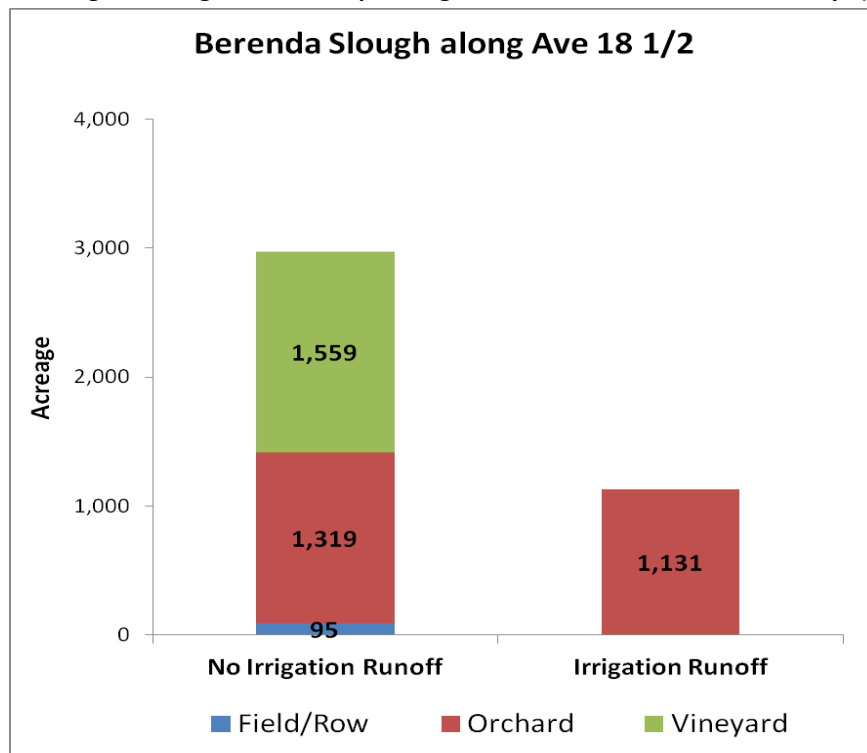
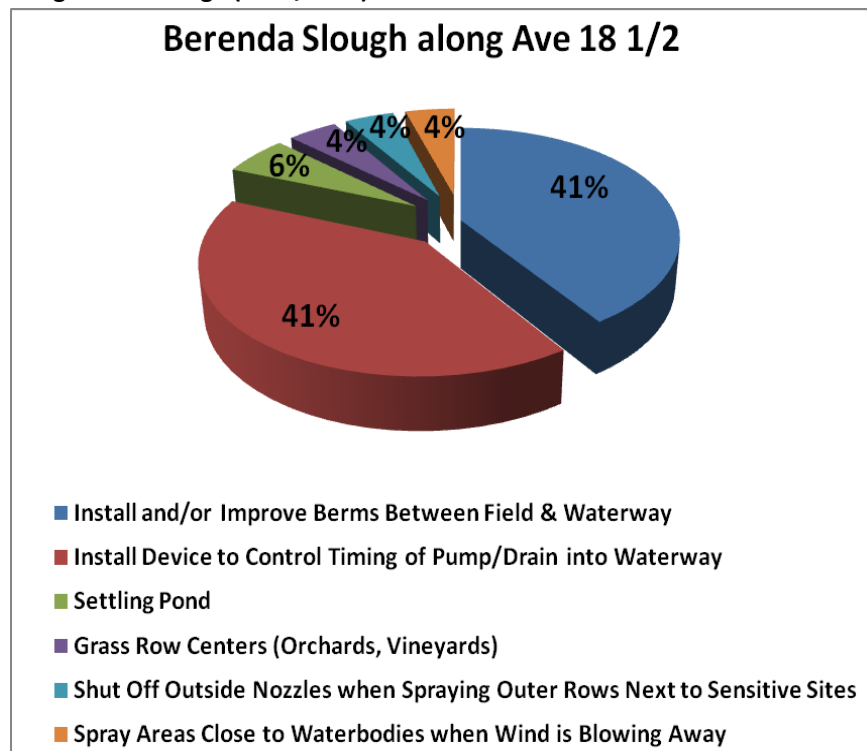


Figure 31. Berenda Slough @ along Ave 18 ½ recommended management practice acreage percentage for members with no irrigation drainage (2010/2011).





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## Dry Creek @ Rd 18

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The Coalition contacted and received completed surveys from 17 targeted growers within the Dry Creek @ Rd 18 subwatershed (Table 31, Figure 32). The 17 members were surveyed for management practices currently implemented across 4,710 acres within the Dry Creek subwatershed, accounting for 53% of acres with direct drainage in the subwatershed (Table 12, Figure 32).

### *Summary of Current Management Practices (2010/2011)*

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Targeted growers in the Dry Creek subwatershed operate either orchards or vineyards; none of the targeted parcels have irrigation drainage (Figure 33). Like the Berenda Slough subwatershed, the Dry Creek subwatershed is in the southern portion of the Coalition region and is dominated by well-drained, sandy soils (Cottonwood Creek Zone, Zone 6).

#### **Irrigation Water Management**

The majority of targeted growers utilize microirrigation (96% of acreage). Of the five growers who either flood irrigate and/or microirrigate, all have laser leveled fields; one grower employs a recirculation/tailwater return system and drainage basin/sediment pond. The majority of growers, accounting for 98% of the targeted acreage, base irrigation schedules on crop moisture needs (Table 31).

#### **Storm Drainage/ Erosion & Sediment Management/Pest Management/Dormant Sprays**

Managing storm water runoff and spray drift are especially important in this subwatershed due to the lack of irrigation drainage. Growers received recommendations to install and/or improve berms between fields and waterways, install a device to control the timing of storm water discharge to drains/waterways, and spray areas close to waterbodies when the wind is blowing away from them (Figure 34).

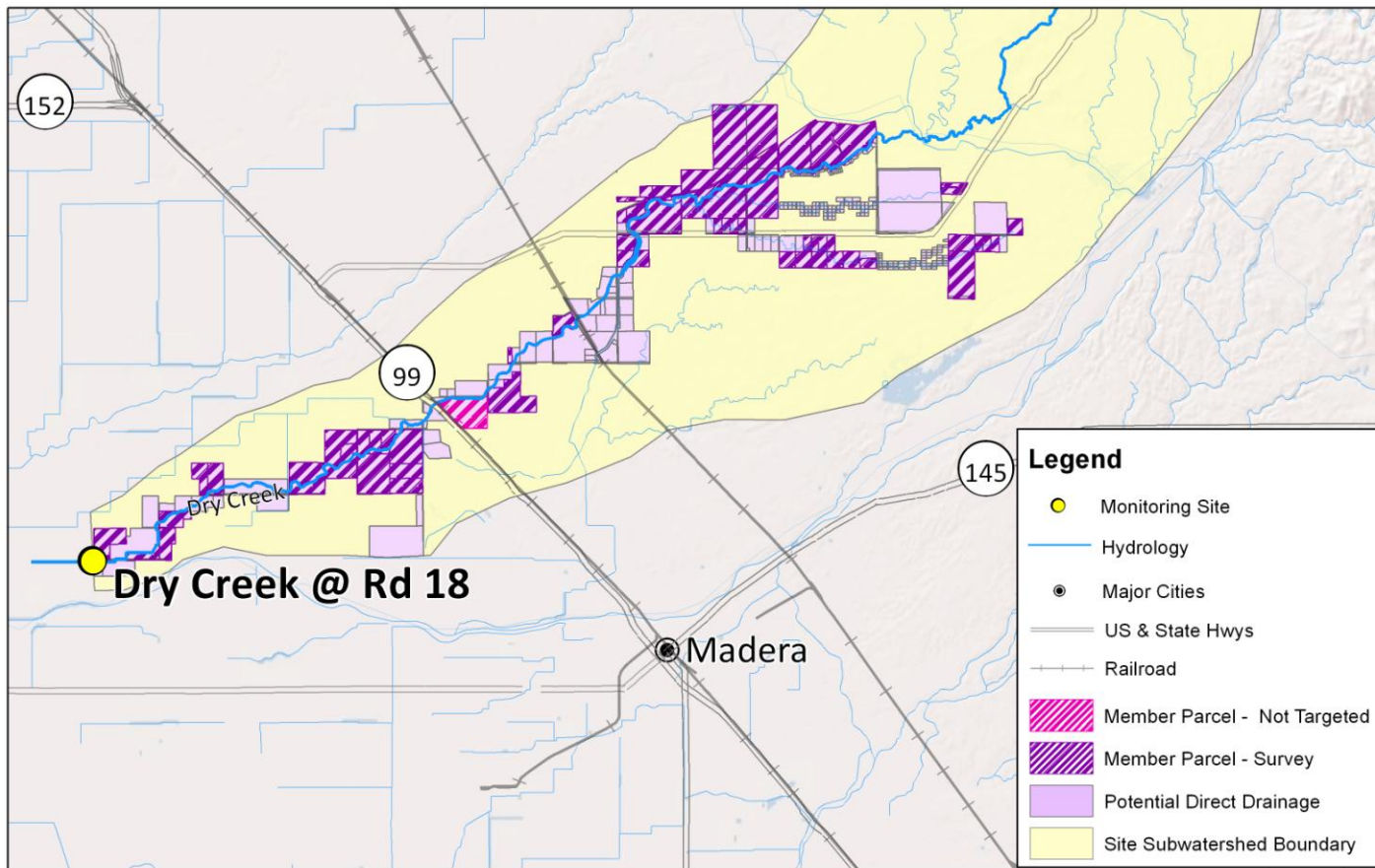
Four growers, accounting for half of the acreage, have storm water drainage every year (either during most storms events or only when soil is saturated in late winter). Each of these four growers employ one or more of the following practices to reduce agricultural storm runoff: grass row centers (2,364 acres), maintain vegetated filter strips around field perimeter at least 10 feet wide (1,446 acres), and/or allow or plant vegetation along ditches (139 acres)(Table 34). None of the four growers with storm drainage use dormant sprays; however, all four apply some type of herbicide during the winter. Coalition representatives discussed the importance of preventing the offsite movement of agricultural constituents through storm water runoff, and the Coalition recommended one grower farming 213 acres install berms between the fields and creek (Figure 34).

Growers without storm drainage implemented sediment/erosion management practices (13 growers reported either no storm drainage or drainage only during 100 year storms). Eleven growers use grass row centers and 12 growers maintain vegetated filter strips around field perimeter at least 10 feet wide (Table 31).

Growers without storm water drainage also all apply herbicides during the winter. Two of the 13 growers, accounting for 2% of the targeted acreage, use dormant sprays. Both growers check weather conditions prior to spraying, maintain setback zones during applications, and only apply to fields with vegetated cover with sprayed berms. Neither grower applies chlorpyrifos or diazinon (Table 31).

All growers employ several spray drift management practices. These include adjusting spray nozzles to match crop canopy profile (100% of respondents), shutting off outside nozzles when spraying outer rows next to sensitive sites (94% of respondents), spraying areas close to waterbodies when the wind is blowing away from them (94% of respondents), using air blast applications when wind is between three and 10 mph and upwind of a sensitive site (94% of respondents), and using nozzles that provide largest effective droplet size to minimize drift (100% of respondents). Ninety-four percent of targeted growers calibrate sprayers before every application (Table 31).

Figure 32. Dry Creek @ Rd 18 member parcels with direct drainage potential.



Source of Layers:  
 Hydrology - NHD hydrodata, 1:24,000-scale, <http://nhd.usgs.gov/>  
 Roads, highways, railroads, county boundary, city outlines - California Spatial Information Library  
 TRS - Teale Public Land Survey System, Pub. date. 20090101, California Spatial Information Library  
 Parcel Layer - Stanislaus 2010, Merced 2011, Madera 2011  
 Basemap, Shaded Relief - ESRI  
 GSC North America 1983

Date Prepared: 02/23/12  
 ESJWQC



### Dry Creek @ Rd 18 3rd Priority Subwatershed Parcels

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**Table 31. Dry Creek @ Rd 18 subwatershed current management practices (2010/2011).**

| CHECKLIST                                | QUESTION                                                          | ANSWER                                                                    | COUNT OF ANSWERS | % RESPONDENTS | SUM OF ASSOCIATED ACREAGE |
|------------------------------------------|-------------------------------------------------------------------|---------------------------------------------------------------------------|------------------|---------------|---------------------------|
| Section 1: Irrigation Water Management   | Irrigation management practices:                                  | Laser leveled fields                                                      | 10               | 59%           | 2,029                     |
|                                          |                                                                   | Recirculation - Tailwater return system                                   | 2                | 12%           | 639                       |
|                                          |                                                                   | Use drainage basins (sediment ponds) to capture and retain runoff         | 2                | 12%           | 639                       |
|                                          | Irrigation System                                                 | Microirrigation                                                           | 14               | 82%           | 4,524                     |
|                                          |                                                                   | Surface                                                                   | 5                | 29%           | 473                       |
|                                          | Which do you base your irrigation schedule on:                    | Actual Moisture Levels in soil/crop needs                                 | 16               | 94%           | 4,612                     |
|                                          |                                                                   | Irrigation District Deliveries                                            | 2                | 12%           | 108                       |
| Section 2: Storm Drainage                | How are you able to manage storm drainage?                        | No Storm Drainage                                                         | 9                | 53%           | 1,769                     |
|                                          |                                                                   | Pump/Drain into waterway & unable to control timing                       | 7                | 41%           | 2,752                     |
|                                          |                                                                   | Recirculation - Tailwater return system                                   | 1                | 6%            | 10                        |
|                                          |                                                                   | Settling Pond                                                             | 1                | 6%            | 10                        |
|                                          | When do you have storm water draining from your field?            | After soil is saturated-late winter                                       | 3                | 18%           | 2,151                     |
|                                          |                                                                   | No Storm Drainage                                                         | 9                | 53%           | 1,769                     |
|                                          |                                                                   | On most rain events                                                       | 1                | 6%            | 213                       |
|                                          |                                                                   | Only in heavy (100 year) storms                                           | 4                | 24%           | 577                       |
| Section 3: Erosion & Sediment Management | Do you apply herbicides during winter months?                     | Diuron (Karmex)                                                           | 2                | 12%           | 1,148                     |
|                                          |                                                                   | Glyphosate (Round-Up)                                                     | 11               | 65%           | 2,800                     |
|                                          |                                                                   | Goal                                                                      | 12               | 71%           | 2,920                     |
|                                          |                                                                   | Other (Herbicides including Prowl, Chateau, Surflan, others)              | 14               | 82%           | 4,351                     |
|                                          |                                                                   | Paraquat (Gramaxone)                                                      | 5                | 29%           | 2,082                     |
|                                          |                                                                   | Simazine (Princep)                                                        | 1                | 6%            | 54                        |
|                                          | If waterway crosses or borders pasture, how is livestock managed? | N/A - Not Pasture                                                         | 17               | 100%          | 4,710                     |
|                                          | Sediment management practices:                                    | Grass Row Centers (Orchards, Vineyards)                                   | 15               | 88%           | 4,023                     |
|                                          |                                                                   | Maintain vegetated filter strips around field perimeter at least 10' wide | 15               | 88%           | 3,163                     |
|                                          |                                                                   | Vegetation is planted along or allowed to grow along ditches              | 1                | 6%            | 139                       |

| CHECKLIST                           | QUESTION                                                                                                                  | ANSWER                                                                                  | COUNT OF ANSWERS | % RESPONDENTS | SUM OF ASSOCIATED ACREAGE |
|-------------------------------------|---------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------|------------------|---------------|---------------------------|
| Section 4: Pest Management          | Have you considered alternative strategies to using diazinon or chlorpyrifos either during the dormant or growing season? | N/A                                                                                     | 17               | 100%          | 4,710                     |
|                                     | How often is spray equipment calibrated?                                                                                  | Once per year                                                                           | 1                | 6%            | 10                        |
|                                     |                                                                                                                           | Prior to each application                                                               | 16               | 94%           | 4,700                     |
|                                     | Spray management practices:                                                                                               | Adjust spray nozzles to match crop canopy profile                                       | 17               | 100%          | 4,710                     |
|                                     |                                                                                                                           | Outside nozzles shut off when spraying outer rows next to sensitive sites               | 16               | 94%           | 4,443                     |
|                                     |                                                                                                                           | Spray areas close to waterbodies when the wind is blowing away from them                | 16               | 94%           | 4,588                     |
|                                     |                                                                                                                           | Use air blast applications when wind is between 3-10 mph and upwind of a sensitive site | 16               | 94%           | 4,656                     |
|                                     |                                                                                                                           | Use electronic controlled sprayer nozzles                                               | 1                | 6%            | 98                        |
|                                     |                                                                                                                           | Uses of nozzles that provide largest effective droplet size to minimize drift           | 17               | 100%          | 4,710                     |
| Section 5: Dormant Spray Management | Do you apply when soil moisture is at field capacity?                                                                     | N/A                                                                                     | 1                | 6%            | 10                        |
|                                     |                                                                                                                           | No                                                                                      | 1                | 6%            | 98                        |
|                                     | Dormant spray management practices:                                                                                       | Check weather conditions prior to spraying (i.e. storm status)                          | 2                | 12%           | 108                       |
|                                     |                                                                                                                           | Maintain setback zones                                                                  | 2                | 12%           | 108                       |
|                                     | Have you been informed of DPR's Dormant Spray Regulations?                                                                | Yes                                                                                     | 2                | 12%           | 108                       |
|                                     | How many acres are sprayed with dormant pesticides?                                                                       | 10 Acres                                                                                | 1                | 6%            | 10                        |
|                                     |                                                                                                                           | 97 Acres                                                                                | 1                | 6%            | 98                        |
|                                     |                                                                                                                           | No Dormant Sprays                                                                       | 15               | 88%           | 4,602                     |
|                                     | Prior to applying winter dormant sprays, what is the condition of your orchard floor?                                     | Vegetated Cover w/Sprayed Berms                                                         | 2                | 12%           | 108                       |

Figure 33. Dry Creek @ Rd 18 crop acreage information from member surveys (2010/ 2011).

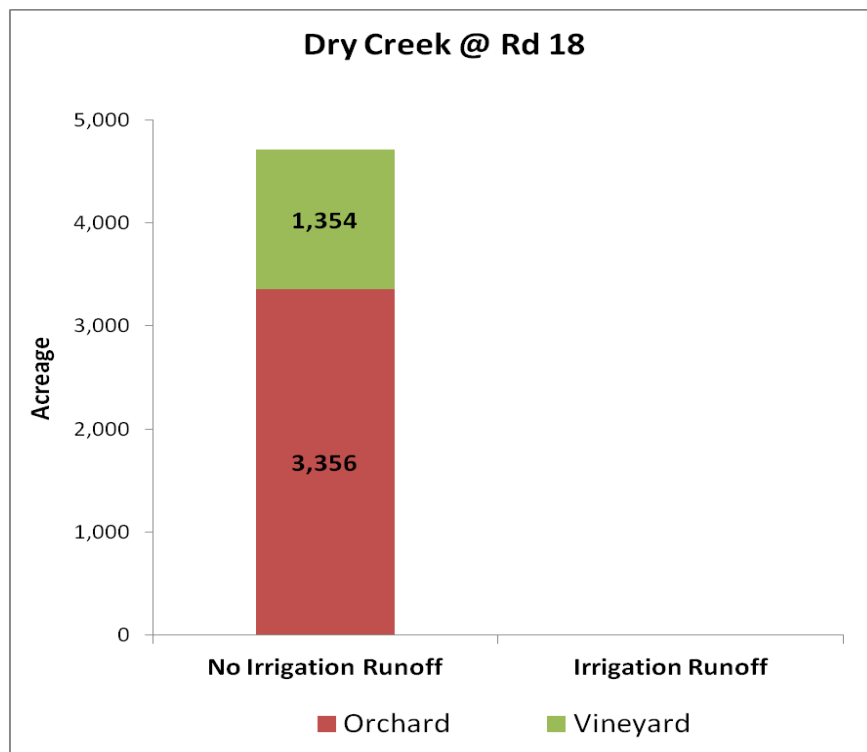
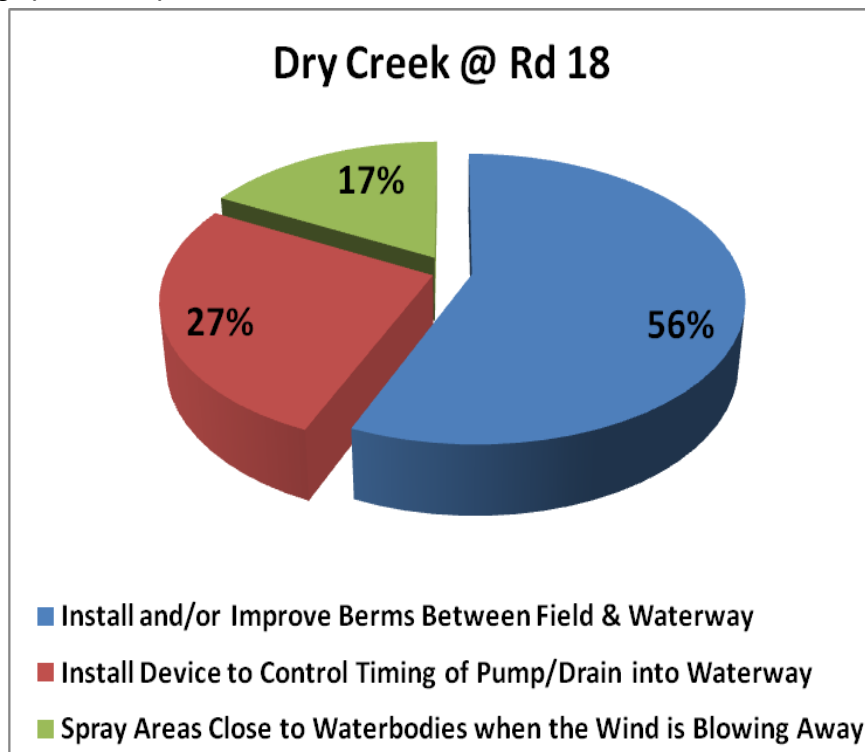


Figure 34. Dry Creek @ Rd 18 recommended management practice acreage percentage for members with no irrigation drainage (2010/2011).



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## Lateral 2 ½ near Keyes Rd

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The Coalition contacted and received completed surveys from 25 targeted growers accounting for 1,826 acres and representing 47% of the direct drainage acreage within the Lateral 2 ½ near Keyes Rd subwatershed (Table 12, Figure 35). The Coalition divided Lateral 2 ½ near Keyes Rd subwatershed in half due to its size. Coalition representatives are focusing on members below Highway 99 who have the most potential to affect water quality sampled at Keyes Road (Figure 33).

### *Summary of Current Management Practices (2010/2011)*

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Targeted growers in the Lateral 2 ½ subwatershed farm field/row crops (approximately 40% of acreage) and orchard/ vineyards (approximately 60% of acreage, Figure 36). All targeted growers indicated no irrigation drainage from their operations and implemented management practices to prevent the transport of pesticides to waterways if irrigation drainage were to occur (e.g. recirculation/tailwater return systems, filter strips, etc.). The Coalition made specific recommendations to growers to reduce offsite movement of pesticides via spray drift, including calibrating spray equipment before every application, shutting off outside nozzles when spraying outer rows next to sensitive sites, spraying areas close to waterbodies when the wind is blowing away from them, and using nozzles that provide largest effective droplet size to minimize drift (Figure 37).

### **Irrigation Water Management**

The majority of targeted growers in the Lateral 2 ½ subwatershed use flood irrigation for at least a portion of their operation (84% of respondents), whereas only 20% of respondents indicated using microirrigation for at least a portion of their operations. Laser leveling of fields is a common practice across the subwatershed (98% of acreage). Thirty percent of acreage in the Lateral 2 ½ subwatershed use recirculation/tailwater return systems. The majority of growers in the subwatershed base their irrigation schedule on irrigation district deliveries (88% of respondents) (Table 32).

### **Storm Drainage**

There is no storm drainage from any of the targeted acreage in the Lateral 2 ½ subwatershed (Table 32).

### **Erosion & Sediment Management**

Several growers implement sediment and erosion management practices (Table 32). Filter strips are maintained around the field perimeter at least 10 feet wide on 20% of acreage, vegetation is planted or allowed to grow in ditches on 26% of acreage, and grass row centers are maintained on 43% of acreage (grass row centers are only applicable to orchards and vineyards which account for 60% of acreage in Lateral 2 ½) (Table 32).

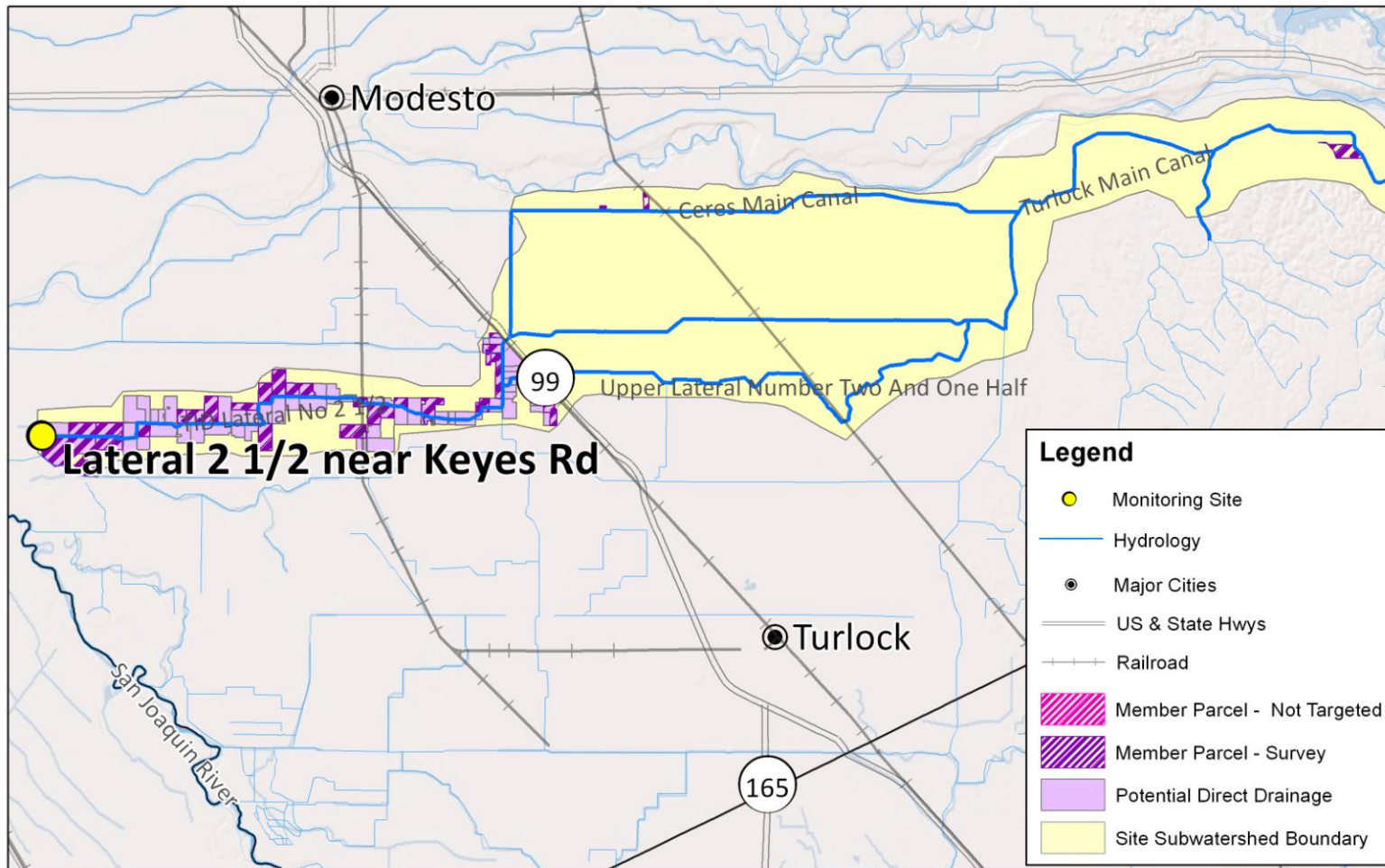
### **Pest Management / Dormant Sprays**

The majority of growers use herbicides during the winter (88% of respondents) and five growers apply dormant sprays (Table 32). Growers employ several spray management practices, including adjusting spray nozzles to match crop canopy profile (92% of respondents), shutting off outside nozzles when spraying outer rows next to sensitive sites (88% of respondents), spraying areas close to waterbodies when the wind is blowing away from them (88% of respondents), using air blast applications when wind

is between three and 10 mph and upwind of a sensitive site (48% of respondents), using nozzles that provide largest effective droplet size to minimize drift (92% of respondents), and calibrating spray equipment prior to every application (88% of respondents). In addition, growers with dormant sprays check weather conditions prior to spraying (four of five growers) and maintain setback zones (three of five growers); all growers apply to fields with vegetative cover (Table 32).



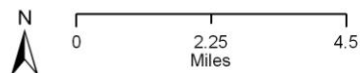
Figure 35. Lateral 2 ½ near Keyes Rd member parcels with direct drainage potential.



Source of Layers:  
 Hydrology - NHD hydrodata, 1:24,000-scale, <http://nhd.usgs.gov/>  
 Roads, highways, railroads, county boundary, city outlines - California Spatial Information Library  
 TRS - Teale Public Land Survey System, Pub. date, 20090101, California Spatial Information Library  
 Parcel Layer - Stanislaus 2010, Merced 2011, Madera 2011  
 Basemap, Shaded Relief - ESRI  
 GSC North America 1983

Date Prepared: 03/02/12

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### Lateral 2 1/2 near Keyes Rd 3rd Priority Subwatershed Parcels

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**Table 32. Lateral 2 ½ near Keyes Rd subwatershed current management practices (2011).**

| CHECKLIST                                | QUESTION                                                                                                                  | ANSWER                                                                    | COUNT OF ANSWERS | % RESPONDENTS | SUM OF ASSOCIATED ACREAGE |
|------------------------------------------|---------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------|------------------|---------------|---------------------------|
| Section 1: Irrigation Water Management   | Irrigation management practices:                                                                                          | Laser leveled fields                                                      | 24               | 96%           | 1,783                     |
|                                          |                                                                                                                           | Recirculation - Tailwater return system                                   | 2                | 8%            | 553                       |
|                                          |                                                                                                                           | Use drainage basins (sediment ponds) to capture and retain runoff         | 1                | 4%            | 35                        |
|                                          | Irrigation System                                                                                                         | Microirrigation                                                           | 5                | 20%           | 538                       |
|                                          |                                                                                                                           | Sprinkler                                                                 | 3                | 12%           | 116                       |
|                                          |                                                                                                                           | Surface                                                                   | 21               | 84%           | 1,602                     |
|                                          | Which do you base your irrigation schedule on:                                                                            | Actual Moisture Levels in soil/crop needs                                 | 2                | 8%            | 114                       |
|                                          |                                                                                                                           | Irrigation District Deliveries                                            | 22               | 88%           | 1,668                     |
|                                          |                                                                                                                           | Unanswered                                                                | 1                | 4%            | 45                        |
| Section 2: Storm Drainage                | How are you able to manage storm drainage?                                                                                | No Storm Drainage                                                         | 25               | 100%          | 1,827                     |
|                                          | When do you have storm water draining from your field?                                                                    | No Storm Drainage                                                         | 25               | 100%          | 1,827                     |
| Section 3: Erosion & Sediment Management | Do you apply herbicides during winter months?                                                                             | Do not apply                                                              | 3                | 12%           | 623                       |
|                                          |                                                                                                                           | Glyphosate (Round-Up)                                                     | 20               | 80%           | 1,070                     |
|                                          |                                                                                                                           | Goal                                                                      | 14               | 56%           | 824                       |
|                                          |                                                                                                                           | Paraquat (Gramaxone)                                                      | 8                | 32%           | 415                       |
|                                          |                                                                                                                           | Matrix                                                                    | 1                | 4%            | 60                        |
|                                          | If waterway crosses or borders pasture, how is livestock managed?                                                         | N/A - Not Pasture                                                         | 25               | 100%          | 1,827                     |
|                                          | Sediment management practices:                                                                                            | Grass Row Centers (Orchards, Vineyards)                                   | 16               | 64%           | 786                       |
|                                          |                                                                                                                           | Maintain vegetated filter strips around field perimeter at least 10' wide | 4                | 16%           | 365                       |
|                                          |                                                                                                                           | Vegetation is planted along or allowed to grow along ditches              | 5                | 20%           | 478                       |
| Section 4: Pest Management               | Have you considered alternative strategies to using diazinon or chlorpyrifos either during the dormant or growing season? | N/A                                                                       | 8                | 32%           | 790                       |
|                                          |                                                                                                                           | Yes                                                                       | 17               | 68%           | 1,037                     |
|                                          | How often is spray equipment calibrated?                                                                                  | Never                                                                     | 1                | 4%            | 44                        |
|                                          |                                                                                                                           | Once per month                                                            | 1                | 4%            | 25                        |
|                                          |                                                                                                                           | Once per year                                                             | 1                | 4%            | 45                        |

| CHECKLIST                           | QUESTION                                                                              | ANSWER                                                                                  | COUNT OF ANSWERS | % RESPONDENTS | SUM OF ASSOCIATED ACREAGE |
|-------------------------------------|---------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------|------------------|---------------|---------------------------|
|                                     | Spray management practices:                                                           | Prior to each application                                                               | 22               | 88%           | 1,713                     |
|                                     |                                                                                       | Adjust spray nozzles to match crop canopy profile                                       | 23               | 92%           | 1,650                     |
|                                     |                                                                                       | Outside nozzles shut off when spraying outer rows next to sensitive sites               | 22               | 88%           | 1,435                     |
|                                     |                                                                                       | Spray areas close to waterbodies when the wind is blowing away from them                | 22               | 88%           | 1,489                     |
|                                     |                                                                                       | Use air blast applications when wind is between 3-10 mph and upwind of a sensitive site | 12               | 48%           | 774                       |
|                                     |                                                                                       | Use electronic controlled sprayer nozzles                                               | 2                | 8%            | 105                       |
|                                     |                                                                                       | Uses of nozzles that provide largest effective droplet size to minimize drift           | 23               | 92%           | 1,534                     |
| Section 5: Dormant Spray Management | Do you apply when soil moisture is at field capacity?                                 | N/A                                                                                     | 2                | 8%            | 90                        |
|                                     |                                                                                       | No                                                                                      | 3                | 12%           | 266                       |
|                                     | Dormant spray management practices:                                                   | Check weather conditions prior to spraying (i.e. storm status)                          | 4                | 16%           | 346                       |
|                                     |                                                                                       | Maintain setback zones                                                                  | 3                | 12%           | 131                       |
|                                     | Have you been informed of DPR's Dormant Spray Regulations?                            | N/A                                                                                     | 1                | 4%            | 25                        |
|                                     |                                                                                       | No                                                                                      | 1                | 4%            | 26                        |
|                                     |                                                                                       | Yes                                                                                     | 3                | 12%           | 305                       |
|                                     | How many acres are sprayed with dormant pesticides?                                   | 10 Acres                                                                                | 1                | 4%            | 10                        |
|                                     |                                                                                       | 136 Acres                                                                               | 1                | 4%            | 215                       |
|                                     |                                                                                       | 25 Acres                                                                                | 1                | 4%            | 25                        |
|                                     |                                                                                       | 26 Acres                                                                                | 1                | 4%            | 26                        |
|                                     |                                                                                       | 80 Acres                                                                                | 1                | 4%            | 80                        |
|                                     |                                                                                       | No Dormant Sprays                                                                       | 20               | 80%           | 1,471                     |
|                                     | Prior to applying winter dormant sprays, what is the condition of your orchard floor? | Vegetative cover                                                                        | 5                | 20%           | 356                       |

Figure 36. Lateral 2 ½ near Keyes Rd crop acreage information from member surveys (2011).

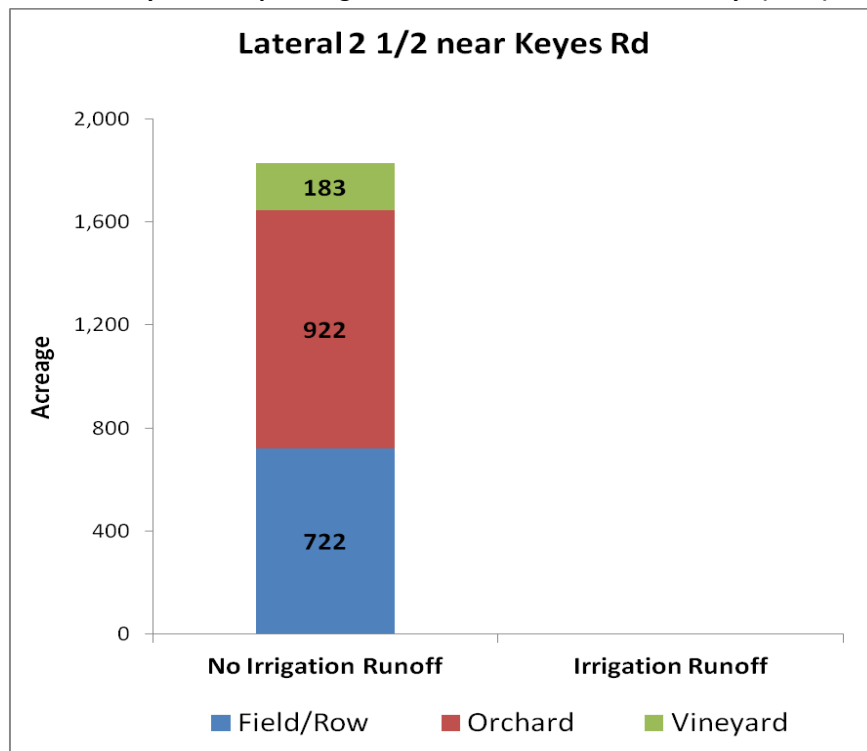
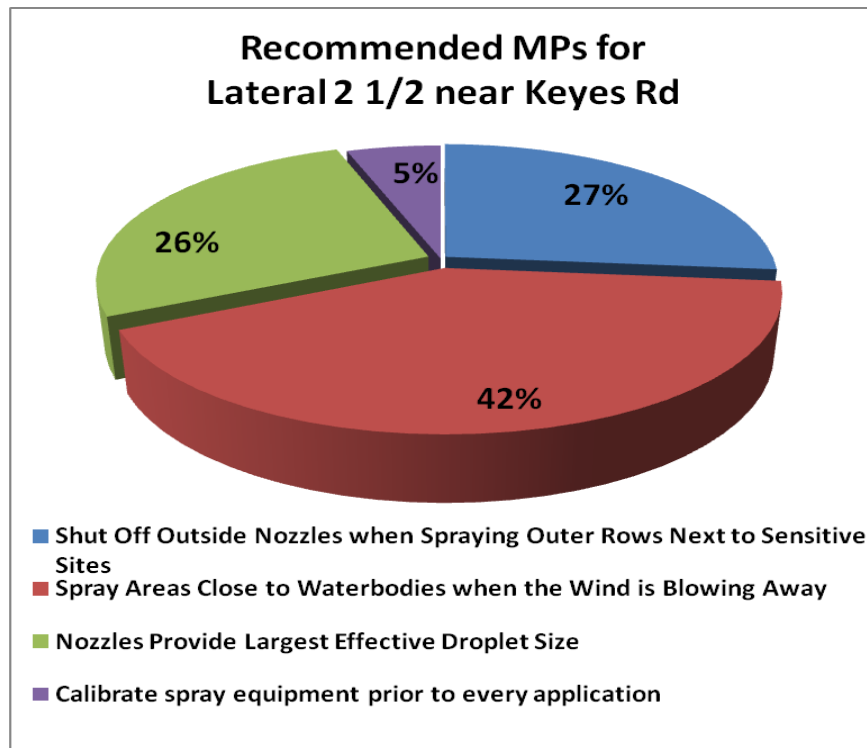


Figure 37. Lateral 2 ½ near Keyes Rd recommended (2012) management practice acreage percentage for members with no irrigation drainage.



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## Livingston Drain @ Robin Ave

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The Coalition contacted and received completed surveys from 11 targeted growers farming 335 acres, which represents 23% of the direct drainage area within the Livingston Drain @ Robin Ave subwatershed (Table 12, Figure 38).

### *Summary of Current Management Practices (2010/2011)*

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Of the parcels surveyed in the Livingston Drain subwatershed, at least 73% of the acreage is orchards and 16% of the acreage is field/row crops (Figure 39). One grower farming 39 acres (12% of acreage) reported operating both orchards and field/row crops. There is no irrigation drainage from any of the targeted growers' properties (Figure 40). The Coalition recommended management designed to address storm water retention (since targeted growers have no irrigation runoff) and to eliminate spray drift, which includes installing berms between field and waterways, spraying areas close to waterbodies when the wind is blowing away from them, and only applying air blast applications when the wind is between three and 10 mph and is upwind of a sensitive site (Figure 40).

#### **Irrigation Management**

None of the targeted growers in Livingston Drain irrigate their fields via flood irrigation—all growers use sprinkler, microirrigation and/or drip irrigation (Table 33). Sixty-eight percent of the acreage is laser leveled. One grower representing 18 acres (5% of acreage) noted his property is very sandy with no runoff and laser leveling is not recommended for the parcel. One grower farming 15 acres (9% of acreage), reported utilizing PAM in combination with a recirculation/tailwater return system and a drainage basin/sediment pond to capture and retain runoff (Table 33). The majority of respondents, accounting for the vast majority of acreage (71%), indicate they base irrigation scheduled on actual soil moisture levels (Table 33).

#### **Erosion & Sediment Management**

Nine of the 11 growers employ at least one type of sediment management practice, including maintaining vegetated filter strips around field perimeter at least 10 feet wide (57% of acreage), planting or allowing vegetation to grow along ditches (68% of acreage), and/or grass row centers (74% of acreage, Table 33).

#### **Storm Water Drainage / Dormant Sprays**

Two growers indicated there is storm water drainage from their fields, but only in heavy (100 year) storms (Table 33). One of the two growers with storm water drainage sprays 36 acres with pesticides. Dormant sprays are also applied by two additional growers who have no storm drainage. Overall dormant sprays are applied to 25% of the targeted acreage. All three of the growers applying dormant pesticides check weather conditions priority to spraying and maintain setback zones. At least 65 acres have some vegetation when dormant sprays occur (Table 33).

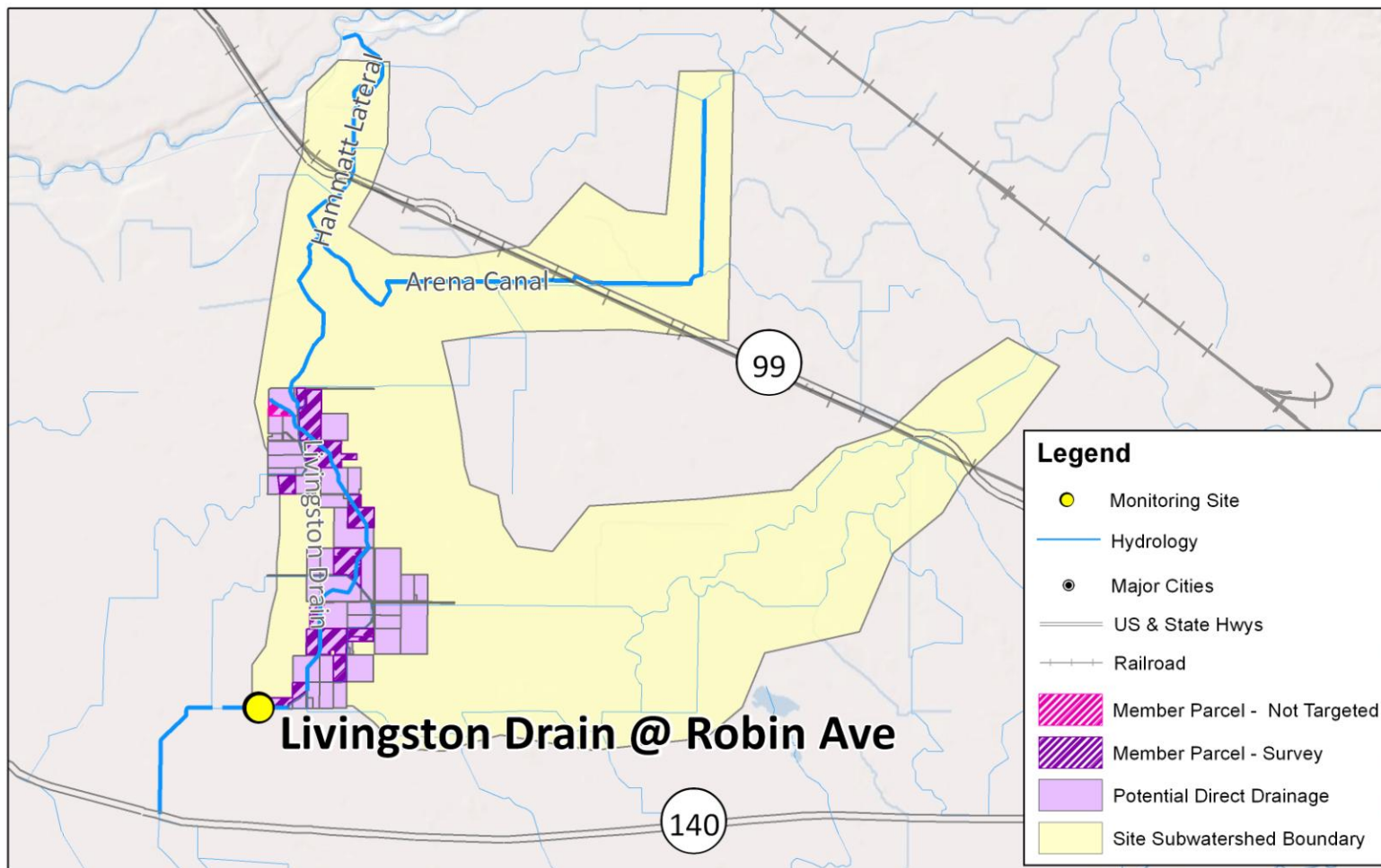
#### **Pest Management**

One targeted grower in the Livingston Drain subwatershed operates a 37-acre organic farm and does not apply any pesticides or herbicides (Table 33). The remaining 10 targeted growers implement

several spray management practices including calibrating prior to each spray application (seven growers), adjusting spray nozzles to match the canopy profile (10 growers), shutting off outside nozzles when spraying outer rows next to sensitive sites (10 growers), spraying areas close to waterbodies when the wind is blowing away from them (eight growers), and using nozzles that provide the largest effective droplet size to minimize drift (10 growers). Seven growers apply herbicides during the winter; glyphosate was the most common used herbicide. Only one grower farming 13 acres (4%) indicated they had not considered alternatives to chlorpyrifos and diazinon (Table 33).



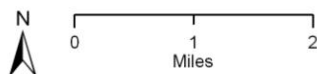
Figure 38. Livingston Drain @ Robin Ave member parcels with direct drainage potential.



Source of Layers:  
 Hydrology - NHD hydrodata, 1:24,000-scale, <http://nhd.usgs.gov/>  
 Roads, highways, railroads, county boundary, city outlines - California Spatial Information Library.  
 TRS - Teale Public Land Survey System, Pub. date. 20090101, California Spatial Information Library.  
 Parcel Layer - Stanislaus 2010, Merced 2011, Madera 2011  
 Basemap, Shaded Relief - ESRI  
 GSC North America 1983

Date Prepared: 03/05/12

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**Table 33. Livingston Drain @ Robin Ave subwatershed current management practices (2011).**

| CHECKLIST                                | QUESTION                                                          | ANSWER                                                                               | COUNT OF ANSWERS | % RESPONDENTS | SUM OF ASSOCIATED ACREAGE |
|------------------------------------------|-------------------------------------------------------------------|--------------------------------------------------------------------------------------|------------------|---------------|---------------------------|
| Section 1: Irrigation Water Management   | Irrigation management practices:                                  | Laser leveled fields                                                                 | 7                | 64%           | 229                       |
|                                          |                                                                   | Recirculation - Tailwater return system                                              | 1                | 9%            | 15                        |
|                                          |                                                                   | Use drainage basins (sediment ponds) to capture and retain runoff                    | 1                | 9%            | 15                        |
|                                          |                                                                   | Use of Polyacrylamide (PAM) to increase water infiltration and reduce furrow erosion | 1                | 9%            | 15                        |
|                                          | Irrigation System                                                 | Microirrigation                                                                      | 5                | 45%           | 128                       |
|                                          |                                                                   | Sprinkler                                                                            | 5                | 45%           | 192                       |
|                                          |                                                                   | Drip Irrigation                                                                      | 2                | 18%           | 54                        |
|                                          | Which do you base your irrigation schedule on:                    | Actual Moisture Levels in soil/crop needs                                            | 6                | 55%           | 236                       |
|                                          |                                                                   | Irrigation District Deliveries                                                       | 3                | 27%           | 57                        |
|                                          |                                                                   | Unanswered                                                                           | 2                | 18%           | 42                        |
| Section 2: Storm Drainage                | How are you able to manage storm drainage?                        | Berms Between Field & Waterway (Install and/or Improve)                              | 1                | 9%            | 71                        |
|                                          |                                                                   | No Storm Drainage                                                                    | 9                | 82%           | 265                       |
|                                          |                                                                   | Pump/Drain into waterway & able to control timing                                    | 1                | 9%            | 15                        |
|                                          |                                                                   | Pump/Drain into waterway & unable to control timing                                  | 2                | 18%           | 56                        |
|                                          |                                                                   | Recirculation - Tailwater return system                                              | 1                | 9%            | 15                        |
|                                          |                                                                   | Settling Pond                                                                        | 1                | 9%            | 15                        |
|                                          | When do you have storm water draining from your field?            | No Storm Drainage                                                                    | 9                | 82%           | 265                       |
|                                          |                                                                   | Only in heavy (100 year) storms                                                      | 2                | 18%           | 70                        |
|                                          |                                                                   |                                                                                      |                  |               |                           |
| Section 3: Erosion & Sediment Management | Do you apply herbicides during winter months?                     | Do not apply                                                                         | 4                | 36%           | 120                       |
|                                          |                                                                   | Glyphosate (Round-Up)                                                                | 6                | 55%           | 197                       |
|                                          |                                                                   | Goal                                                                                 | 3                | 27%           | 125                       |
|                                          |                                                                   | Paraquat (Gramaxone)                                                                 | 5                | 45%           | 150                       |
|                                          | If waterway crosses or borders pasture, how is livestock managed? | N/A - Not Pasture                                                                    | 11               | 100%          | 335                       |
|                                          | Sediment management practices:                                    | Grass Row Centers (Orchards, Vineyards)                                              | 7                | 64%           | 247                       |
|                                          |                                                                   | Maintain vegetated filter strips around field perimeter at least 10' wide            | 6                | 55%           | 192                       |



| CHECKLIST                           | QUESTION                                                                                                                  | ANSWER                                                                                  | COUNT OF ANSWERS | % RESPONDENTS | SUM OF ASSOCIATED ACREAGE |
|-------------------------------------|---------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------|------------------|---------------|---------------------------|
|                                     |                                                                                                                           | Vegetation is planted along or allowed to grow along ditches                            | 7                | 64%           | 229                       |
| Section 4: Pest Management          | Have you considered alternative strategies to using diazinon or chlorpyrifos either during the dormant or growing season? | N/A                                                                                     | 4                | 36%           | 88                        |
|                                     |                                                                                                                           | No                                                                                      | 1                | 9%            | 13                        |
|                                     |                                                                                                                           | Yes                                                                                     | 6                | 55%           | 234                       |
|                                     | How often is spray equipment calibrated?                                                                                  | Never (Does not spray)                                                                  | 1                | 9%            | 37                        |
|                                     |                                                                                                                           | Once per year                                                                           | 3                | 27%           | 84                        |
|                                     |                                                                                                                           | Prior to each application                                                               | 7                | 64%           | 214                       |
|                                     | Spray management practices:                                                                                               | Adjust spray nozzles to match crop canopy profile                                       | 10               | 91%           | 298                       |
|                                     |                                                                                                                           | Outside nozzles shut off when spraying outer rows next to sensitive sites               | 10               | 91%           | 298                       |
|                                     |                                                                                                                           | Spray areas close to waterbodies when the wind is blowing away from them                | 8                | 73%           | 188                       |
|                                     |                                                                                                                           | Use air blast applications when wind is between 3-10 mph and upwind of a sensitive site | 5                | 45%           | 181                       |
|                                     |                                                                                                                           | Uses of nozzles that provide largest effective droplet size to minimize drift           | 10               | 91%           | 298                       |
| Section 5: Dormant Spray Management | Do you apply when soil moisture is at field capacity?                                                                     | N/A                                                                                     | 2                | 18%           | 42                        |
|                                     |                                                                                                                           | No                                                                                      | 1                | 9%            | 41                        |
|                                     | Dormant spray management practices:                                                                                       | Check weather conditions prior to spraying (i.e. storm status)                          | 3                | 27%           | 83                        |
|                                     |                                                                                                                           | Maintain setback zones                                                                  | 3                | 27%           | 83                        |
|                                     | Have you been informed of DPR's Dormant Spray Regulations?                                                                | Yes                                                                                     | 3                | 27%           | 83                        |
|                                     | How many acres are sprayed with dormant pesticides?                                                                       | 18 Acres                                                                                | 1                | 9%            | 18                        |
|                                     |                                                                                                                           | 24 Acres                                                                                | 1                | 9%            | 24                        |
|                                     |                                                                                                                           | 36 Acres                                                                                | 1                | 9%            | 41                        |
|                                     |                                                                                                                           | No Dormant Sprays                                                                       | 8                | 73%           | 252                       |
|                                     | Prior to applying winter dormant sprays, what is the condition of your orchard floor?                                     | Some vegetation                                                                         | 1                | 9%            | 41                        |
|                                     |                                                                                                                           | Vegetative cover                                                                        | 1                | 9%            | 24                        |
|                                     |                                                                                                                           | Unanswered                                                                              | 1                | 9%            | 18                        |

Figure 39. Livingston Drain @ Robin Ave crop acreage information from member surveys (2011).

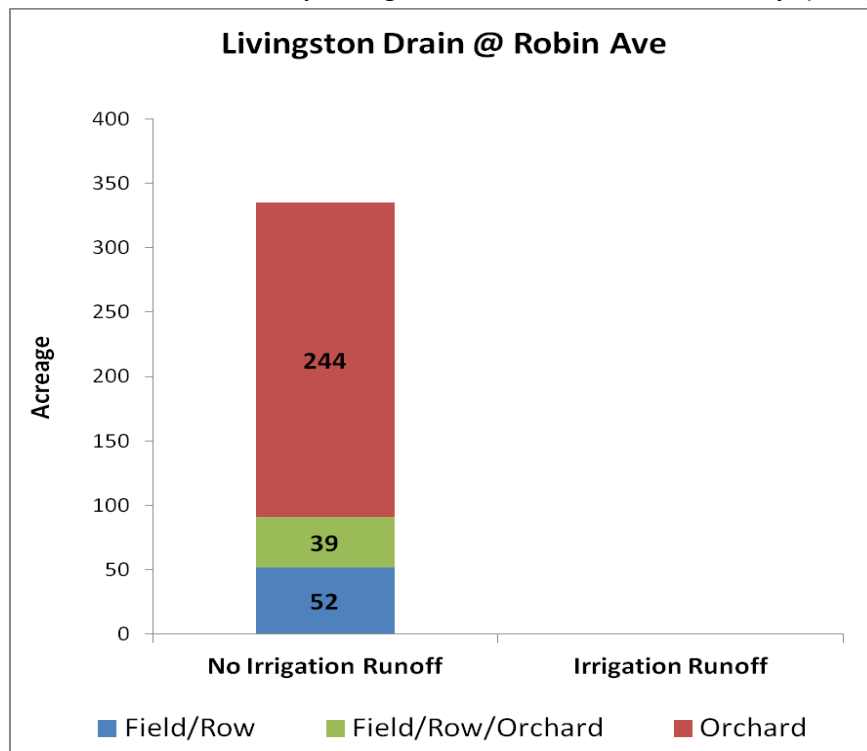
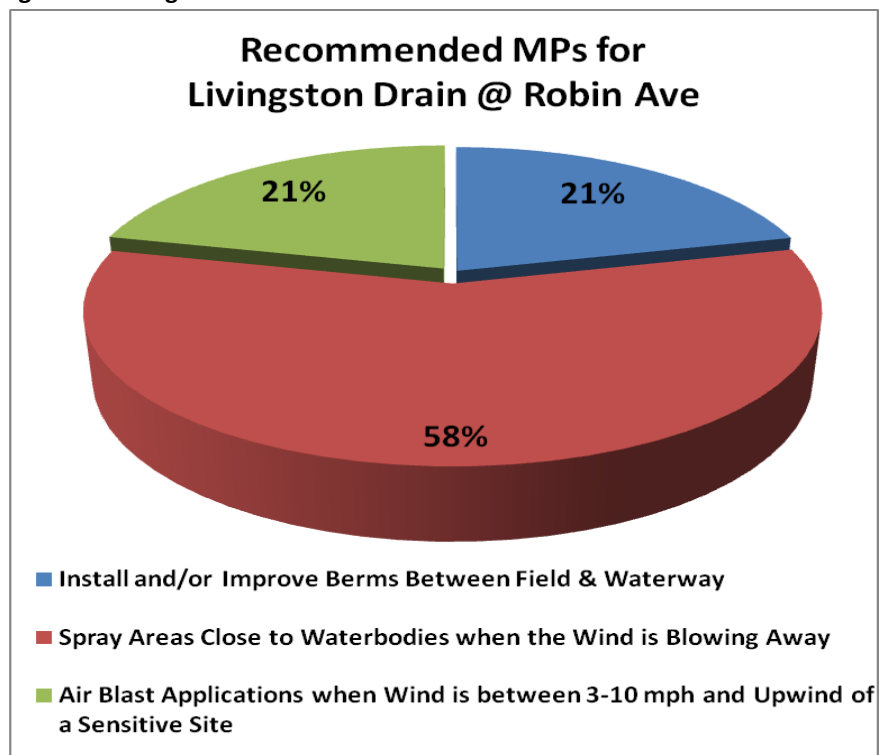


Figure 40. Livingston Drain @ Robin Ave recommended (2012) management practice acreage percentage for members with irrigation drainage.



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## FOURTH PRIORITY SUBWATERSHEDS SUMMARY OF MANAGEMENT PRACTICES (2012-2014)

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The Coalition began focused outreach in fourth priority subwatersheds in January 2012. The Coalition compiled a list of targeted growers in the Black Rascal Creek @ Yosemite Rd (1), Deadman Creek @ Hwy 59 (2), Deadman Creek @ Gurr Rd (8) and Hilmar Drain @ Central Ave (3) subwatersheds. The Coalition mailed initial contact letters to growers on January 24, 2012 informing them of the high priority subwatershed Management Plan process, including growers' responsibilities, and requesting that members contact the Coalition to schedule an individual grower meeting (Table 13). The Coalition is scheduling individual meetings with targeted growers to discuss water quality concerns, document currently implemented management practices, and recommend additional management practices designed to address the water quality concerns.

The Coalition will provide a preliminary analysis of currently implemented and recommended management practices in the 2013 MPUR. The Coalition will continue with focused outreach in the fourth priority subwatersheds through 2014 which will include following up with growers to document newly implemented practices. In addition, the Coalition is scheduled to conduct MPM in these subwatersheds in 2012 through 2014 to evaluate changes in water quality and the effectiveness of Coalition outreach.

## EVALUATION OF MANAGEMENT PRACTICE EFFECTIVENESS

The Coalition implemented its management plan process, which includes focused outreach and MPM, for three years in the first priority subwatersheds and for two years in the second priority subwatersheds (Table 34). The results of this process in the first and second priority subwatersheds provide the Coalition with data to evaluate management practice effectiveness.

**Table 34. Years of current management practice, newly implemented management practices and water quality assessment for evaluating management practice effectiveness.**

| PRIORITY GROUP                          | YEAR(S) OF CURRENT<br>MPs | YEAR(S) OF NEWLY<br>IMPLEMENTED MPs | YEAR(S) OF WQ<br>ASSESSMENT FOR<br>EVALUATION |
|-----------------------------------------|---------------------------|-------------------------------------|-----------------------------------------------|
| <b>FIRST PRIORITY SUBWATERSHEDS</b>     |                           |                                     |                                               |
| Dry Creek @ Wellsford                   | 2008, 2009                | 2009, 2010, 2011                    | 2009, 2010, 2011                              |
| Duck Slough @ Hwy 99                    | 2008                      | 2009, 2010                          | 2009, 2010, 2011                              |
| Prairie Flower Drain @ Crows Landing Rd | 2008                      | 2009, 2010                          | 2009, 2010, 2011                              |
| <b>SECOND PRIORITY SUBWATERSHEDS</b>    |                           |                                     |                                               |
| Bear Creek @ Kibby Rd                   | 2009                      | 2010, 2011                          | 2010, 2011                                    |
| Cottonwood Creek @ Rd 20                | 2009                      | 2010, 2011                          | 2010, 2011                                    |
| Duck Slough @ Gurr Rd                   | 2009                      | 2010, 2011                          | 2010, 2011                                    |
| Highline Canal @ Hwy 99                 | 2009                      | 2010, 2011                          | 2010, 2011                                    |

MP – Management practice

WQ – Water Quality

Since the Coalition began focused outreach, growers within the in the first and second priority subwatersheds implemented new management practices designed to address agricultural induced water quality impairments. Because subwatersheds within the Coalition region may be unique in both water quality impairments and causes of the impairments, the number and type of practices recommended to members may vary from subwatershed to subwatershed. Across the seven first and second high priority subwatersheds, 35 members implemented 47 new management practices between 2009 and 2011 (Table 35). Table 36 lists the number of acres associated with newly implemented management practices in the first and second priority subwatersheds. Management practices within Pest Management / Dormant Spray Management category that focus on spray drift were implemented to the most acres in the seven subwatersheds (Table 36).

**Table 35. Count of targeted growers implementing new management practices in first and second priority subwatersheds.**

| SUBWATERSHED                                       | NUMBER OF GROWERS IMPLEMENTING: |           |           | # New MPs IMPLEMENTED | NUMBER OF GROWERS: |                      |                      | % TARGETED GROWERS IMPLEMENTING NEW MPs |
|----------------------------------------------------|---------------------------------|-----------|-----------|-----------------------|--------------------|----------------------|----------------------|-----------------------------------------|
|                                                    | 1 New MP                        | 2 New MPs | 3 New MPs |                       | RECOMMENDED MPs    | IMPLEMENTING NEW MPs | TARGETED (FOLLOW UP) |                                         |
| FIRST PRIORITY SUBWATERSHEDS                       |                                 |           |           |                       |                    |                      |                      |                                         |
| Dry Creek @ Wellsford Rd                           | 7                               | 1         | 0         | 9                     | 4                  | 8                    | 22                   | 36%                                     |
| Duck Slough @ Hwy 99                               | 3                               | 3         | 1         | 12                    | 8                  | 7                    | 20                   | 35%                                     |
| Prairie Flower Drain @ Crows Landing               | 2                               | 1         | 1         | 7                     | 4                  | 5                    | 10                   | 50%                                     |
| 1 <sup>ST</sup> PRIORITY TOTAL                     | 12                              | 5         | 2         | 28                    | 16                 | 20                   | 52                   | 38%                                     |
| SECOND PRIORITY SUBWATERSHEDS                      |                                 |           |           |                       |                    |                      |                      |                                         |
| Bear Creek @ Kibby Rd                              | 2                               | 1         | 0         | 4                     | 7                  | 3                    | 14                   | 21%                                     |
| Cottonwood Creek @ Rd 20                           | 5                               | 1         | 0         | 7                     | 3                  | 6                    | 24                   | 25%                                     |
| Duck Slough @ Gurr Rd                              | 2                               | 0         | 0         | 2                     | 3                  | 2                    | 6                    | 33%                                     |
| Highline Canal @ Hwy 99                            | 2                               | 2         | 0         | 6                     | 2                  | 4                    | 8                    | 50%                                     |
| 2 <sup>ND</sup> PRIORITY TOTAL                     | 11                              | 4         | 0         | 19                    | 15                 | 15                   | 52                   | 29%                                     |
|                                                    |                                 |           |           |                       |                    |                      |                      |                                         |
| 1 <sup>ST</sup> AND 2 <sup>ND</sup> PRIORITY TOTAL | 23                              | 9         | 2         | 47                    | 31                 | 35                   | 104                  | 34%                                     |

MP – Management practice

**Table 36. First and second priority subwatershed acreage with newly implemented management practices.**

| MANAGEMENT PRACTICE CATEGORY                                                 | MANAGEMENT PRACTICES                                                           | 1ST PRIORITY SUBWATERSHEDS |                      |                                         | 2ND PRIORITY SUBWATERSHEDS |                          |                       |                         | SUM OF ACREAGE WITH MANAGEMENT PRACTICE <sup>2</sup> | % TARGETED ACRES |
|------------------------------------------------------------------------------|--------------------------------------------------------------------------------|----------------------------|----------------------|-----------------------------------------|----------------------------|--------------------------|-----------------------|-------------------------|------------------------------------------------------|------------------|
|                                                                              |                                                                                | DRY CREEK @ WELLSFORD RD   | DUCK SLOUGH @ HWY 99 | PRAIRIE FLOWER DRAIN @ CROWS LANDING RD | BEAR CREEK @ KIBBY RD      | COTTONWOOD CREEK @ RD 20 | DUCK SLOUGH @ GURR RD | HIGHLINE CANAL @ HWY 99 |                                                      |                  |
|                                                                              | TARGETED ACREAGE                                                               | 6,392                      | 4,016                | 865                                     | 1,292                      | 5,768                    | 2,656                 | 368                     |                                                      |                  |
| Pest Management / Dormant Spray Management                                   | Shut off outside nozzles when spraying outer rows next to sensitive sites      | 524                        | 646                  |                                         |                            |                          | 622                   |                         | 1,792                                                | 8%               |
|                                                                              | Spray areas close to waterbodies when the wind is blowing away from them       |                            |                      |                                         |                            | 1,107                    | 91                    | 25                      | 1,223                                                | 6%               |
|                                                                              | Use air blast applications when wind is 3-10 mph and upwind of sensitive sites |                            |                      |                                         |                            |                          |                       | 25                      | 25                                                   | <1%              |
|                                                                              | Use electronic controlled sprayer nozzles                                      |                            |                      |                                         |                            | 375                      |                       |                         | 375                                                  | 2%               |
|                                                                              | Use nozzles that provide largest effective droplet size to minimize drift      |                            |                      |                                         |                            |                          |                       | 121                     | 121                                                  | 1%               |
| Irrigation Water Management                                                  | Microirrigation system                                                         |                            | 279                  |                                         | 207                        |                          |                       |                         | 486                                                  | 2%               |
|                                                                              | Reduce amount of water used in surface irrigation                              | 162                        | 764                  | 271                                     | 404                        | 427                      |                       | 197                     | 2,225                                                | 10%              |
|                                                                              | Use Polyacrylamide (PAM)                                                       |                            |                      | 150                                     |                            |                          |                       |                         | 150                                                  | 1%               |
| Irrigation Water Management / Storm Drainage / Erosion & Sediment Management | Drainage Basins (Sediment Ponds)                                               | 121                        |                      | 150                                     |                            |                          |                       |                         | 271                                                  | 1%               |
|                                                                              | Filter strips at least 10' wide around field perimeter                         | 28                         |                      |                                         |                            | 8                        |                       |                         | 36                                                   | <1%              |
|                                                                              | Grass row centers                                                              | 107                        |                      |                                         |                            |                          |                       |                         | 107                                                  | 1%               |
|                                                                              | Install device to control amount/timing of discharge to waterway               |                            | 1,148                | 512                                     |                            |                          |                       |                         | 1,660                                                | 8%               |
|                                                                              | Recirculation - Tailwater return system                                        | 443                        |                      |                                         |                            |                          |                       |                         | 443                                                  | 2%               |
|                                                                              | Other (Not specified) <sup>1</sup>                                             | 3,651                      | 451                  |                                         |                            |                          |                       |                         | 4,102                                                | 19%              |

<sup>1</sup>If growers implemented management practices other than those asked about during Coalition follow-up, they were instructed to indicate so and provide a summary/explanation.

Starting in 2009, the Coalition began monitoring for the effectiveness of newly implemented management practices (Table 34). High priority management plan constituents monitored for management practice effectiveness include chlorpyrifos, copper, diazinon, diuron (added in 2010), *C. dubia* water column toxicity, *S. capricornutum* water column toxicity and *H. azteca* sediment toxicity. Overall, the number of exceedances for these priority constituents decreased since 2009 (Figure 41, Tables 37 and 38). The number of samples collected for these constituents across the first and second high priority subwatersheds varied from year to year due to changes in MPM schedules and rotating of Assessment and Core Monitoring constituents. Tables 37 and 38 include both the number of exceedances per year from 2006 through 2011 and the ratio of the number of exceedances relative to the number of samples collected (as a percentage) for the first and second high priority subwatersheds.

**Figure 41. Counts of high priority exceedances and toxicities from 2006 through 2011 in first and second priority subwatersheds.**

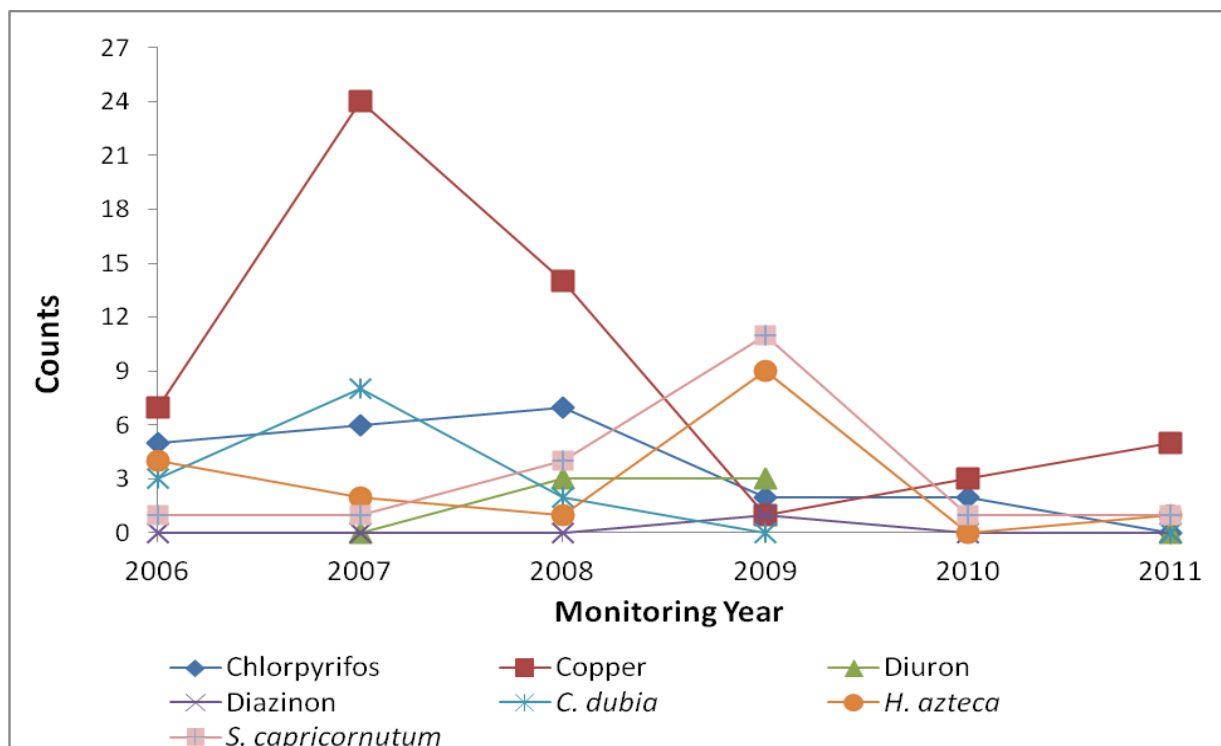


**Table 37. Count of exceedances and samples collected for high priority pesticides in first and second priority subwatersheds.**

| YEAR | CHLORPYRIFOS |                      |              |                    | COPPER <sup>1</sup> |                      |              |                     | DIAZINON   |                      |              |                  | DIURON     |                      |              |                    |
|------|--------------|----------------------|--------------|--------------------|---------------------|----------------------|--------------|---------------------|------------|----------------------|--------------|------------------|------------|----------------------|--------------|--------------------|
|      | EXCEEDANCE   | SAMPLES <sup>2</sup> | % EXCEEDANCE | LBS APPLIED        | EXCEEDANCE          | SAMPLES <sup>2</sup> | % EXCEEDANCE | LBS APPLIED         | EXCEEDANCE | SAMPLES <sup>2</sup> | % EXCEEDANCE | LBS APPLIED      | EXCEEDANCE | SAMPLES <sup>2</sup> | % EXCEEDANCE | LBS APPLIED        |
| 2006 | 5            | 49                   | 10%          | 39,184             | 7                   | 35                   | 20%          | 154,565             | 0          | 49                   | 0%           | 1,703            | 0          | 35                   | 0%           | 7,046              |
| 2007 | 6            | 60                   | 10%          | 31,397             | 24                  | 62                   | 39%          | 107,663             | 0          | 57                   | 0%           | 1,361            | 3          | 54                   | 6%           | 5,884              |
| 2008 | 7            | 61                   | 11%          | 18,234             | 14                  | 62                   | 23%          | 74,434              | 1          | 58                   | 2%           | 966              | 3          | 57                   | 5%           | 3,682              |
| 2009 | 2            | 12                   | 17%          | 18,767             | 1                   | 9                    | 11%          | 83,207              | 0          | 5                    | 0%           | 510              | NA         | NA                   | NA           | 3,868              |
| 2010 | 2            | 17                   | 12%          | 22,064             | 3                   | 24                   | 13%          | 116,078             | 0          | 2                    | 0%           | 404              | 0          | 5                    | 0%           | 4,039              |
| 2011 | 0            | 65                   | 0%           | 7,029 <sup>3</sup> | 5                   | 69                   | 7%           | 92,149 <sup>3</sup> | 0          | 60                   | 0%           | 239 <sup>3</sup> | 0          | 60                   | 0%           | 3,650 <sup>3</sup> |

<sup>1</sup>Since October 2008, the Coalition analyzes for both the total and dissolved fraction of copper in every event. For counting exceedances and samples scheduled for copper analysis, this table ignores fraction (e.g. if site A is scheduled for copper total and copper dissolved analysis in Event 1, the table counts only one sample for copper). No single sample collected from one site during one event has ever exceeded both the total and dissolved copper WQTLs.

<sup>2</sup>Refers to all samples scheduled for constituent analysis (dry sites are included).

<sup>3</sup>PUR data only available through June 2011 for Madera County, October 2011 for Merced County, and November 2011 for Stanislaus County.

NA – Not applicable, no samples were collected for the constituent during the year.

**Table 38. Count of toxicities and samples collected for high priority toxic analysis in first and second priority subwatersheds.**

| YEAR | <i>C. DUBIA</i> TOXICITY |                      |         | <i>S. CAPRICORNUTUM</i> TOXICITY |                      |         | <i>H. AZTECA</i> TOXICITY |                      |         |
|------|--------------------------|----------------------|---------|----------------------------------|----------------------|---------|---------------------------|----------------------|---------|
|      | TOXICITIES               | SAMPLES <sup>1</sup> | % TOXIC | TOXICITIES                       | SAMPLES <sup>1</sup> | % TOXIC | TOXICITIES                | SAMPLES <sup>1</sup> | % TOXIC |
| 2006 | 8                        | 49                   | 16%     | 1                                | 49                   | 2%      | 2                         | 14                   | 14%     |
| 2007 | 2                        | 58                   | 3%      | 4                                | 56                   | 7%      | 1                         | 14                   | 7%      |
| 2008 | 0                        | 61                   | 0%      | 11                               | 57                   | 19%     | 9                         | 14                   | 64%     |
| 2009 | NA                       | NA                   | NA      | 1                                | 5                    | 20%     | 0                         | 1                    | 0%      |
| 2010 | 0                        | 3                    | 0%      | 1                                | 13                   | 8%      | 1                         | 5                    | 20%     |
| 2011 | 1                        | 62                   | 2%      | 3                                | 62                   | 5%      | 2                         | 10                   | 20%     |

<sup>1</sup>Samples refers to all samples scheduled for constituent analysis (dry sites are included). Resampling events are not scheduled monitoring events and are not included.

NA – Not applicable, no samples were collected for the constituent during the year.



## Chlorpyrifos

Chlorpyrifos is a high priority constituent for all first and second priority subwatersheds. As stated in previous sections, the Coalition discussed with growers the importance of irrigation and storm water management as well as encouraged management practices to reduce spray drift. Prior to 2009, the number of chlorpyrifos exceedances in first and second priority subwatersheds ranged from 5 to 7 samples representing 10 – 11% of the samples analyzed (Table 37). In 2009 and 2010, the number of exceedances was reduced to two in each year and there were no exceedances of the chlorpyrifos WQTL in 2011 (Table 37). Preliminary PUR data indicate that less chlorpyrifos was applied to the subwatershed in 2011 compared to previous years (2011 PUR data not available for all months, Table 37). The Coalition petitioned to remove chlorpyrifos from the Duck Slough @ Hwy 99, Bear Creek @ Kibby Rd, Duck Slough @ Gurr Rd, Highline Canal @ Hwy 99 and Prairie Flower Drain @ Crows Landing Rd management plans as a result of improved water quality.

## Copper

Copper is included in a management plan for all the first and second priority subwatersheds except Prairie Flower Drain @ Crows Landing Rd. While the amount of copper applied remains high; the percentage of copper exceedances was less in 2011 (7%) compared to 2010 in first and second priority subwatersheds (13%, Table 37). Before outreach began in 2008, copper exceedances occurred in 23% of the samples collected compared to 7% of samples in 2011 (Table 37). Copper exceedances that occurred in 2010 and 2011 occurred in samples collected from Cottonwood Creek; all other first and second high priority subwatersheds had no copper WQTL exceedances.

Growers within all subwatersheds implemented additional management practices designed to prevent the offsite movement of copper including management of spray drift and irrigation/storm runoff (Table 36). Sources of copper in ESJWQC waterways include natural sources and anthropogenic sources including applications by growers and applications by water districts. Only one source of copper is under the control of Coalition members (discharges from irrigated agriculture). Management practices implemented by growers can be effective and still not eliminate exceedances of the WQTL. The Coalition petitioned to remove copper from the Dry Creek @ Wellsford and Highline Canal @ Hwy 99 site subwatershed management plans due to improved water quality. The Coalition will continue to monitor for copper in Duck Slough, Bear Creek and Cottonwood Creek to assess water quality improvements and obtain two full years of monitoring with no copper WQTL exceedances.

## Diazinon

Cottonwood Creek @ Rd 20 is the only subwatershed with diazinon in its management plan; only one exceedance occurred in 2008. Because diazinon is a US EPA approved TMDL constituent, a single exceedance requires a management plan. During individual contacts, the Coalition encouraged orchard operators to implement management practices during the dormant spray/storm season. The Coalition believes these practices, along with declining diazinon applications, have been effective in reducing diazinon water quality impairments. No exceedances of diazinon have occurred since 2008 (Table 37). Therefore, the Coalition petitioned to remove diazinon from the Cottonwood Creek management plan since monitoring has demonstrated more than two consecutive years of no exceedances.

## Diuron

Dry Creek @ Wellsford Rd, Cottonwood Creek @ Rd 20 and Highline Canal @ Hwy 99 include diuron in their management plans. Between 2007 and 2008, there were six exceedances of the diuron WQTL; all exceedances occurred in samples collected during a storm event in either January or February (Table 37). The Coalition discussed the importance of preventing offsite movement of dormant spray pesticides and herbicides, such as diuron, during individual grower meetings. Growers in the three subwatersheds implemented several management practices designed to address storm water runoff and dormant spray applications (e.g. maintaining filter strips at least 10 feet wide, spray areas close to waterbodies when the wind is blowing away from them, etc., Table 36). The Coalition believes these management practices are effective in reducing diuron discharges. There were no exceedances of the diuron WQTL during 2010 MPM or 2011 Assessment Monitoring in any of the three subwatersheds (Table 37). Therefore, the Coalition petitioned to remove diuron from the Dry Creek @ Wellsford Rd, Cottonwood Creek @ Rd 20 and Highline Canal @ Hwy 99 management plans due to two consecutive years of monitoring with no exceedances of diuron.

## C. dubia toxicity

Management plans were implemented for *C. dubia* toxicity in the Prairie Flower Drain @ Crows Landing Rd, Bear Creek @ Kibby Rd, Duck Slough @ Gurr Rd and Highline Canal @ Hwy 99 subwatersheds. Across the ESJWQC region, water toxicity to *C. dubia* is often caused, either partially or entirely, by organophosphates in surface waterways. The Coalition's strategy for *C. dubia* toxicity is to focus on chlorpyrifos and diazinon water quality impairments to address the toxicity. Since focused outreach began in 2009, there has been only one *C. dubia* toxicity in first and second priority subwatersheds (Table 38). The single *C. dubia* toxicity occurred in 2011 in samples collected from Prairie Flower Drain @ Crows Landing Rd and coincided with exceedances of carbaryl (five times the WQTL) and dimethoate (10 times the WQTL). The Toxicity Identification Evaluation (TIE) indicated pyrethroids were the cause of toxicity. The Coalition identified the PCA and grower responsible for the carbaryl application that resulted in the exceedance, discussed water quality concerns and applicable management practices, and is working with this member to obtain funds for a tailwater/recirculation system. The Coalition emphasizes during general and focused outreach that all pesticides carry risks for water quality and preventing the offsite movement of all pesticides, via storm water, irrigation tailwater, and/or sediment, is the most effective method to reduce agriculturally induced water quality impairments.

The Coalition believes its strategy of focusing on chlorpyrifos and diazinon is effective in reducing *C. dubia* toxicities. Samples collected from Bear Creek @ Kibby Rd, Duck Slough @ Gurr Rd, and Highline Canal @ Hwy 99 have not been toxic to *C. dubia* since focused outreach began and therefore the Coalition petitioned to remove *C. dubia* toxicity from the Bear Creek @ Kibby Rd management plan. The Coalition recognizes it will need to continue to inform growers of the risks of switching to alternative pesticides and continues to do so during both general and focused outreach efforts. During 2012, MPM for *C. dubia* toxicity will occur in the Prairie Flower Drain @ Crows Landing Rd, Bear Creek @ Kibby Rd, Duck Slough @ Gurr Rd, and Highline Canal @ Hwy 99 subwatersheds.

### ***S. capricornutum* toxicity**

Management plans were implemented for *S. capricornutum* toxicity in the Dry Creek @Wellsford Rd, Duck Slough @ Hwy 99, Prairie Flower Drain @ Crows Landing Rd, Duck Slough @ Gurr Rd, and Highline Canal @ Hwy 99 subwatersheds. Since focused outreach began in 2009, *S. capricornutum* toxicity occurred in samples collected from the Prairie Flower Drain @ Crows Landing Rd subwatershed once in 2009, once in 2010, and three times in 2011 (Table 38). All other first and second high priority subwatersheds have not had any samples toxic to *S. capricornutum* since 2009. Potential sources of past toxicity include metals, ammonia and applied herbicides. Prairie Flower Drain contains both agricultural and dairy parcels that discharge to the drain. Management practices implemented by members within the Prairie Flower subwatershed may be effective and still not eliminate all exceedances. The Coalition will continue to monitor for *S. capricornutum* toxicity at Prairie Flower Drain during months of past exceedances and when the site rotates into Assessment Monitoring. The Coalition will conduct MPM in 2012 for *S. capricornutum* toxicity in Dry Creek @Wellsford Rd, Duck Slough @ Hwy 99, Duck Slough @ Gurr Rd, and Highline Canal @ Hwy 99 in order to demonstrate two consecutive years of monitoring with no toxicities. The Coalition petitioned to remove *S. capricornutum* toxicity from the Dry Creek @Wellsford Rd, Duck Slough @ Hwy 99 and Duck Slough @ Gurr Rd subwatersheds management plans.

### ***H. azteca* toxicity**

Management plans were implemented for *H. azteca* toxicity (sediment toxicity) in the Dry Creek @ Wellsford Rd, Prairie Flower Drain @ Crows Landing Rd, Duck Slough @ Gurr Rd, and Highline Canal @ Hwy 99 subwatersheds. The Coalition discussed management practices to address sediment toxicity during its focused outreach to growers in the first and second priority subwatersheds. Since focused outreach began in 2009, *H. azteca* toxicity has not occurred in the Prairie Flower Drain @ Crows Landing Rd and Highline Canal @ Hwy 99 subwatersheds. However, *H. azteca* toxicity occurred once in the Dry Creek @ Wellsford Rd (September 2011) and twice in the Duck Slough @ Gurr Rd subwatershed (September 2010 and September 2011; Table 38). Pesticide Use Reports indicate both chlorpyrifos and various pyrethroids were applied prior to all three exceedances. The Coalition believes the management practices it recommends to reduce the offsite movement of storm water, irrigation tailwater, and/or sediment are effective given that, overall, there is a reduction in the percentage of *H. azteca* toxicities in 2011 compared to the percentage of toxicities in 2008 in the first and second priority subwatersheds (Table 38). Nevertheless, growers need to take further steps to eliminate all sediment toxicity, and the Coalition will continue MPM for *H. azteca* toxicity at the four sites in 2012 to assess changes in water quality.

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## COALITION WIDE EVALUATION

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Monitoring results from recent years indicate that water quality is improved in several ESJWQC high priority management plan subwatersheds. The Coalition submitted a letter to the Regional Board on January 6, 2012 petitioning to remove constituents from the management plan of 10 high priority subwatersheds. Monitoring results from these sites demonstrate no exceedances of the particular constituents during two or more consecutive years of monitoring in months of past exceedances. The high priority sites (listed in order of priority year) and constituents being petitioned to remove are Dry Creek @ Wellsford Rd (copper, diuron, specific conductance (SC) and *S. capricornutum* toxicity), Duck Slough @ Hwy 99 (chlorpyrifos, dissolved oxygen (DO) and *S. capricornutum* toxicity), Prairie Flower Drain @ Crows Landing Rd (chlorpyrifos and pH), Bear Creek @ Kibby Rd (chlorpyrifos and DO), Cottonwood Creek @ Rd 20 (diazinon and diuron), Duck Slough @ Gurr Rd (chlorpyrifos, SC, *S. capricornutum* toxicity and total dissolved solids (TDS)), Highline Canal @ Hwy 99 (ammonia, chlorpyrifos, copper, diuron, pH, SC and TDS), Lateral 2 ½, near Keyes Rd (*E. coli*), Deadman Creek @ Gurr Rd (copper), and Hilmar Drain @ Central Ave (chlorpyrifos). Until the request is approved, the constituents will continue to be monitored as scheduled.

Since 2004, the Coalition has had water quality impairments with chlorpyrifos detections and exceedances within its boundaries. The Coalition focused on chlorpyrifos impairments during general outreach (since 2007) and focused outreach to high priority subwatersheds (since 2008). Since the implementation of the Coalition's Management Plan in 2008, there is an overall decrease in the number and percentage of chlorpyrifos exceedances across the entire ESJWQC region (Table 39 and Figure 42). During 2011, the Coalition conducted Assessment Monitoring at 11 sites and MPM at 12 sites; six of the 11 Assessment Monitoring sites also received MPM, therefore 17 sites (excluding Lateral 3 along East Taylor Rd which was approved to be removed from the ESJWQC MRPP on February 7, 2012) were monitored in 2011 (Table 2 and Figure 43). Seven of the site subwatersheds sampled in 2011 received focused outreach to address management plan constituents while the Coalition has either not started or only just initiated this process in the other 10 site subwatersheds monitored in 2011. The Coalition believes that general and focused outreach regarding water quality results and management practices resulted in decreased chlorpyrifos exceedances in both high priority subwatersheds and new Assessment Monitoring locations.

**Table 39. Count of exceedances and samples collected for chlorpyrifos across the ESJWQC region.**

| YEAR | EXCEEDANCE COUNT | SAMPLES <sup>1</sup> | % EXCEEDANCE | LBS APPLIED <sup>2</sup> |
|------|------------------|----------------------|--------------|--------------------------|
| 2006 | 17               | 115                  | 15%          | 221,111                  |
| 2007 | 19               | 186                  | 10%          | 168,482                  |
| 2008 | 27               | 244                  | 11%          | 132,342                  |
| 2009 | 5                | 101                  | 5%           | 157,503                  |
| 2010 | 9                | 93                   | 10%          | 129,277                  |
| 2011 | 3                | 147                  | 2%           | 69,580                   |

<sup>1</sup> Samples refers to all samples collected for constituent analysis (dry sites not included).

<sup>2</sup> PUR data only available through June 2011 for Madera County, October 2011 for Merced County, and November 2011 Stanislaus County.

**Figure 42. Percentage of chlorpyrifos exceedances from all 2006 -2011 monitoring events (Assessment Monitoring and MPM) in ESJWQC Zones 1-6.**

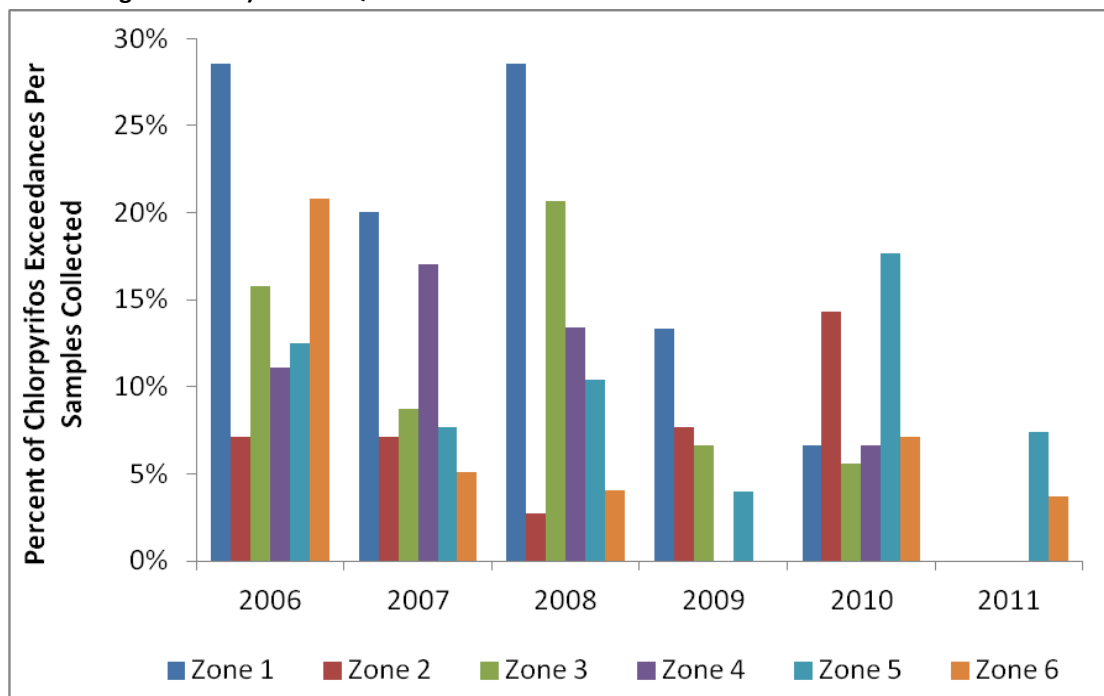
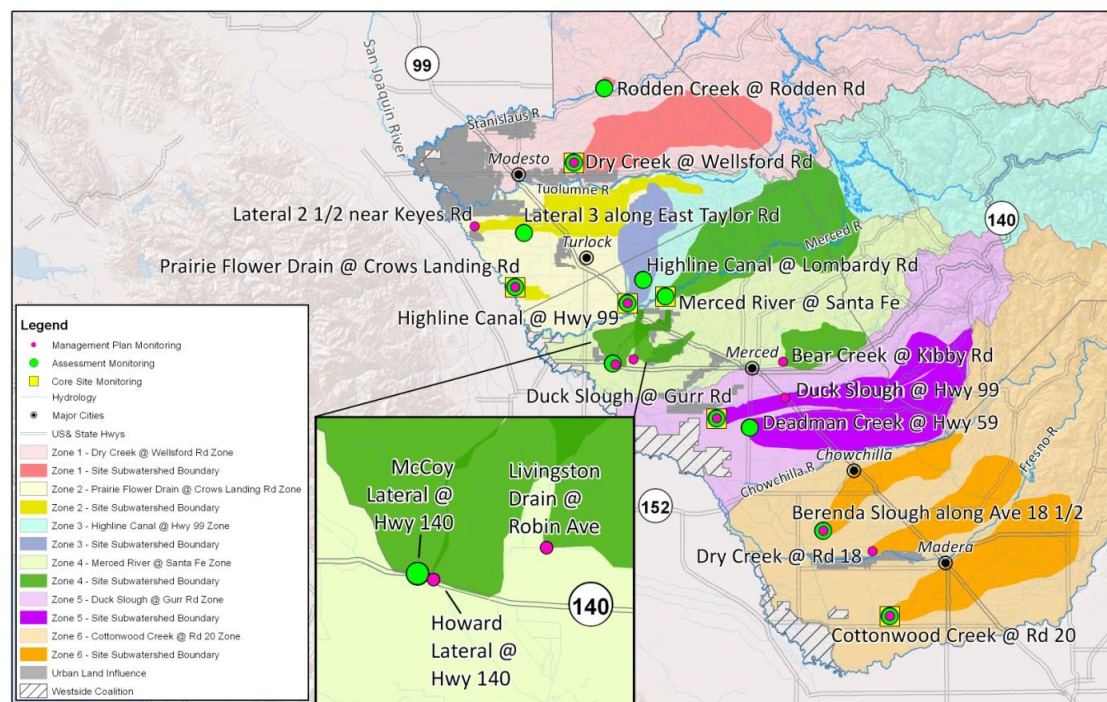
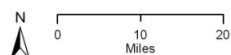


**Figure 43. ESJWQC January through December 2011 sample locations and zone boundaries.**



### ESJWQC January - December 2011 Monitoring Sites Zone Boundaries & Urban Land Influence



ESJWQC\_2011\_amr



In addition to the Coalition's focused outreach strategy, the Coalition believes growers across the ESJWQC region are taking additional actions to prevent water quality impairments caused by agricultural. The Coalition reviewed funding data from the various organizations managing the distribution of financial support to growers for the implementation of management practices. These organizations include the Coalition for Urban/Rural Environmental Stewardship (CURES), which is managing the distribution of Prop 84 funds and the associated cost share program, and the AWEP and EQIP funding cost share programs, which are managed by the Natural Resource Conservation Service (NRCS) office of each county within the ESJWQC region (Stanislaus, Merced, and Madera). The AWEP funds are specific to agriculture and a group must apply for the funds before they are made available. On July 30, 2009, AWEP funding of \$10 million was awarded to the ESJWQC, CURES, the Westside San Joaquin River Watershed Coalition, the West and East Stanislaus Resource Conservation District and NRCS and is currently being distributed through the county NRCS offices. Funds were made available to support management practice implementation on farms and dairies with operations bordering waterways within subwatersheds covered by management plans in Stanislaus and Merced counties. On the other hand, EQIP funds are regularly allocated to counties from the federal government for any projects focused on implementing management practices designed to protect and/or improve the quality of surface water, groundwater, soil, and/or air.

Data obtained from CURES regarding Prop 84 funding indicate there were six contracts awarded in 2011 worth \$281,853 (Prop 84 funding is a 50% cost share program, therefore the total cost of the management practices is twice the amount listed, Table 40). The Prop 84 funds focus on irrigation management, and awards thus far have been for microirrigation and tailwater return systems (Table 40). Prop 84 funds awarded in 2011 are associated with 1,256 acres in Merced County within the ESJWQC region (Table 40).

**Table 40. Prop 84 funding contracts awarded, contract dollars and contract acres Merced County.**

Data provided to the Coalition are considered preliminary.

| COUNTY | FUNDING YEAR | PROGRAM | PRACTICE NAME           | TOTAL NUMBER OF CONTRACTS AWARDED | TOTAL CONTRACT DOLLARS <sup>1</sup> | TOTAL CONTRACT ACREAGE |
|--------|--------------|---------|-------------------------|-----------------------------------|-------------------------------------|------------------------|
| Merced | 2011         | Prop 84 | Microirrigation         | 2                                 | \$159,512                           | 156                    |
|        |              |         | Tailwater Return System | 4 <sup>2</sup>                    | \$122,341 <sup>2</sup>              | 1,109 <sup>2</sup>     |
|        |              |         | <b>Total</b>            | <b>6</b>                          | <b>\$281,853</b>                    | <b>1,265</b>           |

<sup>1</sup> Prop 84 funding is a 50% cost share program, therefore the total cost of the management practices is twice the amount listed.

<sup>2</sup> After awards were approved, two growers have since declined Prop 84 funding. The other two growers have yet to start implementing the management practice.

The NRCS offices for the three counties in the ESJWQC region award 100% of their appropriated AWEP and EQIP monies and always have more applications than available funds to be awarded. Table 41 summarizes total contract acreage associated with EQIP and AWEP funded management practices designed to address surface water impairments from irrigated agriculture from 2009 through 2011. Of the management practices funded by AWEP and EQIP in the subwatersheds monitored by the Coalition in 2011, microirrigation/drip irrigation systems were associated with the most acreage (1,699 acres),

followed by low pressure pipelines (1,350 acres) and water/sediment control basins (793 acres, Table 41).

The practices funded by Prop 84, AWEPP and EQIP programs to date include several of the practices recommended by the Coalition during focused outreach. These data indicate targeted growers have options for financial resources to aid in implementing recommended practices.

In addition, the Prop 84, AWEPP, and EQIP funding information indicate that growers are implementing management practices to prevent the offsite movement of agricultural constituents to adjacent waterways in both high priority subwatersheds and subwatersheds that have not yet rotated into high priority status (e.g. Merced River, Howard Lateral, etc., Table 41). The data demonstrate that growers beyond those farming in the high priority subwatersheds are taking actions to address agriculturally induced water quality impairments in the ESJWQC region.

**Table 41. Acres associated with management practices awarded AWEP and EQIP funding in subwatersheds sampled by the ESJWQC during 2011.**

Data provided to the Coalition are considered preliminary since counties may still be updating funding award records.

| COUNTY      | SUBWATERSHED<br>(HIGH PRIORITY MP YEARS)               | FUNDING<br>YEAR | PROGRAM | IRRIGATION<br>WATER MGMT | LASER<br>LEVELING | MICRO/ DRIP<br>IRRIGATION<br>SYSTEM | SPRINKLER<br>SYSTEM | NUTRIENT<br>MGMT | PIPELINE |                 | UNDER<br>GROUND<br>OUTLET | RECIRCULATION/<br>TAILWATER RETURN<br>SYSTEM | WATER AND<br>SEDIMENT<br>CONTROL<br>BASIN |
|-------------|--------------------------------------------------------|-----------------|---------|--------------------------|-------------------|-------------------------------------|---------------------|------------------|----------|-----------------|---------------------------|----------------------------------------------|-------------------------------------------|
|             |                                                        |                 |         |                          |                   |                                     |                     |                  | CONCRETE | LOW<br>PRESSURE |                           |                                              |                                           |
| Stanislaus  | Dry Creek @ Wellsford Rd<br>(2008-2010)                | 2009            | AWEP    |                          | 97                |                                     |                     |                  |          | 97              |                           |                                              |                                           |
|             |                                                        | 2010            | AWEP    |                          |                   | 37                                  |                     | 548              |          | 793             |                           |                                              | 793                                       |
|             |                                                        |                 | EQIP    |                          |                   | 95                                  |                     |                  |          |                 |                           |                                              |                                           |
|             | 2011                                                   | AWEP            |         |                          | 196               |                                     |                     |                  |          |                 |                           |                                              |                                           |
|             | Prairie Flower Drain @ Crows<br>Landing Rd (2008-2010) | 2009            | AWEP    |                          |                   |                                     |                     |                  |          | 260             | 260                       | 260                                          |                                           |
|             |                                                        | EQIP            |         |                          |                   |                                     | 327                 |                  |          |                 |                           |                                              |                                           |
| Merced      | Duck Slough @ Hwy 99 (2008-<br>2010)                   | 2009            | AWEP    |                          |                   | 90                                  |                     |                  |          |                 |                           |                                              |                                           |
|             |                                                        | 2010            | AWEP    |                          |                   | 96                                  |                     |                  |          |                 |                           |                                              |                                           |
|             |                                                        |                 | EQIP    |                          |                   | 99                                  |                     |                  |          |                 |                           |                                              |                                           |
|             | Bear Creek @ Kibby Rd (2010-<br>2012)                  | 2009            | EQIP    |                          |                   |                                     |                     |                  |          |                 |                           | 27                                           |                                           |
|             |                                                        | 2010            | EQIP    |                          |                   | 81                                  |                     |                  |          |                 |                           | 28                                           |                                           |
|             | Duck Slough @ Gurr Rd (2010-<br>2012)                  | 2009            | AWEP    |                          |                   |                                     |                     |                  |          | 86              |                           | 62                                           |                                           |
|             | Highline Canal @ Lombardy Rd<br>& Hwy 99 (2010-2012)   | 2009            | EQIP    |                          |                   | 16                                  |                     | 40               |          |                 |                           |                                              |                                           |
|             | Livingston Drain @ Robin Ave<br>(2011-2013)            | 2009            | EQIP    |                          |                   | 81                                  |                     |                  |          |                 |                           |                                              |                                           |
|             |                                                        | 2010            | EQIP    |                          |                   | 157                                 | 17                  |                  |          |                 |                           |                                              |                                           |
|             | Deadman Creek @<br>Hwy 59 (2012-2014)                  | 2009            | EQIP    |                          |                   |                                     |                     |                  |          | 87              |                           | 95                                           |                                           |
|             |                                                        | 2010            | EQIP    |                          |                   | 280                                 |                     |                  |          |                 |                           |                                              |                                           |
|             | Merced River @ Santa Fe<br>(2013-2015)                 | 2009            | EQIP    |                          |                   | 150                                 |                     |                  |          |                 |                           |                                              |                                           |
|             | Howard Lateral @ Hwy 140<br>(2015-2017)                | 2009            | EQIP    |                          |                   | 57                                  |                     |                  |          |                 |                           |                                              |                                           |
|             | McCoy Lateral @ Hwy 140<br>(2016-2018)                 | 2010            | EQIP    |                          |                   |                                     |                     |                  |          |                 | 27                        |                                              |                                           |
| Madera      | Cotton Wood Creek<br>@ Rd 20 (2010-2012)               | 2009            | EQIP    | 119                      |                   |                                     |                     | 35               |          |                 |                           |                                              |                                           |
|             |                                                        | 2010            | AWEP    |                          |                   | 30                                  |                     |                  |          |                 |                           |                                              |                                           |
|             |                                                        |                 | EQIP    |                          |                   | 109                                 |                     |                  |          |                 |                           |                                              |                                           |
|             | Dry Creek @ Rd 18<br>(2011-2013)                       |                 | AWEP    |                          |                   | 37                                  |                     |                  |          |                 |                           |                                              |                                           |
|             |                                                        | 2009            | EQIP    |                          |                   | 15                                  |                     |                  |          |                 |                           |                                              |                                           |
|             |                                                        | 2010            | EQIP    |                          |                   | 75                                  |                     |                  |          |                 |                           |                                              |                                           |
| Total Acres |                                                        |                 |         | 119                      | 97                | 1,699                               | 17                  | 624              | 327      | 1,350           | 260                       | 473                                          | 793                                       |



### Conclusions:

- Subwatersheds that have high priority status and have had individual grower visits have seen a reduction in exceedances,
- The drop in exceedances coincides with implementation of management practices encouraged by the Coalition,
- Subwatersheds with high numbers of exceedances of pesticides either have not completed or started focused outreach,
- Agriculture may not be the only cause of copper water quality impairments in Coalition Zone 6,
- Growers in the ESJWQC region are taking advantage of available funding resources to be used to implement management practices that improve water quality,
- Growers across the ESJWQC region are implementing management practices, and
- After demonstrating two or more consecutive years of monitoring without exceedances, the Coalition has been able to petition to the Regional Board to remove certain constituents from active management plans from 10 high priority subwatersheds including all of the first and second priority subwatersheds.

## STATUS OF TMDL CONSTITUENTS

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The ESJWQC established monitoring and management activities as required in the Regional Board's Basin Plan for the Sacramento and San Joaquin River basins. The Basin Plan establishes Total Maximum Daily Load (TMDL) requirements for dischargers and requires that dischargers comply with the monitoring and management criteria defined in the Basin Plan. A narrative concerning each special monitoring constituent is documented below as an effort by the Coalition to describe how it is meeting the TMDL requirements for Coalition members.

If an exceedance occurs for a TMDL constituent, a management plan is required for that constituent in that site subwatershed regardless of whether there was a second exceedance. A management plan for a TMDL constituent results in additional focused monitoring, sourcing, and outreach within subwatersheds. Coalition efforts include but are not limited to: 1) Management Plan Monitoring, 2) conducting site subwatershed grower meetings, 3) encouraging the adoption of and evaluating the efficacy of management practices, and 4) addressing the seven surveillance and monitoring objectives described in the Basin Plan, where applicable. The Coalition addresses toxicity, pesticides, and sediment bound analytes with specific management practices whether or not there is a TMDL.

Intensive outreach and documentation of implemented management practices occur throughout the Coalition, but greater efforts to acquire this information are made in locations that the Coalition has designated as high priority subwatersheds (Table 6). Furthermore, the Coalition conducts annual meetings to provide growers with information on management practices that improve water quality.

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## CHLORPYRIFOS AND DIAZINON TMDL

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The San Joaquin River chlorpyrifos and diazinon TMDL was adopted by the Regional Board in June 23, 2006 and documented in an amendment to the Basin Plan (*Amendments to the Water Quality Control Plan for the Sacramento River and San Joaquin River Basins for the Control of Diazinon and Chlorpyrifos Runoff into the Lower San Joaquin River*). The TMDL was approved by the United States Environmental Protection Agency (USEPA) on October 10, 2007. Dischargers had until December 31, 2010 to be compliant with the water quality objectives (WQOs) and loading capacity in the San Joaquin River and load allocations to the river for diazinon and chlorpyrifos.

The ESJWQC and Westside Coalition submitted the San Joaquin River Chlorpyrifos and Diazinon 2010 AMR on October 31, 2010, which summarized the first year of San Joaquin River chlorpyrifos and diazinon TMDL monitoring (January through September 2010).

The 2011 monitoring design closely followed the monitoring design utilized in 2010. The memorandum submitted to the Regional Board on May 14, 2010 outlined the approach to implement the monitoring component for the San Joaquin River Chlorpyrifos and Diazinon TMDL, which includes monitoring of

chlorpyrifos and diazinon in the San Joaquin River at six compliance points on a quarterly basis, tributary monitoring based on each Coalitions approved monitoring plan on a monthly basis, and an assessment of the monitoring objectives and results on an annual basis. The Coalitions submitted a memorandum to the Regional Board on April 29, 2011 that indicated that monthly monitoring by the Westside Coalition of three of the six compliance points (SJR @ Sack Dam, SJR @ Lander Ave, and SJR @ Las Palmas Ave (Patterson)) will be included in the TMDL compliance point monitoring ; the remaining three compliance points would be monitored quarterly.

The Coalitions and Regional Board agreed to move the chlorpyrifos and diazinon AMR due date from October 31 to May 1 reporting on the previous water year's monitoring results (refer to memorandum submitted April 29, 2011). The San Joaquin River Chlorpyrifos and Diazinon 2012 AMR will be submitted on May 1, 2012 and will include a complete analysis and discussion of all monitoring data collected during October 2010 through September 2011.

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## SALT AND BORON TMDL

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The Regional Board and stakeholders initiated the Central Valley Salinity Alternatives for Long-Term Sustainability (CV-SALTS) in July 2008 to facilitate efforts needed for the efficient management of salinity in the Central Valley. The Regional Board and State Water Board initiated this comprehensive effort to address salinity concerns in California's Central Valley and adopt long-term solutions that will lead to improved water quality and economic sustainability with the goal of developing a Salt and Boron Basin Plan Amendment. Coalition representatives attend CV-SALTS meetings and participate in planning and reviewing studies relevant to the development of a Basin Plan amendment for salt and boron (Table 42). Coalition technical consultants participated in several CV-SALTS committees including the Technical Advisory Committee, the Knowledge Gained and BMP Subcommittees (Table 42). In addition, the Coalition monitors for salt (SC, TDS and nitrates) and boron in every zone and includes these constituents in conversations with growers about water quality impairments and applicable management practices (Table 43).

**Table 42. Coalition representatives and MLJ-LLC attendance to CV-SALTS meetings during 2011.**

| ORGANIZATION | MEETING DATE | COALITION<br>REPRESENTATIVE<br>IN ATTENDANCE | MEETING TITLE                                     |
|--------------|--------------|----------------------------------------------|---------------------------------------------------|
| CV-SALTS     | 20-Jan-11    | PK                                           | Executive Committee Meeting                       |
| CV-SALTS     | 10-Feb-11    | PK                                           | Executive Committee Meeting                       |
| CV-SALTS     | 17-Mar-11    | PK                                           | Executive Committee Meeting                       |
| CV-SALTS     | 6-Apr-11     | MJ, MT                                       | Knowledge Gained Committee                        |
| CV-SALTS     | 6-Apr-11     | PK                                           | Economic and Technical Advisory Committee Meeting |
| CV-SALTS     | 8-Apr-11     | PK                                           | BMP Subcommittee Meeting                          |
| CV-SALTS     | 12-Apr-11    | PK                                           | Executive Committee Meeting                       |
| CV-SALTS     | 22-Apr-11    | PK                                           | Executive Committee Meeting                       |
| CV-SALTS     | 2-May-11     | PK, MJ                                       | BMP Subcommittee Meeting                          |
| CV-SALTS     | 12-May-11    | PK                                           | Executive Committee Meeting                       |
| CV-SALTS     | 24-May-11    | PK, MJ                                       | Executive Committee Meeting                       |
| CV-SALTS     | 25-May-11    | PK, MJ                                       | BMP Subcommittee Meeting                          |

| ORGANIZATION | MEETING DATE | COALITION<br>REPRESENTATIVE<br>IN ATTENDANCE | MEETING TITLE               |
|--------------|--------------|----------------------------------------------|-----------------------------|
| CV-SALTS     | 25-May-11    | MJ                                           | Knowledge Gained Committee  |
| CV-SALTS     | 13-Jun-11    | PK, MJ                                       | BMP Subcommittee Meeting    |
| CV-SALTS     | 16-Jun-11    | PK                                           | Executive Committee Meeting |
| CV-SALTS     | 23-Jun-11    | PK, MJ                                       | Executive Committee Meeting |
| CV-SALTS     | 27-Jun-11    | PK, MJ                                       | BMP Subcommittee Meeting    |
| CV-SALTS     | 20-Jul-11    | MJ                                           | Knowledge Gained Committee  |
| CV-SALTS     | 21-Jul-11    | PK                                           | Executive Committee Meeting |
| CV-SALTS     | 9-Aug-11     | PK                                           | Executive Committee Meeting |
| CV-SALTS     | 18-Aug-11    | PK                                           | Executive Committee Meeting |
| CV-SALTS     | 22-Aug-11    | PK                                           | BMP Subcommittee Meeting    |
| CV-SALTS     | 12-Sep-11    | PK, MJ                                       | BMP Subcommittee Meeting    |
| CV-SALTS     | 13-Sep-11    | PK                                           | Executive Committee Meeting |
| CV-SALTS     | 15-Sep-11    | PK                                           | Executive Committee Meeting |
| CV-SALTS     | 17-Oct-11    | PK, MJ                                       | BMP Subcommittee Meeting    |
| CV-SALTS     | 19-Oct-11    | PK                                           | Executive Committee Meeting |
| CV-SALTS     | 19-Oct-11    | MJ                                           | Knowledge Gained Committee  |
| CV-SALTS     | 20-Oct-11    | PK                                           | Executive Committee Meeting |
| CV-SALTS     | 15-Nov-11    | PK                                           | Executive Committee Meeting |
| CV-SALTS     | 17-Nov-11    | PK                                           | Executive Committee Meeting |
| CV-SALTS     | 21-Nov-11    | PK, MJ                                       | BMP Subcommittee Meeting    |
| CV-SALTS     | 12-Dec-11    | PK                                           | Executive Committee Meeting |

MJ – Michael Johnson, MJ-LLC

MT – Melissa Turner, MJ-LLC

PK – Parry Klassen, ESJWQC

**Table 43. ESJWQC sites monitored for salt (specific conductance) and boron during January through December 2011.**

| ZONE   | SITE NAME                               | SC | TDS | NITRATE<br>+NITRITE | BORON<br>(TOTAL) |
|--------|-----------------------------------------|----|-----|---------------------|------------------|
| Zone 1 | Dry Creek @ Wellsford Rd                | A  | A   | A                   | A                |
|        | Rodden Creek @ Rodden Rd                | A  | A   | A                   | A                |
| Zone 2 | Lateral 2 1/2 near Keyes Rd             | F  |     |                     |                  |
|        | Prairie Flower Drain @ Crows Landing Rd | A  | A   | A                   | A                |
| Zone 3 | Highline Canal @ Hwy 99                 | A  | A   | A                   | A                |
|        | Highline Canal @ Lombardy Rd            | A  | A   | A                   | A                |
| Zone 4 | Bear Creek @ Kibby Rd                   | F  |     |                     |                  |
|        | Howard Lateral @ Hwy 140                | F  |     |                     |                  |
|        | Livingston Drain @ Robin Ave            | F  |     |                     |                  |
|        | McCoy Lateral @ Hwy 140                 | A  | A   | A                   | A                |
|        | Merced River @ Santa Fe                 | A  | A   | A                   | A                |
| Zone 5 | Deadman Creek @ Hwy 59                  | A  | A   | A                   | A                |
|        | Duck Slough @ Gurr Rd                   | A  | A   | A                   | A                |
|        | Duck Slough @ Hwy 99                    | F  |     |                     |                  |
| Zone 6 | Berenda Slough along Ave 18 1/2         | A  | A   | A                   | A                |
|        | Cottonwood Creek @ Rd 20                | A  | A   | A                   | A                |
|        | Dry Creek @ Rd 18                       | F  |     |                     |                  |

A - Assessment Monitoring (constituent was monitored at sites during 2011 Assessment Monitoring).

F - Field parameter data collected at sites scheduled for MPM.

Blank cells indicate that the site was not monitored for the particular constituent due to MPM only.

## DISSOLVED OXYGEN

Low levels of DO in the Stockton Deep Water Ship Channel (DWSC) have been a concern for numerous years. To address the issue, the EPA approved on February 27, 2007 the *Amendments to the Water Quality Control Plan for the Sacramento River and San Joaquin River Basins for the Control Program for Factors Contributing to the Dissolved Oxygen Impairment in the Stockton Deep Water Ship Channel* (hereafter, DO Basin Plan Amendment). To demonstrate compliance with the DO TMDL, agriculturally-influenced tributaries to the San Joaquin River are routinely monitored, as described in the Coalition's MRPP (pages 33-58). The Coalition monitored monthly for DO in at least one representative site within each Coalition zone during 2011 (Table 44). The Coalition is addressing DO exceedances through the management plan process and includes discussions of DO water quality concerns during grower outreach. During 2011 monitoring, there were a total of 11 DO exceedances in five of the ESJWQC subwatersheds (Table 45).

In addition, the Coalition continues to follow developments in achieving DO WQOs in the Stockton DWSC. The Coalition participated in several DO TMDL Technical Working Group meetings during 2010 to discuss the progress of several studies and pilot programs (2011 MPUR, page 134, Table 41). These programs include the upper San Joaquin River DO project and the performance of the Aeration Facility, located at the west (downstream) end of Rough and Ready Island at the Port of Stockton. The *Stockton Deep Water Ship Channel Demonstration Dissolved Oxygen Aeration Facility Project Final Report* was released in December 2010 and indicates the Aeration Facility is a useful and effective tool to achieve the Basin Plan DO WQO in the Deep Water Ship Channel. The Coalition will continue to participate in meetings and review technical documents as they are made available.

**Table 44. ESJWQC sites monitored for dissolved oxygen during January through December 2011.**

| ZONE   | SITE NAME                               | DISSOLVED OXYGEN |
|--------|-----------------------------------------|------------------|
| Zone 1 | Dry Creek @ Wellsford Rd                | A                |
|        | Rodden Creek @ Rodden Rd                | A                |
| Zone 2 | Lateral 2 1/2 near Keyes Rd             | F                |
|        | Prairie Flower Drain @ Crows Landing Rd | A                |
| Zone 3 | Highline Canal @ Hwy 99                 | A                |
|        | Highline Canal @ Lombardy Rd            | A                |
| Zone 4 | Bear Creek @ Kibby Rd                   | F                |
|        | Howard Lateral @ Hwy 140                | F                |
|        | Livingston Drain @ Robin Ave            | F                |
|        | McCoy Lateral @ Hwy 140                 | A                |
|        | Merced River @ Santa Fe                 | A                |
| Zone 5 | Deadman Creek @ Hwy 59                  | A                |
|        | Duck Slough @ Gurr Rd                   | A                |
|        | Duck Slough @ Hwy 99                    | F                |
| Zone 6 | Berenda Slough along Ave 18 1/2         | A                |
|        | Cottonwood Creek @ Rd 20                | A                |
|        | Dry Creek @ Rd 18                       | F                |

A - Assessment Monitoring (constituent was monitored at sites during 2011 Assessment Monitoring).

F - Field parameter data collected at sites scheduled for MPM.

**Table 45. ESJWQC Exceedances of dissolved oxygen from January through December 2011.**

Dissolved oxygen WQTL is listed below the constituent. Field parameters under a management plan are all classified as Priority E constituents and are monitored only as a part of Normal Monitoring (see Management Plan approved November 25, 2008, Prioritization of Exceedances section) or when a site is monitored for a high priority constituent in a management plan.

| Station Name                            | Sample Date | Season           | DO      |
|-----------------------------------------|-------------|------------------|---------|
|                                         |             |                  | <7 MG/L |
| Prairie Flower Drain @ Crows Landing Rd | 1/18/2011   | Winter1          | 5.35    |
| Duck Slough @ Gurr Rd                   | 3/15/2011   | Winter2          | 6.78    |
| Berenda Slough along Ave 18 1/2         | 3/17/2011   | Winter2-Sediment | 6.72    |
| Cottonwood Creek @ Rd 20                | 4/19/2011   | Irrigation1      | 6.7     |
| Prairie Flower Drain @ Crows Landing Rd | 4/19/2011   | Irrigation1      | 2.14    |
| Dry Creek @ Wellsford Rd                | 6/14/2011   | Irrigation3      | 6.36    |
| Dry Creek @ Wellsford Rd                | 7/12/2011   | Irrigation4      | 6.82    |
| Dry Creek @ Wellsford Rd                | 8/9/2011    | Irrigation5      | 6.52    |
| Berenda Slough along Ave 18 1/2         | 10/11/2011  | Fall1            | 5.69    |
| Prairie Flower Drain @ Crows Landing Rd | 10/11/2011  | Fall1            | 6.59    |
| Dry Creek @ Wellsford Rd                | 12/6/2011   | Fall3            | 6.7     |
| Non Contiguous Waterbody Exceedances    |             |                  | 0       |
| Total Exceedances                       |             |                  | 11      |

## SITE SUBWATERSHED MANAGEMENT PLAN UPDATE

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Brief descriptions of all site subwatersheds included the ESJWQC Management Plan as of April 1, 2012 are listed below. The descriptions include subwatersheds that are listed as current high priority subwatersheds and those that will reach high priority status in the future. Further analysis of high priority site subwatersheds (2008-2010, 2010-2012, 2011-2013 and 2012-2014) is included in Appendix I of this report.

### **Ash Slough @ Ave 21**

The Ash Slough @ Ave 21 site subwatershed is a rotating Assessment Monitoring location within the Cottonwood Creek @ Rd 20 Zone (Zone 6). Monitoring occurred at the site from the 2005 irrigation season through 2010 (Assessment Monitoring from fall of 2008 through 2010). However, following the 2006 irrigation season, Ash Slough was dry during all events in 2007 through 2010 except two (May 2009 and April 2010). Assessment Monitoring is scheduled to occur again in 2015 and 2016.

Focused outreach and MPM will begin in the Ash Slough subwatershed in 2015 and management plan constituents include chlorpyrifos, copper, *E. coli*, and lead. Additional MPM for chlorpyrifos and copper was scheduled in 2007 and 2008; however, the site was dry during all sampling events. During the only two Assessment Monitoring events for which water was present since 2006 (May 2009 and April 2010), copper (dissolved) exceeded the WQTL during both events.

Initially, the Coalition scheduled Ash Slough to be a part of the third set of high priority management plan subwatersheds (focused outreach 2011-2013). However, because the slough was dry during the majority of Assessment Monitoring in 2008 through 2010, the Coalition received approval on November 17, 2010 to move Ash Slough to the seventh set of high priority subwatersheds (focused outreach 2015-2017).

### **Bear Creek @ Kibby Rd**

The Bear Creek @ Kibby Rd site subwatershed is a rotating Assessment Monitoring location within the Merced River @ Santa Fe Zone (Zone 4). Sampling was initiated at Bear Creek @ Kibby Rd during the storm season of 2005 and continued through irrigation season of 2008. Assessment Monitoring is scheduled to occur in 2023 and 2024.

Bear Creek @ Kibby Rd is one of the Coalition's second priority subwatersheds and management plan constituents include chlorpyrifos, copper, DO, *E. coli*, pH and *C. dubia* toxicity. Additional MPM at Bear Creek @ Kibby Rd occurred in 2008 (May and July) for chlorpyrifos and *C. dubia* toxicity. The Coalition resumed MPM in 2010 and will continue through 2012 during months of past exceedances; there were no exceedances during 2011 MPM in Bear Creek.

A summary of current, recommended and newly implemented management practices in the Bear Creek subwatershed is included in the Second Priority Subwatersheds Summary of Management Practices section of this report.

#### **Berenda Slough along Ave 18 ½**

Berenda Slough along Ave 18 ½ is an Assessment Monitoring location within the Cottonwood Creek @ Rd 20 Zone (Zone 6). Monitoring at Berenda Slough along Ave 18 ½ first began in May 2006 and continued through the irrigation season of 2008. Assessment Monitoring took place in 2011 and is scheduled to occur again in 2012, 2017 and 2018.

Berenda Slough is one of the Coalition's third priority subwatersheds and management plan constituents include chlorpyrifos, copper, DO, *E. coli* and *S. capricornutum* toxicity. Chlorpyrifos and *S. capricornutum* toxicity were sampled as a part of additional MPM in 2007 and upstream MPM in 2008. All constituents were monitored monthly during 2011 as a part of Assessment Monitoring and there was one chlorpyrifos exceedance in April 2011. Metals were sampled for the first time at the site in 2011 and there were 11 dissolved copper exceedances (every month except March).

A summary of current and recommended practices is included in the Third Priority Subwatersheds Summary of Management Practices section of this report.

#### **Black Rascal Creek @ Yosemite Rd**

Black Rascal Creek @ Yosemite Rd is an Assessment Monitoring location within the Merced River @ Santa Fe Zone (Zone 4). Monitoring was initiated at the site beginning in the irrigation season of 2006 and continued through the irrigation season of 2008. Assessment Monitoring is scheduled to occur in 2025 and 2026.

Black Rascal Creek @ Yosemite Rd is one of the Coalition's forth priority subwatersheds and management plan constituents include chlorpyrifos, DO, *E. coli*, lead, pH and *C. dubia* toxicity. During the irrigation season of 2008, MPM for *C. dubia* toxicity (May, July and August) and chlorpyrifos (May, July, August and September) occurred and there were no exceedances. The Coalition believes the three chlorpyrifos exceedances in 2007 (where two were associated with *C. dubia* toxicity) were the result of a single application by one grower, and the Coalition since worked with that grower to reduce offsite movement of the pesticide. Management Plan Monitoring is scheduled to resume in 2012 for *C. dubia* toxicity (May, July and August), chlorpyrifos (May, July, August and September), and lead (April and September) and will continue through 2014. The Coalition will initiate its management practice tracking and outreach strategy in 2012.

#### **Cottonwood Creek @ Rd 20**

Cottonwood Creek @ Rd 20 is the Core Monitoring location in Zone 6. Monitoring at Cottonwood Creek first began in the storm season of 2005 and continued through 2011. The site was monitored for Core constituents only beginning in the fall of 2008 through 2010 as scheduled in the current 2008 MRPP.



Assessment Monitoring occurred at the site in 2011 and is scheduled to occur every third year. Core Monitoring will resume at Cottonwood Creek @ Rd 20 in 2012.

The Cottonwood Creek @ Rd 20 site subwatershed is one of the Coalition's second priority subwatersheds and management plan constituents include chlorpyrifos, copper, diazinon, diuron, DO, *E. coli*, and lead. Copper was sampled during additional MPM in 2007 and during upstream MPM at Cottonwood Creek @ Hwy 145 in 2008. In 2010, MPM resumed (chlorpyrifos, copper, diazinon and diuron) during months of past exceedances. During 2011, dissolved copper was the only high priority MPM constituent to exceed its WQTL (April, May, July, September and October); MPM will continue through 2012.

A summary of current, recommended and newly implemented management practices in the Cottonwood Creek subwatershed is included in the Second Priority Subwatersheds Summary of Management Practices section of this report.

#### **Deadman Creek @ Gurr Rd**

Deadman Creek @ Gurr Rd is a rotating Assessment Monitoring location in the Duck Slough @ Gurr Rd Zone (Zone 5). Monitoring at Deadman Creek @ Gurr Rd first began during the irrigation season of 2004. Monitoring was not conducted during 2005 or in the storm season of 2006. Monitoring resumed during the 2006 irrigation season and continued through fall 2010. Assessment Monitoring began in the fall of 2008 and continued through 2010 as scheduled under the current 2008 MRPP. Assessment Monitoring is scheduled to occur again in 2017 and 2018.

The Deadman Creek @ Gurr Rd site subwatershed is one of the Coalition's fourth priority subwatersheds and management plan constituents include ammonia, arsenic, chlorpyrifos, copper, DO, *E. coli*, SC, TDS, *C. dubia* toxicity, *P. promelas* toxicity, and *S. capricornutum* toxicity. During 2008, 2010 and 2011, MPM took place for high priority constituents during months of past exceedances. Management Plan Monitoring is scheduled in 2012 for *C. dubia* toxicity (February, March and November), chlorpyrifos (March, April, August and September), copper (January, February, April and May), *P. promelas* toxicity (January through March, May and June), and *S. capricornutum* toxicity (February).

#### **Deadman Creek @ Hwy 59**

Deadman Creek @ Hwy 59 is an Assessment Monitoring location in the Duck Slough @ Gurr Rd Zone and is upstream of Deadman Creek @ Gurr Rd (Zone 5). Monitoring began at the site in the irrigation season of 2006 and continued through the irrigation season of 2008. Assessment Monitoring was scheduled during 2011 and will continue through 2012 and will occur again in 2019 and 2020.

Deadman Creek @ Hwy 59 is one of the Coalition's forth priority subwatersheds and management plan constituents include arsenic, chlorpyrifos, DO, *E. coli*, and *S. capricornutum* toxicity. Additional MPM occurred for chlorpyrifos in 2008 (August and September). During 2009 MPM occurred for chlorpyrifos (August and September) and *S. capricornutum* toxicity (April) and in 2010, *S. capricornutum* toxicity (January) occurred. During 2011 Assessment Monitoring, there were two chlorpyrifos exceedances

(April and September). Assessment Monitoring is scheduled to occur again in 2012 and MPM for chlorpyrifos and *S. capricornutum* toxicity will continue through 2014. The Coalition will also begin its management practice tracking and outreach strategy in the subwatershed in 2012.

### Dry Creek @ Road 18

Dry Creek @ Rd 18 is an Assessment Monitoring location within the Cottonwood Creek @ Rd 20 Zone (Zone 6). Monitoring began at the site during the 2005 irrigation season and continued through the 2008 irrigation season. Assessment Monitoring is scheduled for 2013 and 2014.

Dry Creek @ Rd 18 is one of the Coalition's third priority subwatersheds and management plan constituents include chlorpyrifos, copper, diazinon, diuron, DO, *E. coli*, lead, pH, *H. azteca* toxicity, and *S. capricornutum* toxicity. In 2007 and 2008, extensive MPM was conducted to address persistent exceedances of the copper WQTL, including five additional samples in 2007 and eight upstream samples in 2008. During 2007 and 2008 monitoring events, total copper exceedances occurred in samples collected from almost every event. Upstream MPM was also conducted for chlorpyrifos during the irrigation season of 2008 and no exceedances of the chlorpyrifos WQTL occurred during that time. In 2011, Dry Creek @ Rd 18 became a high priority site subwatershed and MPM was scheduled for several constituents; exceedances of the dissolved copper WQTL occurred in seven of the eight months scheduled for copper MPM.

A summary of current and recommended practices is included in the Third Priority Subwatersheds Summary of Management Practices section of this report. Management Plan Monitoring is scheduled to continue in 2012 for chlorpyrifos (February, April and July), copper (January, February and April-September), diazinon (February), diuron (January and February), *H. azteca* toxicity (March and September), lead (May, June, August and September) and *S. capricornutum* toxicity (January, February and May).

### Dry Creek @ Wellsford Rd

The Dry Creek @ Wellsford Rd site subwatershed is the Core Monitoring location in Zone 1. Monitoring at Dry Creek @ Wellsford Rd was initiated during the storm season of 2005 and has continued through 2011. As scheduled in the current 2008 MRPP, Core Monitoring occurred at the site in the fall of 2008 through 2010, and will resume in 2012. Assessment Monitoring at Dry Creek @ Wellsford Rd occurred in 2011 and is scheduled to reoccur every third year.

The Dry Creek @ Wellsford Rd site subwatershed is one of the Coalition's first priority subwatersheds and management plan constituents include chlorpyrifos, copper, diuron, DO, *E. coli*, pH, SC, *H. azteca* toxicity and *S. capricornutum* toxicity. Additional MPM occurred at the site in 2007, and upstream MPM occurred at Dry Creek @ Waterford Rd in 2008 and 2009. Management Plan Monitoring (chlorpyrifos, copper, diuron, *H. azteca* toxicity and *S. capricornutum* toxicity) occurred in 2009 through 2011 during months of past exceedances.

A summary of current and recommended practices was included in the 2011 MPUR, and a summary of newly implemented practices in the Dry Creek @ Wellsford Rd subwatershed is included in the First Priority Subwatersheds Summary of Management Practices section of this report. During 2011, the only high priority exceedance to occur was sediment toxicity in September. The Coalition believes its

management plan tracking and outreach strategy has been effective in improving water quality in Dry Creek.

#### **Duck Slough @ Gurr Rd**

Duck Slough @ Gurr Rd is the Core Monitoring location in Zone 5. Monitoring at Duck Slough @ Gurr Rd began during the irrigation season of 2004 and continued through fall 2011. Core Monitoring took place at Duck Slough @ Gurr Rd beginning in the fall of 2008 and continued through 2010. Core Monitoring will resume at the site in 2012. Assessment Monitoring occurred at Duck Slough @ Gurr Rd in 2011 and is scheduled to occur every third year thereafter.

Duck Slough @ Gurr is one of the Coalition's second priority subwatersheds and management plan constituents include chlorpyrifos, copper, DO, *E. coli*, lead, pH, SC, TDS, *C. dubia* toxicity, *H. azteca* toxicity, and *S. capricornutum* toxicity. Additional MPM occurred in 2007, and upstream MPM occurred at Duck Slough @ Hwy 59 and North Slough @ Hwy 59 in 2008. During 2011, MPM (copper, chlorpyrifos, *C. dubia* toxicity, *S. capricornutum* toxicity, and *H. azteca* toxicity) occurred and will continue through 2012 during months of past exceedances.

A summary of current, recommended and newly implemented management practices in the Duck Slough @ Gurr Rd subwatershed is included in the Second Priority Subwatersheds Summary of Management Practices section of this report. During 2011, the only high priority constituent exceedance to occur was September toxicity to *H. azteca*.

#### **Duck Slough @ Hwy 99**

The Duck Slough @ Hwy 99 site subwatershed is a rotating Assessment Monitoring location within the Duck Slough @ Gurr Rd Zone (Zone 5). Sampling was initiated at this location during the storm season of 2005 and continued through the end of the irrigation season of 2008. Assessment Monitoring is scheduled to occur in 2013 and 2014.

The Duck Slough @ Hwy 99 site subwatershed is one of the Coalition's first priority subwatersheds and management plan constituents include chlorpyrifos, copper, DO, *E. coli*, lead, pH, and *S. capricornutum* toxicity. Management Plan Monitoring (chlorpyrifos, copper, lead, and *S. capricornutum* toxicity) occurred from 2007 through 2011 during months of past exceedances.

A summary of current and recommended practices was included in the 2011 MPUR, and a summary of newly implemented practices in the Duck Slough @ Hwy 99 subwatershed is included in the First Priority Subwatersheds Summary of Management Practices section of this report. The Coalition believes its management plan tracking and outreach strategy has been effective in improving water quality in Duck Slough.

### **Hatch Drain @ Tuolumne Rd**

Hatch Drain @ Tuolumne Rd is an Assessment Monitoring location in the Prairie Flower Drain @ Crows Landing Rd Zone (Zone 2). Monitoring began at the site in 2007 and continued through the 2008 irrigation season. During the two years, there were three samples toxic to *H. azteca*.

Hatch Drain @ Tuolumne Rd is one of the Coalition's fifth priority subwatersheds and management plan constituents include DO, SC, TDS, *E. coli*, arsenic, and *S. capricornutum* and *H. azteca* toxicity. In 2014, MPM is scheduled to begin and will continue through 2015. Assessment Monitoring is scheduled to occur in 2024 and 2025.

### **Highline Canal @ Hwy 99**

The Highline Canal @ Hwy 99 site subwatershed is the Core Monitoring location in Zone 3. The Coalition began monitoring at the site in the irrigation season of 2005 and has monitored continually through 2011. Core Monitoring constituents were sampled at the site from October 2008 through 2010. Assessment Monitoring occurred at the site in 2011 and will occur again every third year. Core Monitoring will resume at the site in 2012.

Highline Canal @ Hwy 99 is one of the Coalition's second priority subwatersheds and management plan constituents include ammonia, chlorpyrifos, copper, diuron, *E. coli*, lead, pH, SC, TDS, *C. dubia* toxicity, *H. azteca* toxicity and *S. capricornutum* toxicity. Additional MPM occurred at the site in 2007 and 2008, and MPM (copper, chlorpyrifos, diuron, *C. dubia* toxicity, *H. azteca* toxicity, and *S. capricornutum* toxicity) occurred during months of past exceedances in 2009, 2010 and 2011.

A summary of current, recommended, and newly implemented management practices in the Highline Canal @ Hwy 99 subwatershed is included in the Second Priority Subwatersheds Summary of Management Practices section of this report. There were no exceedances of high priority constituents during 2011 monitoring; the Coalition will continue MPM in 2012.

### **Highline Canal @ Lombardy Rd**

The Highline Canal @ Lombardy Rd site subwatershed is an Assessment Monitoring location in the Highline Canal @ Hwy 99 Zone (Zone 3) and is located upstream of the Highline Canal @ Hwy 99 site. Monitoring was initiated at this site during the 2005 storm season and continued through the 2008 irrigation season. Assessment Monitoring occurred at Highline Canal @ Lombardy Rd in 2011 and is scheduled to continue through 2012.

The Highline Canal @ Lombardy Rd subwatershed is one of the Coalition's fifth priority subwatersheds and its management plan includes chlorpyrifos, copper, *E. coli*, lead, pH, SC, *C. dubia* toxicity, *H. azteca* toxicity and *S. capricornutum* toxicity. The Coalition has conducted four years of MPM (additional MPM in 2007 and 2008; MPM during months of past exceedances in 2009 and 2010). Exceedances during 2011 include dissolved copper (February), *E. coli* (February and June), and toxicity to *S. capricornutum* (April). When the site becomes a high priority subwatershed in 2013, the Coalition plans to focus on *C. dubia* toxicity, chlorpyrifos, copper, *H. azteca* toxicity, lead and *S. capricornutum* toxicity.

### **Hilmar Drain @ Central Ave**

The Hilmar Drain @ Central Ave site subwatershed is within the Prairie Flower Drain @ Crows Landing Rd Zone (Zone 2). Normal Monitoring began at the site in 2005 and continued through 2008; the site is scheduled for Assessment Monitoring in 2020 and 2021.

The subwatershed is one of the Coalition's forth priority subwatersheds and management plan constituents include ammonia, chlorpyrifos, copper, diuron, DO, *E. coli*, nitrate, pH, SC, TDS, *H. azteca* toxicity and *S. capricornutum* toxicity. Management Plan Monitoring occurred at the site in 2007 through 2009, and will occur again in 2012 for chlorpyrifos, copper, diuron, *H. azteca* toxicity, nitrate, and *S. capricornutum* toxicity during months of past exceedances. The Coalition plans to begin individual contact meetings with targeted growers in 2012 and MPM is scheduled for chlorpyrifos (July), copper (February and July), diuron (April and June), *H. azteca* toxicity (March and September), and *S. capricornutum* toxicity (April, July and September).

### **Howard Lateral @ Hwy 140**

Howard Lateral @ Hwy 140 is an Assessment Monitoring location in the Merced River @ Santa Fe Zone (Zone 4). Assessment Monitoring first occurred in the fall of 2008 continued through 2010. The site is scheduled for Assessment Monitoring again in 2029 and 2030.

The site is one of the Coalition's seventh priority subwatersheds and requires a management plan for chlorpyrifos, copper, DO, *E. coli*, pH, SC, and TDS. To collect two years of monitoring for management plan constituents before the site becomes a high priority, the Coalition conducted MPM in 2011 for chlorpyrifos (June) and copper (April, July and October); there was an exceedance of copper in October. Management Plan Monitoring will occur again in 2012 to satisfy the two year requirement; MPM is then scheduled to resume when the site becomes a high priority in 2015.

### **Lateral 2 1/2 near Keyes Rd**

Lateral 2 ½ near Keyes Rd is a rotating Assessment Monitoring location within the Prairie Flower Zone (Zone 2), and Assessment Monitoring is next scheduled for 2028 and 2029. Monitoring first began at the site in the fall of 2008 and continued through 2010 for Assessment Monitoring constituents.

During the 2008 through 2010 monitoring three chlorpyrifos exceedances occurred (July 2009 and April and July 2010). Given the exceedances and because Lateral 2 ½ drains directly to the San Joaquin River, the Coalition was approved on November 17, 2010 to move Lateral 2 ½ near Keyes to the Coalition's third priority subwatersheds (focused outreach 2011-2013); other management plan constituents include *E. coli* and pH. Management Plan Monitoring occurred in 2011 for chlorpyrifos (April and July) and there were no exceedances.

A summary of current and recommended practices is included in the Third Priority Subwatersheds Summary of Management Practices section of this report. The Coalition will follow up with targeted growers in 2012 and 2013 to determine which additional management practices were implemented, and MPM will continue during those years for chlorpyrifos.

### **Livingston Drain @ Robin Ave**

Livingston Drain @ Robin Ave is an Assessment Monitoring location in the Merced River @ Santa Fe Zone (Zone 4), and Assessment Monitoring is next scheduled for 2021 and 2022. Monitoring began at the site during the irrigation season of 2007 and continued through the irrigation season of 2008.

Livingston Drain @ Robin Ave is one of the Coalition's third priority subwatersheds and management plan constituents include chlorpyrifos, copper, *E. coli*, lead, pH and *S. capricornutum* toxicity. Additional MPM occurred in 2008 for copper; five copper (total) exceedances occurred in 2008 during Normal Monitoring and MPM. When the site became a high priority subwatershed in 2011, MPM resumed for chlorpyrifos (January and June through August), copper (January, February, May through July, and September), lead (January and February), and *S. capricornutum* toxicity (February through May); there were two exceedances of copper (dissolved) in July and September of 2011.

A summary of current and recommended practices is included in the Third Priority Subwatersheds Summary of Management Practices section of this report. Management Plan Monitoring and outreach is scheduled to occur through 2013.

### **Merced River @ Santa Fe Dr**

Merced River @ Santa Fe is the Core Monitoring location within Zone 4. Normal Monitoring was initiated during the irrigation season of 2004 and continued through the irrigation season of 2008. Core Monitoring began at Merced River @ Santa Fe in the fall of 2008 and continued through 2010. Assessment Monitoring occurred at the site in 2011 and will occur again every third year. Core Monitoring will resume at the site in 2012.

The Merced River @ Santa Fe subwatershed is one of the Coalition's fifth priority subwatersheds and management plan constituents includes chlorpyrifos, DO, *E. coli*, lead, and *C. dubia* toxicity. The Coalition has conducted three years of MPM (additional MPM in July and August 2008; upstream MPM in Dry Creek @ Oakdale Rd November 2009 through January 2010; and MPM in January 2010) and has educated growers in the subwatershed of water quality concerns due to chlorpyrifos in the river through educational mailings and news articles. Exceedances during 2011 include dichlorodiphenyltrichloroethane (DDT, first exceedance, June) and *E. coli* (June). The Coalition plans to focus on high priority constituents, including *C. dubia* toxicity, chlorpyrifos, and lead, when the site becomes a high priority in 2013.

### **Miles Creek @ Reilly Rd**

Miles Creek @ Reilly Rd is an Assessment Monitoring location in the Duck Slough @ Gurr Rd Zone (Zone 5), and Assessment Monitoring is scheduled for 2015 and 2016. Monitoring began at the site in 2007 and continued through the irrigation season of 2008.

The Miles Creek @ Reilly Rd subwatershed is one of the Coalition's fifth priority subwatersheds and management plan constituents include chlorpyrifos, copper, DO, *E. coli*, lead, *C. dubia* toxicity, *H. azteca* toxicity, and *S. capricornutum* toxicity. Management Plan Monitoring occurred during 2009 and 2010



for chlorpyrifos (July, August and September 2009), copper (July and August 2009 and January and February 2010), *S. capricornutum* toxicity (April 2009), and *C. dubia* toxicity (January and February 2010); chlorpyrifos exceeded the WQTL in July 2009. Management Plan Monitoring will resume in 2013 when the site becomes a high priority.

#### **Mootz Drain @ Langworth Rd / Mootz Drain downstream of Langworth Pond**

Mootz Drain downstream of Langworth Pond is an Assessment Monitoring location within the Dry Creek @ Wellsford Rd Zone (Zone 1). The downstream of Langworth Pond site replaced the Mootz Drain @ Langworth Rd Assessment Monitoring location starting in December 2009 to better characterize discharges from upstream agriculture since the pond can act as a sediment basin and retain both water and sediment. Sampling began in Mootz Drain in October of 2008 and continued through 2010. The site is next scheduled for Assessment Monitoring in 2015 and 2016.

Mootz Drain downstream of Langworth Pond is one of the Coalition's seventh priority subwatersheds and management plan constituents include ammonia, chlorpyrifos, diuron, DO, and *E. coli*. Chlorpyrifos first exceeded the WQTL in December 2008 and again in June 2009 (both exceedances occurred within the pond @ Langworth Rd). Diuron exceeded the WQTL in February 2009 (in the pond @ Langworth Rd) and again in December 2010 (downstream of Langworth Pond). Management Plan Monitoring will occur in 2015 for chlorpyrifos and diuron and will continue through 2017.

#### **Mustang Creek @ East Ave**

Mustang Creek @ East Ave is a rotating Assessment Monitoring location within the Highline Canal @ Hwy 99 Zone (Zone 3). Mustang Creek is an ephemeral waterbody and it is frequently dry; flow is found primarily during winter runoff events. Monitoring began at the site in 2006 and continued through 2010 (Assessment Monitoring fall of October 2008 through 2010). Mustang Creek is scheduled to rotate into an Assessment Monitoring location again in 2015 and 2016.

The Mustang Creek @ East Ave site subwatershed is one of the Coalition's sixth priority subwatersheds and management plan constituents include chlorpyrifos, copper, dichlorodiphenyldichloroethylene (DDE), DO, *E. coli*, nitrate, SC, simazine, and TDS. The Coalition conducted MPM for both chlorpyrifos and simazine (January and February 2010). The two exceedances of chlorpyrifos and two exceedances of simazine occurred during the same storm events (January and February 2008). Samples with copper exceeded the WQTL in 2009 (February, October, and December) and 2010 (February), and there were two exceedances of nitrate in 2009 (February and March). The Coalition plans to focus on high priority constituents, including chlorpyrifos, copper, nitrate, and simazine, when the site becomes a high priority in 2014.

#### **Prairie Flower Drain @ Crows Landing Rd**

The Prairie Flower Drain @ Crows Landing Rd subwatershed is the Core Monitoring location in Zone 2, and sampling began in 2005 and has occurred continuously since. Assessment Monitoring at this site occurred in 2011 and is scheduled to recur every third year. Core Monitoring will resume at this location in 2012.



The Prairie Flower Drain @ Crows Landing Rd site subwatershed is one of the Coalition's first priority subwatersheds and has a management plan for ammonia, chlorpyrifos, dimethoate, DO, *E. coli*, molybdenum, nitrate, pH, SC, TDS, *C. dubia* toxicity, *H. azteca* toxicity, *P. promelas* toxicity and *S. capricornutum* toxicity. Additional and upstream MPM occurred in 2007 and 2008 for chlorpyrifos, *C. dubia* toxicity, nitrate, and *P. promelas* toxicity; chlorpyrifos and nitrate exceedances occurred as well as toxicity to *C. dubia*, *H. azteca*, and *S. capricornutum*. In 2009 through 2011, MPM occurred (*C. dubia* toxicity, chlorpyrifos, *H. azteca* toxicity, nitrate, and *S. capricornutum* toxicity) during months of past exceedances. A summary of current, recommended and newly implemented practices was included in the 2011 MPUR.

The Coalition plans to continue to conduct MPM in 2012 and will work with the Regional Board and other entities to address continued water quality impairments in Prairie Flower Drain.

#### **Silva Drain @ Meadow Dr**

Silva Drain @ Meadow Dr is an Assessment Monitoring location in the Merced River @ Santa Fe Zone (Zone 4) and is next scheduled for Assessment Monitoring in 2027 and 2028. Monitoring began at the site in 2006 and continued through the 2008 irrigation season.

Silva Drain @ Meadow Dr is one of the Coalition's sixth priority subwatersheds and management plan constituents include ammonia, chlorpyrifos, copper, DO, *E. coli*, *C. dubia* toxicity and *H. azteca* toxicity. Additional MPM was conducted for chlorpyrifos in 2007 and 2008 (July and August); since Silva Drain is such a small subwatershed, upstream sampling was not conducted. There were six chlorpyrifos WQTL exceedances, three copper WQTL exceedances, and two toxicities each to *C. dubia* and *H. azteca*. Management Plan Monitoring will resume at the site in 2014 when it becomes a high priority.

#### **Westport Drain @ Vivian Rd**

Westport Drain @ Vivian Rd is a rotating Assessment Monitoring location within the Prairie Flower Zone (Zone 2) and is scheduled for Assessment Monitoring in 2026 and 2027. Monitoring began at the site in 2007 and continued through the irrigation season of 2008.

Westport Drain is one of the Coalition's sixth priority subwatersheds, and management plan constituents include chlorpyrifos, DO, *E. coli*, nitrate, SC, TDS and *S. capricornutum* toxicity. There were two exceedances of chlorpyrifos (July 2008 and 2009), three toxicities to *S. capricornutum* (May 2007, February and April 2008), and 13 nitrate exceedances (storm and irrigation months). Management Plan Monitoring has not occurred at the site in the past and will begin in 2014 when the site becomes a high priority.

## **Appendix I**

**East San Joaquin Water Quality Coalition**

**High Priority Site Subwatershed Analysis**

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## HIGH PRIORITY SITE SUBWATERSHEDS (2008-2010)

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## I. DRY CREEK @ WELLSFORD RD

### Management Plan Constituents

#### Priority A/B

- Chlorpyrifos

#### Priority C

- Copper
- Diuron

#### Priority D

- *Selenastrum capricornutum* water column toxicity
- *Hyalella azteca* sediment toxicity

#### Priority E

- Dissolved Oxygen
- *E. coli*
- pH
- Specific Conductance
- Total Dissolved Solids

### Description of Dry Creek at Wellsford Rd Site Subwatershed

Dry Creek @ Wellsford Rd (23,794 irrigated acres) – Dry Creek originates to the east of Modesto and drains into the Tuolumne River. This site subwatershed samples Dry Creek at the furthest downstream location that collects agricultural drainage prior to flowing through the urban areas of Modesto (Table I-1). This site subwatershed includes an upstream location (Dry Creek @ Waterford Rd) which was sampled in 2008 and 2009. Dairies are located upstream of this site and the town of Waterford may contribute an urban signal. Located in the northern part of the Coalition region, the primary irrigated agriculture is a combination of field crops, deciduous nuts, mixed pasture, and vineyards (Figure I-1).

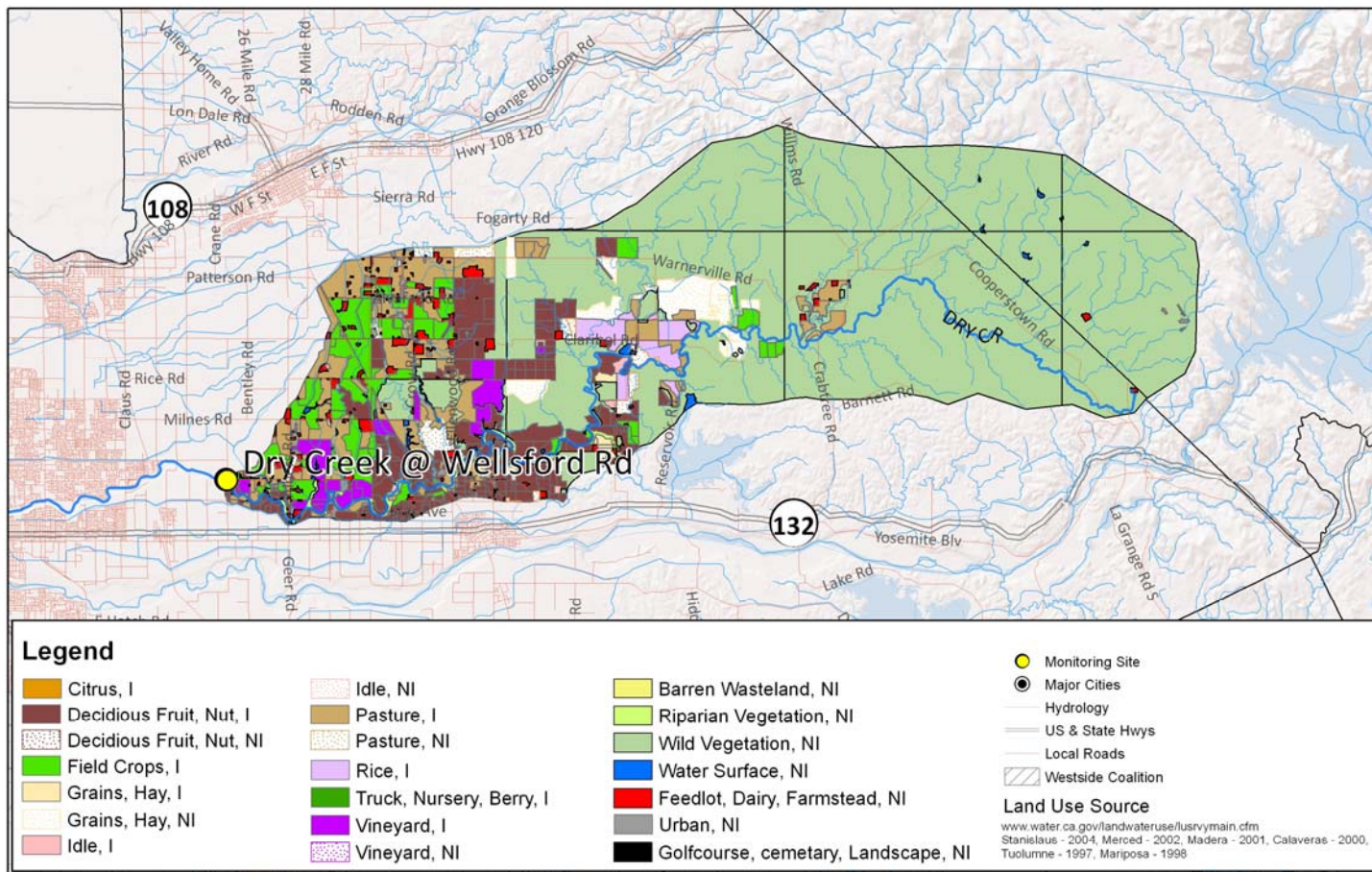
**Table I-1. Dry Creek @ Wellsford Rd site subwatershed sampling locations coordinates.**

| SITE NAME                             | STATION CODE | TARGET LATITUDE | TARGET LONGITUDE |
|---------------------------------------|--------------|-----------------|------------------|
| Dry Creek @ Waterford Rd <sup>U</sup> | 535XDCWF     | 37.6588         | -120.7789        |
| Dry Creek @ Wellsford Rd*             | 535XDCAWR    | 37.6602         | -120.8743        |

U – Upstream sites

\*Original ESJWQC sampling site

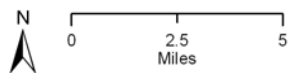
Figure I-1. Dry Creek @ Wellsford Rd site subwatershed land use map.



Source of Layers:  
 Hydrology - NHD hydrodata, 1:24,000-scale, <http://nhd.usgs.gov/>  
 Roads, highways, railroads, county boundary, city outlines - California Spatial Information Library  
 TRS - Teale Public Land Survey System, Pub. date: 20050101, California Spatial Information Library  
 Parcel Layer - Stanislaus 2010, Merced 2011, Madera 2011  
 Basemap, Shaded Relief - ESRI  
 GSC North America 1983

Date Prepared: 08/08/11

ESJWQC



**Dry Creek @ Wellsford Rd.**



## Subwatershed Monitoring History

Monitoring within the Dry Creek subwatershed was initiated at Dry Creek @ Wellsford Rd in 2005 and continued uninterrupted through 2011 (Table I-2). The site is the Zone 1 Core Monitoring location under the 2008 MRPP and was monitored for Core constituents during the fall of 2008, and the 2009 through 2011 sampling years (Table I-3). Assessment Monitoring occurred at the site during 2011 and is scheduled to occur every third year (e.g. 2014, 2017). Core Monitoring resumed at this location in 2012. All constituents sampled at the Dry Creek subwatershed from 2005 through 2011 are listed in Table I-3.

Dry Creek @ Wellsford Rd MPM was initiated during the 2007 irrigation season and continued through 2011. Additional sampling occurred at Dry Creek @ Wellsford Rd in 2007 and upstream monitoring occurred at Dry Creek @ Waterford Rd in 2008 and 2009 for chlorpyrifos and toxicity to *C. dubia* (Table I-4). Due to exceedances, copper, diuron and toxicity to *S. capricornutum* and *H. azteca* were added to the Dry Creek @ Wellsford Rd management plan in 2010 (Table I-4). During 2011, monthly Assessment Monitoring occurred and the following MPM constituents were analyzed monthly: copper (February and April), chlorpyrifos (July-September), diuron (February), *S. capricornutum* (February and March), and *H. azteca* (March and September).

Dry Creek is currently on California's 2008-2010 303d List of Impaired Waterbodies for chlorpyrifos, diazinon, *E. coli*, and unknown water toxicity.

**Table I-2. Dry Creek @ Wellsford Rd site subwatershed sampling events per season and year (including MPM).**

| YEAR | SEASON     | EVENTS SAMPLED | EVENTS NOT SAMPLED <sup>1</sup> | TOTAL |
|------|------------|----------------|---------------------------------|-------|
| 2005 | Storm      | 2              | 0                               | 2     |
|      | Irrigation | 5              | 0                               | 5     |
| 2006 | Storm      | 2              | 0                               | 2     |
|      | Irrigation | 5              | 0                               | 5     |
| 2007 | Storm      | 2              | 0                               | 2     |
|      | Irrigation | 9              | 0                               | 9     |
| 2008 | Storm      | 3              | 0                               | 3     |
|      | Irrigation | 6              | 0                               | 6     |
|      | Fall       | 2              | 0                               | 2     |
| 2009 | Winter     | 2              | 0                               | 2     |
|      | Storm      | 2              | 0                               | 2     |
|      | Irrigation | 6              | 0                               | 6     |
|      | Fall       | 2              | 0                               | 2     |
| 2010 | Winter     | 1              | 0                               | 1     |
|      | Storm      | 3              | 0                               | 3     |
|      | Irrigation | 5              | 0                               | 5     |
|      | Fall       | 3              | 0                               | 3     |
| 2011 | Winter     | 2              | 0                               | 2     |
|      | Storm      | 1              | 0                               | 1     |
|      | Irrigation | 6              | 0                               | 6     |
|      | Fall       | 3              | 0                               | 3     |

<sup>1</sup>If an event was not sampled during scheduled monitoring, the site was dry.

**Table I-3. Dry Creek @ Wellsford Rd site subwatershed analyses per sampling season and year.**

Only environmental samples with a sample replicate and lab replicate number of one are shown.

| METHOD                        | ANALYTE                         | 2005  |            | 2006  |            | 2007  |            | 2008  |            |      | 2009   |       |            | 2010 |        |       | 2011       |      |        |       |            |      |
|-------------------------------|---------------------------------|-------|------------|-------|------------|-------|------------|-------|------------|------|--------|-------|------------|------|--------|-------|------------|------|--------|-------|------------|------|
|                               |                                 | STORM | IRRIGATION | STORM | IRRIGATION | STORM | IRRIGATION | STORM | IRRIGATION | FALL | WINTER | STORM | IRRIGATION | FALL | WINTER | STORM | IRRIGATION | FALL | WINTER | STORM | IRRIGATION | FALL |
| Field and Physical Parameters |                                 |       |            |       |            |       |            |       |            |      |        |       |            |      |        |       |            |      |        |       |            |      |
| EPA 110.2                     | Color                           | 2     | 5          | 2     | 5          | 2     | 6          | 2     | 6          |      |        |       |            |      |        |       |            |      |        |       |            |      |
| EPA 160.1                     | Dissolved Solids                | 2     | 5          | 2     | 5          | 2     | 6          | 3     | 6          | 2    | 2      | 2     | 6          | 2    | 1      | 3     | 5          | 3    | 2      | 1     | 6          | 3    |
| EPA 160.2                     | Suspended Solids                |       |            |       |            |       |            | 1     |            | 2    | 2      | 2     | 6          | 2    | 1      | 3     | 5          | 3    | 2      | 1     | 6          | 3    |
| EPA 180.1                     | Turbidity                       | 2     | 5          | 2     | 5          | 2     | 6          | 3     | 6          | 2    | 2      | 2     | 6          | 2    | 1      | 3     | 5          | 3    | 2      | 1     | 6          | 3    |
| EPA 405.1                     | BOD                             |       |            |       | 1          | 2     | 2          |       |            |      |        |       |            |      |        |       |            |      |        |       |            |      |
| EPA 415.1                     | Total Organic Carbon            | 2     | 5          | 2     | 5          | 2     | 6          | 3     | 6          | 2    | 2      | 2     | 6          | 2    | 1      | 3     | 5          | 3    | 2      | 1     | 6          | 3    |
| SM 9223                       | <i>E. coli</i>                  | 2     | 5          | 2     | 5          | 2     | 6          | 3     | 6          | 2    | 2      | 2     | 6          | 2    | 1      | 3     | 5          | 3    | 2      | 1     | 6          | 3    |
| Walkley-Black                 | Total Organic Carbon (sediment) |       |            |       |            |       |            |       |            |      |        |       |            |      |        |       |            |      | 1      |       | 1          |      |
| ASTM D422 or ASTM D4464       | Grain size (sediment)           |       |            |       |            |       |            |       |            |      |        |       |            |      |        |       |            |      | 1      |       | 1          |      |
| NA                            | Dissolved Oxygen                | 2     | 5          | 3     | 5          | 3     | 10         | 4     | 8          | 2    | 2      | 2     | 6          | 2    | 1      | 3     | 5          | 3    | 3      | 1     | 7          | 3    |
| NA                            | Specific Conductivity           | 2     | 5          | 3     | 5          | 3     | 10         | 4     | 8          | 2    | 2      | 2     | 6          | 2    | 1      | 3     | 5          | 3    | 3      | 1     | 7          | 3    |
| NA                            | pH                              | 2     | 5          | 3     | 5          | 3     | 10         | 4     | 8          | 2    | 2      | 2     | 6          | 2    | 1      | 3     | 5          | 3    | 3      | 1     | 7          | 3    |
| Carbamates                    |                                 |       |            |       |            |       |            |       |            |      |        |       |            |      |        |       |            |      |        |       |            |      |
| EPA 8321A                     | Aldicarb                        |       |            |       | 5          | 2     | 6          | 2     | 6          |      |        |       |            |      |        |       |            |      | 2      | 1     | 6          | 3    |
| EPA 8321A                     | Carbaryl                        |       |            |       | 5          | 2     | 6          | 2     | 6          |      |        |       |            |      |        |       |            |      | 2      | 1     | 6          | 3    |
| EPA 8321A                     | Carbofuran                      |       |            |       | 5          | 2     | 6          | 2     | 6          |      |        |       |            |      |        |       |            |      | 2      | 1     | 6          | 3    |
| EPA 8321A                     | Diuron                          |       |            |       | 5          | 2     | 6          | 2     | 6          |      |        |       |            |      |        | 1     |            |      | 2      | 1     | 6          | 3    |
| EPA 8321A                     | Linuron                         |       |            |       | 5          | 2     | 6          | 2     | 6          |      |        |       |            |      |        |       |            |      | 2      | 1     | 6          | 3    |
| EPA 8321A                     | Methiocarb                      |       |            |       | 5          | 2     | 6          | 2     | 6          |      |        |       |            |      |        |       |            |      | 2      | 1     | 6          | 3    |
| EPA 8321A                     | Methomyl                        |       |            |       | 5          | 2     | 6          | 2     | 6          |      |        |       |            |      |        |       |            |      | 2      | 1     | 6          | 3    |
| EPA 8321A                     | Oxamyl                          |       |            |       | 5          | 2     | 6          | 2     | 6          |      |        |       |            |      |        |       |            |      | 2      | 1     | 6          | 3    |
| Organochlorines               |                                 |       |            |       |            |       |            |       |            |      |        |       |            |      |        |       |            |      |        |       |            |      |
| EPA 8081A                     | DDD(p,p')                       |       |            |       | 5          | 2     | 6          | 2     | 6          |      |        |       |            |      |        |       |            |      | 2      | 1     | 4          |      |
| EPA 8081A                     | DDE(p,p')                       |       |            |       | 5          | 2     | 6          | 2     | 6          |      |        |       |            |      |        |       |            |      | 2      | 1     | 4          |      |
| EPA 8081A                     | DDT(p,p')                       |       |            |       | 5          | 2     | 6          | 2     | 6          |      |        |       |            |      |        |       |            |      | 2      | 1     | 4          |      |
| EPA 8081A                     | Dicofol                         |       |            |       | 5          | 2     | 6          | 2     | 6          |      |        |       |            |      |        |       |            |      | 2      | 1     | 4          |      |
| EPA 8081A                     | Dieldrin                        |       |            |       | 5          | 2     | 6          | 2     | 6          |      |        |       |            |      |        |       |            |      | 2      | 1     | 4          |      |
| EPA 8081A                     | Endrin                          |       |            |       | 5          | 2     | 6          | 2     | 6          |      |        |       |            |      |        |       |            |      | 2      | 1     | 4          |      |

| METHOD             | ANALYTE                    | 2005  |            | 2006  |            | 2007  |            | 2008  |            |      | 2009   |       |            |      |        | 2010  |            |      |        | 2011  |            |      |  |
|--------------------|----------------------------|-------|------------|-------|------------|-------|------------|-------|------------|------|--------|-------|------------|------|--------|-------|------------|------|--------|-------|------------|------|--|
|                    |                            | STORM | IRRIGATION | STORM | IRRIGATION | STORM | IRRIGATION | STORM | IRRIGATION | FALL | WINTER | STORM | IRRIGATION | FALL | WINTER | STORM | IRRIGATION | FALL | WINTER | STORM | IRRIGATION | FALL |  |
| EPA 8081A          | Methoxychlor               |       |            |       | 5          | 2     | 6          | 2     | 6          |      |        |       |            |      |        |       |            |      | 2      | 1     | 4          |      |  |
| Group A Pesticides |                            |       |            |       |            |       |            |       |            |      |        |       |            |      |        |       |            |      |        |       |            |      |  |
| EPA 8081A          | Aldrin                     |       |            |       |            |       |            |       |            |      |        |       |            |      |        |       |            |      | 2      | 1     | 4          |      |  |
| EPA 8081A          | Chlordane                  |       |            |       |            |       |            |       |            |      |        |       |            |      |        |       |            |      | 2      | 1     | 4          |      |  |
| EPA 8081A          | Endosulfan I               |       |            |       |            |       |            |       |            |      |        |       |            |      |        |       |            |      | 2      | 1     | 4          |      |  |
| EPA 8081A          | Endosulfan II              |       |            |       |            |       |            |       |            |      |        |       |            |      |        |       |            |      | 2      | 1     | 4          |      |  |
| EPA 8081A          | HCH, alpha                 |       |            |       |            |       |            |       |            |      |        |       |            |      |        |       |            |      | 2      | 1     | 4          |      |  |
| EPA 8081A          | HCH, beta                  |       |            |       |            |       |            |       |            |      |        |       |            |      |        |       |            |      | 2      | 1     | 4          |      |  |
| EPA 8081A          | HCH, delta                 |       |            |       |            |       |            |       |            |      |        |       |            |      |        |       |            |      | 2      | 1     | 4          |      |  |
| EPA 8081A          | HCH, gamma                 |       |            |       |            |       |            |       |            |      |        |       |            |      |        |       |            |      | 2      | 1     | 4          |      |  |
| EPA 8081A          | Heptachlor                 |       |            |       |            |       |            |       |            |      |        |       |            |      |        |       |            |      | 2      | 1     | 4          |      |  |
| EPA 8081A          | Heptachlor epoxide         |       |            |       |            |       |            |       |            |      |        |       |            |      |        |       |            |      | 2      | 1     | 4          |      |  |
| EPA 8081A          | Toxaphene                  |       |            |       |            |       |            |       |            |      |        |       |            |      |        |       |            |      | 2      | 1     | 4          |      |  |
| Organophosphates   |                            |       |            |       |            |       |            |       |            |      |        |       |            |      |        |       |            |      |        |       |            |      |  |
| EPA 8141A          | Azinphos methyl            |       |            |       | 5          | 2     | 7          | 2     | 6          |      |        |       |            |      |        |       |            |      | 2      | 1     | 6          | 3    |  |
| EPA 8141A          | Chlorpyrifos               | 2     | 5          | 2     | 5          | 2     | 8          | 2     | 6          |      |        |       | 2          |      |        |       | 3          |      | 2      | 1     | 6          | 3    |  |
| EPA 8141A          | Diazinon                   | 2     | 5          | 2     | 5          | 2     | 7          | 2     | 6          |      |        |       |            |      |        |       |            |      | 2      | 1     | 6          | 3    |  |
| EPA 8141A          | Dimethoate                 | 2     | 5          | 2     | 5          | 2     | 7          | 2     | 6          |      |        |       |            |      |        |       |            |      | 2      | 1     | 6          | 3    |  |
| EPA 8141A          | Disulfoton                 |       |            |       | 5          | 2     | 7          | 2     | 6          |      |        |       |            |      |        |       |            |      | 2      | 1     | 6          | 3    |  |
| EPA 8141A          | Malathion                  |       |            |       | 5          | 2     | 7          | 2     | 6          |      |        |       |            |      |        |       |            |      | 2      | 1     | 6          | 3    |  |
| EPA 8321A          | Methamidophos              |       |            |       | 5          | 2     | 6          | 2     | 6          |      |        |       |            |      |        |       |            |      | 2      | 1     | 6          | 3    |  |
| EPA 8141A          | Methidathion               |       |            |       | 5          | 2     | 7          | 2     | 6          |      |        |       |            |      |        |       |            |      | 2      | 1     | 6          | 3    |  |
| EPA 8141A          | Molinate                   |       |            |       | 5          | 2     | 7          | 2     | 6          |      |        |       |            |      |        |       |            |      |        |       |            |      |  |
| EPA 8141A          | Parathion, Methyl          |       |            |       | 5          | 2     | 7          | 2     | 6          |      |        |       |            |      |        |       |            |      | 2      | 1     | 6          | 3    |  |
| EPA 8141A          | Phorate                    |       |            |       | 5          | 2     | 7          | 2     | 6          |      |        |       |            |      |        |       |            |      | 2      | 1     | 6          | 3    |  |
| EPA 8141A          | Phosmet                    |       |            |       | 5          | 2     | 7          | 2     | 6          |      |        |       |            |      |        |       |            |      | 2      | 1     | 6          | 3    |  |
| EPA 8141A          | Thiobencarb                |       |            |       | 5          | 2     | 7          | 2     | 6          |      |        |       |            |      |        |       |            |      |        |       |            |      |  |
| EPA 8141A          | Trifluralin                |       |            |       |            |       |            |       |            |      |        |       |            |      |        |       |            |      | 2      | 1     | 6          | 3    |  |
| Pyrethroids        |                            |       |            |       |            |       |            |       |            |      |        |       |            |      |        |       |            |      |        |       |            |      |  |
| EPA 8081A          | Bifenthrin                 |       | 1          | 2     | 5          | 2     | 6          |       |            |      |        |       |            |      |        |       |            |      |        |       |            |      |  |
| EPA 8081A          | Cyfluthrin, total          |       | 1          | 2     | 5          | 2     | 6          |       |            |      |        |       |            |      |        |       |            |      |        |       |            |      |  |
| EPA 8081A          | Cyhalothrin, lambda, total | 2     | 5          | 2     | 5          | 2     | 6          |       |            |      |        |       |            |      |        |       |            |      |        |       |            |      |  |

| METHOD             | ANALYTE                           | 2005  |            | 2006  |            | 2007  |            | 2008  |            |      | 2009   |       |            |      |        | 2010  |            |      |        | 2011  |            |      |  |
|--------------------|-----------------------------------|-------|------------|-------|------------|-------|------------|-------|------------|------|--------|-------|------------|------|--------|-------|------------|------|--------|-------|------------|------|--|
|                    |                                   | STORM | IRRIGATION | STORM | IRRIGATION | STORM | IRRIGATION | STORM | IRRIGATION | FALL | WINTER | STORM | IRRIGATION | FALL | WINTER | STORM | IRRIGATION | FALL | WINTER | STORM | IRRIGATION | FALL |  |
| EPA 8081A          | Cypermethrin, total               | 2     | 5          | 2     | 5          | 2     | 6          |       |            |      |        |       |            |      |        |       |            |      |        |       |            |      |  |
| EPA 8081A          | Esfenvalerate/ Fenvalerate, total | 2     | 5          | 2     | 5          | 2     | 6          |       |            |      |        |       |            |      |        |       |            |      |        |       |            |      |  |
| EPA 8081A          | Permethrin, total                 | 2     | 5          | 2     | 5          | 2     | 6          |       |            |      |        |       |            |      |        |       |            |      |        |       |            |      |  |
| Triazines          |                                   |       |            |       |            |       |            |       |            |      |        |       |            |      |        |       |            |      |        |       |            |      |  |
| EPA 547M           | Glyphosate                        |       |            |       | 5          | 2     | 6          | 2     | 6          |      |        |       |            |      |        |       |            |      | 2      |       | 4          |      |  |
| EPA 549.2M         | Paraquat dichloride               |       |            |       | 5          | 2     | 6          | 2     | 6          |      |        |       |            |      |        |       |            |      | 2      |       | 4          |      |  |
| EPA 619            | Atrazine                          |       |            |       | 5          | 2     | 6          | 2     | 6          |      |        |       |            |      |        |       |            |      | 2      | 1     | 6          | 3    |  |
| EPA 619            | Cyanazine                         |       |            |       | 5          | 2     | 6          | 2     | 6          |      |        |       |            |      |        |       |            |      | 2      | 1     | 6          | 3    |  |
| EPA 619            | Simazine                          |       |            |       | 5          | 2     | 6          | 2     | 6          |      |        |       |            |      |        |       |            |      | 2      | 1     | 6          | 3    |  |
| Metals (Total)     |                                   |       |            |       |            |       |            |       |            |      |        |       |            |      |        |       |            |      |        |       |            |      |  |
| EPA 200.8          | Arsenic                           |       |            |       | 5          | 2     | 6          | 2     | 6          |      |        |       |            |      |        |       |            |      | 2      | 1     | 5          |      |  |
| EPA 200.8          | Boron                             |       |            |       | 5          | 2     | 6          | 2     | 6          |      |        |       |            |      |        |       |            |      | 2      | 1     | 6          | 3    |  |
| EPA 200.8          | Cadmium                           |       |            |       | 5          | 2     | 6          | 2     | 6          |      |        |       |            |      |        |       |            |      | 2      | 1     | 5          |      |  |
| EPA 200.8          | Copper                            |       |            |       | 5          | 2     | 6          | 2     | 6          |      |        |       |            |      |        | 2     |            |      | 2      | 1     | 6          | 3    |  |
| EPA 200.8          | Lead                              |       |            |       | 5          | 2     | 6          | 2     | 6          |      |        | 1     |            |      |        |       | 3          | 3    | 2      | 1     | 5          |      |  |
| EPA 200.8          | Molybdenum                        |       |            |       |            |       |            |       |            |      |        |       |            |      |        |       |            |      | 2      | 1     | 5          |      |  |
| EPA 200.8          | Nickel                            |       |            |       | 5          | 2     | 6          | 2     | 6          |      |        |       |            |      |        |       |            |      | 2      | 1     | 6          | 3    |  |
| EPA 200.8          | Selenium                          |       |            |       | 5          | 2     | 2          | 2     | 6          |      |        |       |            |      |        |       |            |      | 2      | 1     | 6          | 3    |  |
| EPA 200.8          | Zinc                              |       |            |       | 5          | 2     | 6          | 2     | 6          |      |        |       |            |      |        |       |            |      | 2      | 1     | 6          | 3    |  |
| Metals (Dissolved) |                                   |       |            |       |            |       |            |       |            |      |        |       |            |      |        |       |            |      |        |       |            |      |  |
| EPA 200.8          | Cadmium                           |       |            |       |            |       |            |       |            |      |        |       |            |      |        |       |            |      | 2      | 1     | 5          |      |  |
| EPA 200.8          | Copper                            |       |            |       |            |       |            |       |            |      |        |       |            |      |        | 2     |            |      | 2      | 1     | 6          | 3    |  |
| EPA 200.8          | Lead                              |       |            |       |            |       |            |       |            |      |        | 1     |            |      |        |       | 3          | 3    | 2      | 1     | 5          |      |  |
| EPA 200.8          | Nickel                            |       |            |       |            |       |            |       |            |      |        |       |            |      |        |       |            |      | 2      | 1     | 6          | 3    |  |
| EPA 200.8          | Zinc                              |       |            |       |            |       |            |       |            |      |        |       |            |      |        |       |            |      | 2      | 1     | 6          | 3    |  |
| Nutrients          |                                   |       |            |       |            |       |            |       |            |      |        |       |            |      |        |       |            |      |        |       |            |      |  |
| SM 2340 C          | Hardness as CaCO3                 |       |            |       | 5          | 2     | 6          | 2     | 6          |      |        | 1     |            |      |        | 2     | 3          | 3    | 2      | 1     | 6          | 3    |  |
| EPA 300.0          | Nitrate as N                      |       |            |       | 5          | 2     | 6          | 2     | 6          |      |        |       |            |      |        |       |            |      |        |       |            |      |  |
| EPA 350.2          | Ammonia as N                      |       |            |       | 5          | 2     | 6          | 3     | 6          | 2    | 2      | 2     | 6          | 2    | 1      | 3     | 5          | 3    | 2      | 1     | 6          | 3    |  |
| EPA 351.3          | Nitrogen, Total Kjeldahl          |       |            |       | 5          | 2     | 6          | 3     | 6          | 2    | 2      | 1     | 1          |      |        |       | 3          | 3    | 2      | 1     | 6          | 3    |  |
| EPA 354.1          | Nitrite as N                      |       |            |       | 5          | 2     | 6          | 2     | 6          |      |        |       |            |      |        |       |            |      |        |       |            |      |  |
| EPA 353.2          | Nitrate + Nitrite as N            |       |            |       |            |       |            | 1     |            | 2    | 2      | 2     | 6          | 2    | 1      | 3     | 5          | 3    | 2      | 1     | 6          | 3    |  |

| METHOD              | ANALYTE                          | 2005  |            | 2006  |            | 2007  |            | 2008  |            |      | 2009   |       |            |      | 2010   |       |            |      | 2011   |       |            |      |
|---------------------|----------------------------------|-------|------------|-------|------------|-------|------------|-------|------------|------|--------|-------|------------|------|--------|-------|------------|------|--------|-------|------------|------|
|                     |                                  | STORM | IRRIGATION | STORM | IRRIGATION | STORM | IRRIGATION | STORM | IRRIGATION | FALL | WINTER | STORM | IRRIGATION | FALL | WINTER | STORM | IRRIGATION | FALL | WINTER | STORM | IRRIGATION | FALL |
| EPA 365.2           | OrthoPhosphate as P              |       |            |       | 5          | 2     | 6          | 3     | 6          | 2    | 3      | 1     | 1          |      |        |       | 3          | 3    | 2      | 1     | 6          | 3    |
| EPA 365.2           | Phosphate as P                   |       |            |       | 5          | 2     | 6          | 3     | 6          | 2    | 2      | 2     | 6          | 2    | 1      | 3     | 5          | 3    | 2      | 1     | 6          | 3    |
| Sediment Pesticides |                                  |       |            |       |            |       |            |       |            |      |        |       |            |      |        |       |            |      |        |       |            |      |
| EPA 8270M_NCI       | Bifenthrin                       |       |            |       |            |       |            |       |            |      |        |       |            |      |        |       |            |      |        | 1     |            |      |
| EPA 8270M_NCI       | Chlorpyrifos                     |       |            |       |            |       |            |       |            |      |        |       |            |      |        |       |            |      |        | 1     |            |      |
| EPA 8270M_NCI       | Cyfluthrin                       |       |            |       |            |       |            |       |            |      |        |       |            |      |        |       |            |      |        | 1     |            |      |
| EPA 8270M_NCI       | Cyhalothrin, lambda              |       |            |       |            |       |            |       |            |      |        |       |            |      |        |       |            |      |        | 1     |            |      |
| EPA 8270M_NCI       | Cypermethrin                     |       |            |       |            |       |            |       |            |      |        |       |            |      |        |       |            |      |        | 1     |            |      |
| EPA 8270M_NCI       | Deltamethrin: Tralomethrin       |       |            |       |            |       |            |       |            |      |        |       |            |      |        |       |            |      |        | 1     |            |      |
| EPA 8270M_NCI       | Esfenvalerate/ Fenvalerate       |       |            |       |            |       |            |       |            |      |        |       |            |      |        |       |            |      |        | 1     |            |      |
| EPA 8270M_NCI       | Fenpropathrin                    |       |            |       |            |       |            |       |            |      |        |       |            |      |        |       |            |      |        | 1     |            |      |
| EPA 8270M_NCI       | Permethrin                       |       |            |       |            |       |            |       |            |      |        |       |            |      |        |       |            |      |        | 1     |            |      |
| Toxicity            |                                  |       |            |       |            |       |            |       |            |      |        |       |            |      |        |       |            |      |        |       |            |      |
| EPA 821-02-012      | <i>Ceriodaphnia dubia</i>        | 2     | 5          | 2     | 6          | 2     | 7          | 2     | 6          |      |        |       |            |      |        |       |            |      | 2      | 1     | 6          | 3    |
| EPA 821-02-012      | <i>Pimephales promelas</i>       | 2     | 5          | 2     | 5          | 2     | 6          | 2     | 6          |      |        |       |            |      |        |       |            |      | 2      | 1     | 6          | 3    |
| EPA 821-02-013      | <i>Selenastrum capricornutum</i> | 2     | 5          | 2     | 5          | 2     | 6          | 4     | 6          |      |        |       |            |      |        | 1     |            |      | 2      | 1     | 6          | 3    |
| EPA 600/R-99-064    | <i>Hyalella azteca</i>           |       | 1          | 1     | 1          | 1     | 1          | 2     | 2          |      |        |       |            |      |        |       | 1          |      | 1      |       | 1          |      |

NA – Not applicable.

**Table I-4. Dry Creek @ Wellsford Rd site subwatershed Management Plan Monitoring schedule (2007-2011).**

Upstream locations included.

| SITE NAME                | SAMPLE DATE | MONITORING TYPE | COPPER | CHLORPYRIFOS | DIURON | C. DUBIA | S. CAPRICORNUTUM | H. AZTECA |
|--------------------------|-------------|-----------------|--------|--------------|--------|----------|------------------|-----------|
| Dry Creek @ Wellsford Rd | 31-Jul-07   | A               |        | X            |        |          |                  |           |
| Dry Creek @ Wellsford Rd | 28-Aug-07   | A               |        | X            |        |          |                  |           |
| Dry Creek @ Wellsford Rd | 25-Sep-07   | A               |        |              |        | X        |                  |           |
| Dry Creek @ Waterford Rd | 22-Jul-08   | U               |        | X            |        |          |                  |           |
| Dry Creek @ Waterford Rd | 19-Aug-08   | U               |        | X            |        |          |                  |           |
| Dry Creek @ Waterford Rd | 23-Sep-08   | U               |        | X            |        | X        |                  |           |
| Dry Creek @ Waterford Rd | 21-Jul-09   | U               |        | X            |        |          |                  |           |
| Dry Creek @ Wellsford Rd | 21-Jul-09   | MPM             |        | X            |        |          |                  |           |
| Dry Creek @ Waterford Rd | 18-Aug-09   | U               |        | X            |        |          |                  |           |
| Dry Creek @ Wellsford Rd | 18-Aug-09   | MPM             |        | X            |        |          |                  |           |
| Dry Creek @ Wellsford Rd | 23-Feb-10   | MPM             | X      |              | X      |          | X                |           |
| Dry Creek @ Wellsford Rd | 20-Apr-10   | MPM             | X      |              |        |          |                  |           |
| Dry Creek @ Wellsford Rd | 18-May-10   | MPM             |        |              |        |          |                  |           |
| Dry Creek @ Wellsford Rd | 20-Jul-10   | MPM             |        | X            |        |          |                  |           |
| Dry Creek @ Wellsford Rd | 17-Aug-10   | MPM             |        | X            |        |          |                  |           |
| Dry Creek @ Wellsford Rd | 14-Sept-10  | MPM             |        | X            |        |          |                  | X         |
| Dry Creek @ Wellsford Rd | 17-Feb-11   | MPM             | X      |              | X      |          | X                |           |
| Dry Creek @ Wellsford Rd | 15-Mar-11   | MPM             |        |              |        |          | X                |           |
| Dry Creek @ Wellsford Rd | 17-Mar-11   | MPM             |        |              |        |          |                  | X         |
| Dry Creek @ Wellsford Rd | 19-Apr-11   | MPM             | X      |              |        |          |                  |           |
| Dry Creek @ Wellsford Rd | 12-Jul-11   | MPM             |        | X            |        |          |                  |           |
| Dry Creek @ Wellsford Rd | 9-Aug-11    | MPM             |        | X            |        |          |                  |           |
| Dry Creek @ Wellsford Rd | 6-Sept-11   | MPM             |        | X            |        |          |                  | X         |

A – Additional sampling

U – Upstream sampling

X – Constituent sampled for Management Plan Monitoring (MPM)

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### Exceedance History

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Samples collected from the Dry Creek subwatershed (Dry Creek @ Wellsford Rd and Dry Creek @ Waterford Rd) from 2005 through 2011 exceeded the WQTLs for field parameters, *E. coli*, pesticides, and metals as well as water column and sediment toxicity. Table I-5 includes exceedances in this subwatershed (including the upstream site) of DO (39), pH (6), SC (1), TDS(1), *E. coli* (40), chlorpyrifos (10), diuron (2), thiobencarb (1), copper (3), lead (1), toxicity to *C. dubia* (2), *S. capricornutum* (4), and *H. azteca* sediment (3).

In 2011, exceedances included DO (4), pH (1), TDS (1) and *E. coli* (5). One sediment sample tested toxic to *H. azteca*.

All exceedances are listed in Table I-5 by season and date and are based on WQTLs listed in the introduction to the ESJWQC Management Plan. Using the ESJWQC Management Plan prioritization process flow chart (see Figure 4 on page 22 of the 2010 MPUR), priorities have been assigned to Management Plan constituents and are listed in the bottom row of Table I-5. The highest priority constituents in the Dry Creek @ Wellsford Rd site subwatershed are chlorpyrifos (A/B), copper and diuron (C), and toxicity to *S. capricornutum* and *H. azteca* (D; Table I-5).

**Table I-5. Dry Creek @ Wellsford Rd site subwatershed exceedances (2005-2011).**

The WQTL used to evaluate the data are listed in the header after the analyte. Upstream site is italicized.

| SITE NAME                | SEASON     | SAMPLE DATE | OXYGEN, DISSOLVED, <7 MG/L | pH, <6.5 AND > 8.5 UNITS | SPECIFIC CONDUCTIVITY, >700 µS/cm | DISSOLVED SOLIDS, >450 MG/L | E. COLI, > 235 MPN/100 ML | COPPER, TOTAL <sup>1</sup> , > 1,300 µg/L | LEAD, TOTAL <sup>1</sup> , > 15 µg/L | CHLORPYRIFOS, > 0.015 µg/L | DIURON, > 2 µg/L | THIOBENCARB, > 0 µg/L | C. DUBIA, (% CONTROL) | S. CAPRICORNUTUM, (% CONTROL) | H. AZTECA, (% CONTROL) |
|--------------------------|------------|-------------|----------------------------|--------------------------|-----------------------------------|-----------------------------|---------------------------|-------------------------------------------|--------------------------------------|----------------------------|------------------|-----------------------|-----------------------|-------------------------------|------------------------|
| Dry Creek @ Wellsford Rd | Storm      | 2/15/2005   |                            |                          |                                   |                             |                           |                                           |                                      |                            |                  |                       | 80                    |                               |                        |
| Dry Creek @ Wellsford Rd | Storm      | 3/22/2005   |                            | 8.96                     |                                   |                             | 900                       |                                           |                                      |                            |                  |                       |                       |                               |                        |
| Dry Creek @ Wellsford Rd | Irrigation | 5/11/2005   |                            | 6.26                     |                                   |                             |                           |                                           |                                      |                            |                  |                       |                       |                               |                        |
| Dry Creek @ Wellsford Rd | Irrigation | 6/15/2005   | 5.9                        |                          |                                   |                             | 240                       |                                           |                                      |                            |                  |                       |                       |                               |                        |
| Dry Creek @ Wellsford Rd | Irrigation | 7/13/2005   | 5.7                        |                          |                                   |                             |                           |                                           |                                      |                            |                  |                       |                       |                               |                        |
| Dry Creek @ Wellsford Rd | Irrigation | 8/17/2005   |                            | 9.18                     |                                   |                             | 900                       |                                           |                                      | 0.024                      |                  |                       |                       |                               |                        |
| Dry Creek @ Wellsford Rd | Irrigation | 9/21/2005   | 6.98                       |                          |                                   |                             | 500                       |                                           |                                      |                            |                  |                       |                       |                               |                        |
| Dry Creek @ Wellsford Rd | Storm      | 3/1/2006    |                            |                          |                                   |                             | 300                       |                                           |                                      |                            |                  |                       |                       |                               |                        |
| Dry Creek @ Wellsford Rd | Storm      | 3/16/2006   |                            |                          |                                   |                             | 1600                      |                                           |                                      |                            |                  |                       |                       |                               |                        |
| Dry Creek @ Wellsford Rd | Irrigation | 5/18/2006   |                            |                          |                                   |                             | 280                       |                                           |                                      |                            |                  |                       |                       |                               |                        |
| Dry Creek @ Wellsford Rd | Irrigation | 6/15/2006   | 6.08                       |                          |                                   |                             |                           |                                           |                                      |                            |                  |                       |                       |                               |                        |
| Dry Creek @ Wellsford Rd | Irrigation | 7/13/2006   | 6.69                       |                          |                                   |                             |                           |                                           |                                      | 0.026                      |                  |                       |                       |                               |                        |
| Dry Creek @ Wellsford Rd | Irrigation | 8/10/2006   |                            |                          |                                   |                             |                           |                                           |                                      | 0.024                      |                  |                       |                       |                               |                        |
| Dry Creek @ Wellsford Rd | Irrigation | 9/14/2006   |                            |                          |                                   |                             | 310                       |                                           |                                      |                            |                  | 0.1                   | 70                    |                               |                        |
| Dry Creek @ Wellsford Rd | Storm      | 2/11/2007   | 6.17                       |                          |                                   |                             | 290                       |                                           |                                      |                            | 37               |                       |                       | 52                            |                        |
| Dry Creek @ Wellsford Rd | Storm      | 2/22/2007   |                            |                          |                                   |                             |                           |                                           |                                      |                            |                  |                       |                       | 16                            |                        |
| Dry Creek @ Wellsford Rd | Storm      | 2/28/2007   |                            |                          |                                   |                             | 2400                      | 8.4 (7.2)                                 |                                      |                            | 4                |                       |                       | 32                            |                        |



| SITE NAME                | SEASON     | SAMPLE DATE | OXYGEN, DISSOLVED, <7 MG/L | pH, <6.5 AND > 8.5 UNITS | SPECIFIC CONDUCTIVITY, >700 µS/CM | DISSOLVED SOLIDS, >450 MG/L | E. COLI, > 235 MPN/100 mL | COPPER, TOTAL <sup>1</sup> , > 1,300 µG/L | LEAD, TOTAL <sup>1</sup> , > 15 µG/L | CHLORPYRIFOS, > 0.015 µG/L | DIURON, > 2 µG/L | THIOBENCARB, > 0 µG/L | C. DUBIA, (% CONTROL) | S. CAPRICORNUTUM, (% CONTROL) | H. AZTECA, (% CONTROL) |
|--------------------------|------------|-------------|----------------------------|--------------------------|-----------------------------------|-----------------------------|---------------------------|-------------------------------------------|--------------------------------------|----------------------------|------------------|-----------------------|-----------------------|-------------------------------|------------------------|
| Dry Creek @ Wellsford Rd | Storm      | 3/7/2007    |                            |                          |                                   |                             |                           |                                           |                                      |                            |                  |                       |                       |                               |                        |
| Dry Creek @ Wellsford Rd | Irrigation | 4/17/2007   |                            |                          |                                   |                             |                           | 5.1 (5.0)                                 |                                      |                            |                  |                       |                       |                               |                        |
| Dry Creek @ Wellsford Rd | Irrigation | 6/19/2007   | 5.77                       |                          |                                   |                             |                           |                                           |                                      |                            |                  |                       |                       |                               |                        |
| Dry Creek @ Wellsford Rd | Irrigation | 7/17/2007   | 6.64                       |                          |                                   |                             |                           |                                           |                                      | 0.021                      |                  |                       |                       |                               |                        |
| Dry Creek @ Wellsford Rd | Irrigation | 7/31/2007   | 6.91                       |                          |                                   |                             |                           |                                           |                                      |                            |                  |                       |                       |                               |                        |
| Dry Creek @ Wellsford Rd | Irrigation | 8/14/2007   | 6.58                       |                          |                                   |                             | 440                       |                                           |                                      |                            |                  |                       |                       |                               |                        |
| Dry Creek @ Wellsford Rd | Irrigation | 9/11/2007   | 6.5                        |                          |                                   |                             | 420                       |                                           |                                      | 0.043                      |                  |                       |                       |                               |                        |
| Dry Creek @ Wellsford Rd | Storm      | 1/24/2008   |                            |                          |                                   |                             | >2400                     |                                           |                                      |                            |                  |                       |                       |                               |                        |
| Dry Creek @ Wellsford Rd | Storm      | 2/26/2008   |                            |                          |                                   |                             | >2400                     | 11 (6.0)                                  | 1.8 (1.7)                            |                            |                  |                       |                       | 33                            |                        |
| Dry Creek @ Wellsford Rd | Sediment   | 3/4/2008    |                            |                          |                                   |                             |                           |                                           |                                      |                            |                  |                       |                       |                               | 88                     |
| Dry Creek @ Wellsford Rd | Irrigation | 4/22/2008   |                            |                          |                                   |                             | >2400                     |                                           |                                      |                            |                  |                       |                       |                               |                        |
| Dry Creek @ Wellsford Rd | Irrigation | 5/20/2008   | 5.67                       |                          |                                   |                             | 330                       |                                           |                                      |                            |                  |                       |                       |                               |                        |
| Dry Creek @ Wellsford Rd | Irrigation | 6/17/2008   | 6.31                       |                          |                                   |                             | >2400                     |                                           |                                      |                            |                  |                       |                       |                               |                        |
| Dry Creek @ Waterford Rd | Irrigation | 7/22/2008   | 6.08                       |                          |                                   |                             |                           |                                           |                                      | 0.02                       |                  |                       |                       |                               |                        |
| Dry Creek @ Wellsford Rd | Irrigation | 7/22/2008   | 6.67                       |                          |                                   |                             | >2400                     |                                           |                                      | 0.03                       |                  |                       |                       |                               |                        |
| Dry Creek @ Waterford Rd | Irrigation | 8/19/2008   | 5.93                       |                          |                                   |                             |                           |                                           |                                      | 0.023                      |                  |                       |                       |                               |                        |
| Dry Creek @ Wellsford Rd | Irrigation | 8/19/2008   | 6.85                       |                          |                                   |                             | 580                       |                                           |                                      |                            |                  |                       |                       |                               |                        |
| Dry Creek @ Wellsford Rd | Sediment   | 8/28/2008   | 6.64                       |                          |                                   |                             |                           |                                           |                                      |                            |                  |                       |                       |                               | 73                     |
| Dry Creek @ Wellsford Rd | Irrigation | 9/23/2008   |                            |                          |                                   |                             | 290                       |                                           |                                      |                            |                  |                       |                       |                               |                        |

| SITE NAME                | SEASON     | SAMPLE DATE | OXYGEN, DISSOLVED, <7 MG/L | pH, <6.5 AND > 8.5 UNITS | SPECIFIC CONDUCTIVITY, >700 µS/CM | DISSOLVED SOLIDS, >450 MG/L | E. COLI, > 235 MPN/100 ML | COPPER, TOTAL <sup>1</sup> , > 1,300 µG/L | LEAD, TOTAL <sup>1</sup> , > 15 µG/L | CHLORPYRIFOS, > 0.015 µG/L | DIURON, > 2 µG/L | THIOBENCARB, > 0 µG/L | C. DUBIA, (% CONTROL) | S. CAPRICORNUTUM, (% CONTROL) | H. AZTECA, (% CONTROL) |
|--------------------------|------------|-------------|----------------------------|--------------------------|-----------------------------------|-----------------------------|---------------------------|-------------------------------------------|--------------------------------------|----------------------------|------------------|-----------------------|-----------------------|-------------------------------|------------------------|
| Dry Creek @ Wellsford Rd | Irrigation | 10/2/2008   | 5.83                       |                          |                                   |                             |                           |                                           |                                      |                            |                  |                       |                       |                               |                        |
| Dry Creek @ Wellsford Rd | Fall       | 10/21/2008  | 4.91                       |                          |                                   |                             | 550                       |                                           |                                      |                            |                  |                       |                       |                               |                        |
| Dry Creek @ Wellsford Rd | Fall       | 12/16/2008  | 2.77                       | 8.68                     |                                   |                             |                           |                                           |                                      |                            |                  |                       |                       |                               |                        |
| Dry Creek @ Wellsford Rd | Winter     | 1/20/2009   | 5.1                        |                          | 707                               |                             |                           |                                           |                                      |                            |                  |                       |                       |                               |                        |
| Dry Creek @ Wellsford Rd | Winter     | 3/17/2009   |                            |                          |                                   |                             | 250                       |                                           |                                      |                            |                  |                       |                       |                               |                        |
| Dry Creek @ Wellsford Rd | Irrigation | 5/19/2009   | 6.24                       |                          |                                   |                             | 260                       |                                           |                                      |                            |                  |                       |                       |                               |                        |
| Dry Creek @ Wellsford Rd | Irrigation | 6/16/2009   |                            |                          |                                   |                             | 1600                      |                                           |                                      |                            |                  |                       |                       |                               |                        |
| Dry Creek @ Waterford Rd | Irrigation | 7/21/2009   | 6.89                       |                          |                                   |                             |                           |                                           |                                      |                            |                  |                       |                       |                               |                        |
| Dry Creek @ Wellsford Rd | Irrigation | 7/21/2009   | 5.9                        |                          |                                   |                             | 270                       |                                           |                                      |                            |                  |                       |                       |                               |                        |
| Dry Creek @ Wellsford Rd | Irrigation | 8/18/2009   |                            |                          |                                   |                             | 410                       |                                           |                                      | 0.027                      |                  |                       |                       |                               |                        |
| Dry Creek @ Wellsford Rd | Fall       | 10/20/2009  | 4.04                       |                          |                                   |                             | 490                       |                                           |                                      |                            |                  |                       |                       |                               |                        |
| Dry Creek @ Wellsford Rd | Fall       | 11/17/2009  | 3.04                       |                          |                                   |                             | 730                       |                                           |                                      |                            |                  |                       |                       |                               |                        |
| Dry Creek @ Wellsford Rd | Storm      | 12/15/2009  | 6.65                       |                          |                                   |                             | 820                       |                                           |                                      |                            |                  |                       |                       |                               |                        |
| Dry Creek @ Wellsford Rd | Storm      | 1/19/2010   | 2.05                       |                          |                                   |                             |                           |                                           |                                      |                            |                  |                       |                       |                               |                        |
| Dry Creek @ Wellsford Rd | Storm      | 4/20/2010   | 6.99                       |                          |                                   |                             | 2000                      |                                           |                                      |                            |                  |                       |                       |                               |                        |
| Dry Creek @ Wellsford Rd | Irrigation | 5/18/2010   |                            |                          |                                   |                             | 370                       |                                           |                                      |                            |                  |                       |                       |                               |                        |
| Dry Creek @ Wellsford Rd | Irrigation | 6/15/2010   | 5.77                       |                          |                                   |                             |                           |                                           |                                      |                            |                  |                       |                       |                               |                        |
| Dry Creek @ Wellsford Rd | Irrigation | 7/20/2010   | 6.30                       |                          |                                   |                             | 490                       |                                           |                                      | 0.067                      |                  |                       |                       |                               |                        |
| Dry Creek @ Wellsford Rd | Irrigation | 8/17/2010   | 6.91                       |                          |                                   |                             | 490                       |                                           |                                      |                            |                  |                       |                       |                               |                        |

| SITE NAME                | SEASON     | SAMPLE DATE | OXYGEN, DISSOLVED, <7 MG/L | pH, <6.5 AND > 8.5 UNITS | SPECIFIC CONDUCTIVITY, >700 µS/CM | DISSOLVED SOLIDS, >450 MG/L | E. COLI, > 235 MPN/100 mL | COPPER, TOTAL <sup>1</sup> , > 1,300 µG/L | LEAD, TOTAL <sup>1</sup> , > 15 µG/L | CHLORPYRIFOS, > 0.015 µG/L | DIURON, > 2 µG/L | THIOBENCARB, > 0 µG/L | C. DUBIA, (% CONTROL) | S. CAPRICORNUTUM, (% CONTROL) | H. AZTECA, (% CONTROL) |
|--------------------------|------------|-------------|----------------------------|--------------------------|-----------------------------------|-----------------------------|---------------------------|-------------------------------------------|--------------------------------------|----------------------------|------------------|-----------------------|-----------------------|-------------------------------|------------------------|
| Dry Creek @ Wellsford Rd | Fall       | 10/19/2010  | 6.01                       |                          |                                   |                             | 370                       |                                           |                                      |                            |                  |                       |                       |                               |                        |
| Dry Creek @ Wellsford Rd | Fall       | 11/16/2010  | 5.36                       | 6.14                     |                                   |                             | 390                       |                                           |                                      |                            |                  |                       |                       |                               |                        |
| Dry Creek @ Wellsford Rd | Winter     | 1/18/2011   |                            |                          |                                   | 660                         |                           |                                           |                                      |                            |                  |                       |                       |                               |                        |
| Dry Creek @ Wellsford Rd | Winter     | 3/17/2011   |                            | 8.68                     |                                   |                             |                           |                                           |                                      |                            |                  |                       |                       |                               |                        |
| Dry Creek @ Wellsford Rd | Irrigation | 4/19/2011   |                            |                          |                                   |                             | 2000                      |                                           |                                      |                            |                  |                       |                       |                               |                        |
| Dry Creek @ Wellsford Rd | Irrigation | 5/10/2011   |                            |                          |                                   |                             | 340                       |                                           |                                      |                            |                  |                       |                       |                               |                        |
| Dry Creek @ Wellsford Rd | Irrigation | 6/14/2011   | 6.36                       |                          |                                   |                             | 280                       |                                           |                                      |                            |                  |                       |                       |                               |                        |
| Dry Creek @ Wellsford Rd | Irrigation | 7/12/2011   | 6.82                       |                          |                                   |                             |                           |                                           |                                      |                            |                  |                       |                       |                               |                        |
| Dry Creek @ Wellsford Rd | Irrigation | 8/9/2011    | 6.52                       |                          |                                   |                             |                           |                                           |                                      |                            |                  |                       |                       |                               |                        |
| Dry Creek @ Wellsford Rd | Irrigation | 9/6/2011    |                            |                          |                                   |                             | 240                       |                                           |                                      |                            |                  |                       |                       |                               | 76                     |
| Dry Creek @ Wellsford Rd | Fall       | 12/6/2011   | 6.7                        |                          |                                   |                             | 330                       |                                           |                                      |                            |                  |                       |                       |                               |                        |
| Constituent Priority     |            |             | E                          | E                        | E                                 | E                           | E                         | C                                         | NP                                   | A/B                        | C                | NP <sup>R</sup>       | NP                    | D                             | D                      |

<sup>1</sup>Total metal WQTL variable based on hardness.

NP – Not Prioritized; less than two exceedances within three consecutive monitoring years and currently no TMDL.

NP<sup>R</sup> – Not Prioritized; thiobencarb is only applied to rice and therefore will be managed under the Rice Coalition.

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## 2007-2011 Management Plan Monitoring Results

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All monitoring results for high priority management plan constituents in the Dry Creek @ Wellsford Rd subwatershed are listed in Table I-6. These constituents include chlorpyrifos, copper, diuron, water toxicity to *S. capricornutum* and *C. dubia*, and sediment toxicity to *H. azteca*.

Chlorpyrifos exceeded the WQTL of 0.015 µg/L once during the first year of monitoring in 2005 (August) and twice again during 2006 (July and August). Normal Monitoring and additional monitoring occurred during 2007 and chlorpyrifos exceeded the WQTL in July and September. Neither exceedance was associated with a 2007 additional monitoring event. Upstream MPM occurred at Dry Creek @ Waterford Rd in 2008 and chlorpyrifos exceeded the WQTL in July and August, as well as once during 2008 Normal Monitoring (July) at the downstream Dry Creek @ Wellsford Rd location. Although upstream monitoring is typically scheduled for one season only, the Coalition continued to monitor the Dry Creek upstream location during 2009 irrigation season because of the inconsistent chlorpyrifos exceedances in 2008 at the Normal Monitoring and upstream locations. A single chlorpyrifos exceedance occurred at Dry Creek @ Wellsford Rd in 2009 (August) and in 2010 (July). Assessment Monitoring occurred at Dry Creek @ Wellsford Rd in 2011 and there were no chlorpyrifos exceedances (Table I-6). Chlorpyrifos MPM is scheduled to continue in 2012 during months of past exceedances (July, August, and September).

Copper exceeded the WQTL (calculated from associated hardness value) twice during 2007 Normal Monitoring (February and April) and again during 2008 Normal Monitoring (February). Due to the updated monitoring schedule that was implemented with the 2008 MRPP, MPM for copper did not begin until 2010. In the current 2008 MRPP, copper is not a Core Monitoring constituent and was not sampled during fall of 2008 and 2009 Core Monitoring at Dry Creek @ Wellsford Rd. Management Plan Monitoring for copper began during 2010 (February and April), and there were no exceedances. Assessment Monitoring occurred at Dry Creek @ Wellsford Rd in 2011 and again there were no exceedances of copper (Table I-6). Copper MPM is scheduled to continue in 2012 during months of past exceedances (February and April).

Diuron exceeded the WQTL twice during 2007 Normal Monitoring (February). In the current 2008 MRPP, diuron is not a Core Monitoring constituent and was not sampled during fall of 2008 and 2009 Core Monitoring at Dry Creek @ Wellsford Rd. The Coalition's original management plan strategy did not address storm exceedances due to the difficulty in sourcing those exceedances, and at the time of the management plan strategy's development the Coalition was not monitoring monthly (only storms and irrigation months). Starting in 2010, the Coalition updated its management plan strategy to monitor management plan constituents during the storm month that they occurred regardless of a rain event. In response to the updated management plan strategy, diuron MPM at Dry Creek @ Wellsford Rd began in February of 2010 and continued in February of 2011 (along with Assessment Monitoring). No exceedances of diuron occurred during 2010 or 2011. Core Monitoring will resume at Dry Creek @ Wellsford in 2012, and diuron MPM is scheduled during the month of past exceedances (February).

Toxicity to *C. dubia* occurred twice since 2005 (February 2005 and September 2006). Dry Creek @ Wellsford Rd was monitored monthly for toxicity to *C. dubia* during 2007 and the storm and irrigation seasons of 2008. Additional monitoring also occurred for toxicity to *C. dubia* in 2007 (September) and upstream MPM occurred in 2008 (September). No toxicity to *C. dubia* occurred during the 2007 and 2008 Normal Monitoring, additional monitoring, or MPM events. In 2009, *C. dubia* MPM was stopped because no exceedances occurred during the previous two consecutive years. *C. dubia* toxicity was analyzed during 2011 Assessment Monitoring and no toxicity occurred. No MPM monitoring is scheduled in 2012 for toxicity to *C. dubia*.

Toxicity to *S. capricornutum* occurred three times in February 2007, and once in February 2008. In the current 2008 MRPP, *S. capricornutum* toxicity is not a Core Monitoring constituent and was not sampled during fall of 2008 and 2009 Core Monitoring at Dry Creek @ Wellsford Rd. Due to the updated monitoring schedule that was implemented with the 2008 MRPP, MPM for *S. capricornutum* toxicity did not begin until 2010. The Coalition's original management plan strategy did not address storm exceedances due to the difficulty in sourcing those exceedances, and at the time of the management plan strategy's development the Coalition was not monitoring monthly (only storms and irrigation months). Starting in 2010, the Coalition updated its management plan strategy to monitor management plan constituents during the month that they occurred regardless of a rain event. In response to the updated management plan strategy, *S. capricornutum* toxicity MPM at Dry Creek @ Wellsford Rd began in February of 2010 and continued in February and March of 2011 (along with Assessment Monitoring). No toxicity occurred during 2010 or 2011 monitoring. Dry Creek @ Wellsford Rd will return to Core Monitoring in 2012 and the Coalition will conduct MPM for *S. capricornutum* toxicity during February and March 2012.

Toxicity to *H. azteca* occurred twice in 2008 (March and August). In the current 2008 MRPP, *H. azteca* toxicity is not a Core Monitoring constituent and was not sampled during fall of 2008, 2009, and winter 2010 Core Monitoring at Dry Creek @ Wellsford Rd. Sediment toxicity was added to the MPM schedule in September of 2010, so MPM for *H. azteca* only occurred once in 2010 (September). Starting in 2011, *H. azteca* MPM occurred in both months of past exceedances, March and September of 2011, with the September sample exhibiting toxicity to *H. azteca*. Management Plan Monitoring is scheduled to continue in 2012 during March and September.

**Table I-6. Dry Creek @ Wellsford Rd site subwatershed monitoring results for high priority constituents (2007-2011).**

Exceedance values are in bold. Resampling (RS) due to toxicity not included in table.

|                                         | MONTH:                                       | JAN     | FEB       | MAR | APR     | MAY     | JUN     | JUL          | AUG          | SEP          | OCT | NOV | DEC |
|-----------------------------------------|----------------------------------------------|---------|-----------|-----|---------|---------|---------|--------------|--------------|--------------|-----|-----|-----|
| <b>2007 NM<br/>(@ Wellsford Rd)</b>     | Date                                         | NA      | 2/11/07   | NA  | 4/17/07 | 5/15/07 | 6/19/07 | 7/17/07      | 8/14/07      | 9/11/07      | NA  | NA  | NA  |
|                                         | Chlorpyrifos (µg/L)                          | NA      | NA        | NA  | <0.003  | 0.011   | <0.003  | <b>0.021</b> | <0.003       | <b>0.043</b> | NA  | NA  | NA  |
|                                         | <i>C. dubia</i> toxicity (% Control)         | NA      | 95        | NA  | 100     | 100     | 100     | 100          | 100          | 100          | NA  | NA  | NA  |
| <b>2007 MPM A<br/>(@ Wellsford Rd)</b>  | Date                                         | NA      | 2/28/07   | NA  | NA      | NA      | NA      | 7/31/07      | 8/28/07      | 9/25/07      | NA  | NA  | NA  |
|                                         | Chlorpyrifos (µg/L)                          | NA      | NA        | NA  | NA      | NA      | NA      | <0.003       | <0.003       | NA           | NA  | NA  | NA  |
|                                         | <i>C. dubia</i> toxicity (% Control)         | NA      | 100       | NA  | NA      | NA      | NA      | NA           | NA           | 100          | NA  | NA  | NA  |
| <b>2008 NM<br/>(@ Wellsford Rd)</b>     | Date                                         | 1/24/08 | 2/26/08   | NA  | 4/22/08 | 5/20/08 | 6/17/08 | 7/22/08      | 8/19/08      | 9/23/08      | NA  | NA  | NA  |
|                                         | Chlorpyrifos (µg/L)                          | <0.003  | <0.003    | NA  | <0.003  | <0.003  | <0.003  | <b>0.03</b>  | <0.003       | <0.003       | NA  | NA  | NA  |
|                                         | <i>C. dubia</i> toxicity (% Control)         | 100     | 100       | NA  | 100     | 100     | 100     | 100          | 100          | 100          | NA  | NA  | NA  |
|                                         | <i>S. capricornutum</i> toxicity (% Control) | 214     | <b>33</b> | NA  | 176     | 201     | 380     | 237          | 320          | 624          | NA  | NA  | NA  |
| <b>2008 MPM US<br/>(@ Waterford Rd)</b> | Date                                         | NA      | NA        | NA  | NA      | NA      | NA      | 7/22/08      | 8/19/08      | 9/23/08      | NA  | NA  | NA  |
|                                         | Chlorpyrifos (µg/L)                          | NA      | NA        | NA  | NA      | NA      | NA      | <b>0.02</b>  | <b>0.023</b> | <0.003       | NA  | NA  | NA  |
|                                         | <i>C. dubia</i> toxicity (% Control)         | NA      | NA        | NA  | NA      | NA      | NA      | NA           | NA           | 100          | NA  | NA  | NA  |
| <b>2009 MPM<br/>(@ Wellsford Rd)</b>    | Date                                         | NA      | NA        | NA  | NA      | NA      | NA      | 7/21/09      | 8/18/09      | NA           | NA  | NA  | NA  |
|                                         | Chlorpyrifos (µg/L)                          | NA      | NA        | NA  | NA      | NA      | NA      | 0.013        | <b>0.027</b> | NA           | NA  | NA  | NA  |
| <b>2009 MPM US<br/>(@ Waterford Rd)</b> | Date                                         | NA      | NA        | NA  | NA      | NA      | NA      | 7/21/09      | 8/18/09      | NA           | NA  | NA  | NA  |
|                                         | Chlorpyrifos (µg/L)                          | NA      | NA        | NA  | NA      | NA      | NA      | <0.003       | <0.003       | NA           | NA  | NA  | NA  |
| <b>2010 MPM<br/>(@ Wellsford Rd)</b>    | Date                                         | NA      | 2/23/10   | NA  | 4/20/10 | NA      | NA      | 7/20/10      | 8/17/10      | 9/14/10      | NA  | NA  | NA  |
|                                         | Copper, dissolved (µg/L)                     | NA      | 3.2       | NA  | 2.8     | NA      | NA      | NA           | NA           | NA           | NA  | NA  | NA  |
|                                         | Copper, total (µg/L)                         | NA      | 3.9       | NA  | 4.3     | NA      | NA      | NA           | NA           | NA           | NA  | NA  | NA  |
|                                         | Chlorpyrifos (µg/L)                          | NA      | NA        | NA  | NA      | NA      | NA      | <b>0.067</b> | 0.013        | <0.003       | NA  | NA  | NA  |
|                                         | Diuron (µg/L)                                | NA      | <0.20     | NA  | NA      | NA      | NA      | NA           | NA           | NA           | NA  | NA  | NA  |
|                                         | <i>S. capricornutum</i> toxicity (% Control) | NA      | 1219      | NA  | NA      | NA      | NA      | NA           | NA           | NA           | NA  | NA  | NA  |
|                                         | <i>H. azteca</i> toxicity (% Control)        | NA      | NA        | NA  | NA      | NA      | NA      | NA           | NA           | 115          | NA  | NA  | NA  |

| MONTH:                            |                                                 | JAN     | FEB     | MAR     | APR     | MAY     | JUN     | JUL     | AUG     | SEP     | OCT      | NOV     | DEC     |
|-----------------------------------|-------------------------------------------------|---------|---------|---------|---------|---------|---------|---------|---------|---------|----------|---------|---------|
| 2011 NM & MPM<br>(@ Wellsford Rd) | Date                                            | 1/18/11 | 2/17/11 | 3/15/11 | 4/19/11 | 5/10/11 | 6/14/11 | 7/12/11 | 8/9/11  | 9/6/11  | 10/11/11 | 11/8/11 | 12/6/11 |
|                                   | Copper, dissolved (µg/L)                        | 1.5     | 1.7*    | 2.0     | 2.5*    | 2.0     | 2.2     | 2.0     | 1.9     | 2.2     | 2.1      | 1.3     | 1.1     |
|                                   | Copper, total (µg/L)                            | 2.4     | 2.1*    | 2.8     | 3.8*    | 3.2     | 3.7     | 3.5     | 3.0     | 3.0     | 3.3      | 1.7     | 1.4     |
|                                   | Chlorpyrifos (µg/L)                             | <0.003  | <0.003  | <0.003  | <0.003  | <0.003  | <0.003  | <0.003* | <0.003* | <0.003* | <0.003   | <0.003  | <0.003  |
|                                   | Diuron (µg/L)                                   | <0.2    | <0.2*   | <0.2    | <0.2    | <0.2    | <0.2    | <0.2    | <0.2    | <0.2    | <0.2     | <0.2    | <0.2    |
|                                   | <i>S. capricornutum</i> toxicity<br>(% Control) | 725     | 393*    | 1212*   | 834     | 807     | 1325    | 422     | 548     | 686     | 893      | 4134    | 496     |
|                                   | <i>H. azteca</i> toxicity (%<br>Control)        | NA      | NA      | 102*    | NA      | NA      | NA      | NA      | NA      | 76*     | NA       | NA      | NA      |

A – Additional MPM conducted in 2007 only.

MPM – Management Plan Monitoring (see Table 4 for MPM schedule)

NA – Not applicable. No monitoring occurred on this date for this constituent.

NM – Normal Monitoring

US – Upstream MPM conducted in 2008 and 2009 only.

\*NM & MPM occurred during this date for this constituent.

## Load Calculations

Loads have been calculated for the chlorpyrifos, copper and diuron detections (Table I-7) based on the following formula:

$$\text{Load} = \text{Discharge (cfs)} \times 28.317\text{L/ft}^3 \times \text{Concentration (mg/L} \times 1000 \text{ or } \mu\text{g/L)}.$$

The load values calculated and presented for pesticides or other constituents in this report represent instantaneous loads only. These values should not be used to extrapolate loading over any period of time (e.g. weekly, monthly, seasonal or annual). The primary purpose for reporting instantaneous loads is to provide the Regional Water Board with a context for the concentrations of various constituents at the time samples were collected.

**Table I-7. Dry Creek @ Wellsford Rd site subwatershed instantaneous load calculations for chlorpyrifos, copper and diuron.**

Upstream site is italicized. Sorted by analyte and date.

| SITE NAME                     | ANALYTE NAME        | SAMPLE DATE     | DISCHARGE CFS | CONCENTRATION $\mu\text{G/L}$ | LOADING RATE $\mu\text{G/SEC}$ |
|-------------------------------|---------------------|-----------------|---------------|-------------------------------|--------------------------------|
| Dry Creek @ Wellsford Rd      | Chlorpyrifos        | 08/17/05        | 0             | 0.024                         | 0                              |
| Dry Creek @ Wellsford Rd      | Chlorpyrifos        | 07/13/06        | 123.91        | 0.026                         | 91.23                          |
| Dry Creek @ Wellsford Rd      | Chlorpyrifos        | 05/15/07        | 51.13         | 0.011                         | 15.93                          |
| Dry Creek @ Wellsford Rd      | Chlorpyrifos        | 07/17/07        | 68.57         | 0.021                         | 40.78                          |
| Dry Creek @ Wellsford Rd      | Chlorpyrifos        | 09/11/07        | 61.02         | 0.043                         | 74.30                          |
| Dry Creek @ Wellsford Rd      | Chlorpyrifos        | 07/22/08        | 63.22         | 0.03                          | 53.71                          |
| <i>Dry Creek at Waterford</i> | <i>Chlorpyrifos</i> | <i>08/19/08</i> | <i>24.24</i>  | <i>0.023</i>                  | <i>15.79</i>                   |
| Dry Creek @ Wellsford Rd      | Chlorpyrifos        | 07/21/09        | 71.26         | 0.013                         | 26.23                          |
| Dry Creek @ Wellsford Rd      | Chlorpyrifos        | 08/18/09        | 47.07         | 0.027                         | 35.99                          |
| Dry Creek @ Wellsford Rd      | Chlorpyrifos        | 07/20/10        | 51.2          | 0.067                         | 97.14                          |
| Dry Creek @ Wellsford Rd      | Chlorpyrifos        | 08/17/10        | 51.94         | 0.013                         | 19.12                          |
| Dry Creek @ Wellsford Rd      | Copper              | 07/13/06        | 123.91        | 3.1                           | 10877.15                       |
| Dry Creek @ Wellsford Rd      | Copper              | 04/17/07        | 30.71         | 5.1                           | 4435.04                        |
| Dry Creek @ Wellsford Rd      | Copper              | 05/15/07        | 51.13         | 6.1                           | 8831.87                        |
| Dry Creek @ Wellsford Rd      | Copper              | 06/19/07        | 32.21         | 5.9                           | 5381.33                        |
| Dry Creek @ Wellsford Rd      | Copper              | 07/17/07        | 68.57         | 3.9                           | 7572.62                        |
| Dry Creek @ Wellsford Rd      | Copper              | 08/14/07        | 65.83         | 5.3                           | 9879.77                        |
| Dry Creek @ Wellsford Rd      | Copper              | 09/11/07        | 61.02         | 3.3                           | 5702.08                        |
| Dry Creek @ Wellsford Rd      | Copper              | 04/22/08        | 39.8          | 4.7                           | 5296.98                        |
| Dry Creek @ Wellsford Rd      | Copper              | 05/20/08        | 38.3          | 3.8                           | 4121.26                        |
| Dry Creek @ Wellsford Rd      | Copper              | 06/17/08        | 38.94         | 3.7                           | 4079.86                        |
| Dry Creek @ Wellsford Rd      | Copper              | 07/22/08        | 63.22         | 3.2                           | 5728.64                        |
| Dry Creek @ Wellsford Rd      | Copper              | 08/19/08        | 52.75         | 5.3                           | 7916.73                        |
| Dry Creek @ Wellsford Rd      | Copper              | 09/23/08        | 33.48         | 2.3                           | 2180.52                        |
| Dry Creek @ Wellsford Rd      | Copper              | 02/23/10        | 4.96          | 3.9                           | 547.76                         |
| Dry Creek @ Wellsford Rd      | Copper              | 04/20/10        | 20.8          | 4.3                           | 2532.67                        |
| Dry Creek @ Wellsford Rd      | Copper              | 01/18/11        | 27            | 2.4                           | 1834.94                        |
| Dry Creek @ Wellsford Rd      | Copper              | 02/17/11        | 2.74          | 2.1                           | 162.94                         |
| Dry Creek @ Wellsford Rd      | Copper              | 03/15/11        | 16.48         | 2.8                           | 1306.66                        |
| Dry Creek @ Wellsford Rd      | Copper              | 04/19/11        | 33.16         | 3.8                           | 3568.17                        |



| SITE NAME                | ANALYTE NAME | SAMPLE DATE | DISCHARGE CFS | CONCENTRATION µG/L | LOADING RATE µG/SEC |
|--------------------------|--------------|-------------|---------------|--------------------|---------------------|
| Dry Creek @ Wellsford Rd | Copper       | 05/10/11    | 21.39         | 3.2                | 1938.24             |
| Dry Creek @ Wellsford Rd | Copper       | 06/14/11    | 34.06         | 3.7                | 3568.56             |
| Dry Creek @ Wellsford Rd | Copper       | 07/12/11    | 56.41         | 3.5                | 5590.77             |
| Dry Creek @ Wellsford Rd | Copper       | 08/09/11    | 50.1          | 3                  | 4256.05             |
| Dry Creek @ Wellsford Rd | Copper       | 09/06/11    | 39.42         | 3                  | 3348.77             |
| Dry Creek @ Wellsford Rd | Copper       | 10/11/11    | 29.5          | 3.3                | 2756.66             |
| Dry Creek @ Wellsford Rd | Copper       | 11/08/11    | 0.34          | 1.7                | 16.37               |
| Dry Creek @ Wellsford Rd | Copper       | 12/06/11    | 0.37          | 1.4                | 14.67               |
| Dry Creek @ Wellsford Rd | Copper (D)   | 02/23/10    | 4.96          | 3.2                | 449.45              |
| Dry Creek @ Wellsford Rd | Copper (D)   | 04/20/10    | 20.8          | 2.8                | 1649.18             |
| Dry Creek @ Wellsford Rd | Copper (D)   | 01/18/11    | 27            | 1.5                | 1146.84             |
| Dry Creek @ Wellsford Rd | Copper (D)   | 02/17/11    | 2.74          | 1.7                | 131.90              |
| Dry Creek @ Wellsford Rd | Copper (D)   | 03/15/11    | 16.48         | 2                  | 933.33              |
| Dry Creek @ Wellsford Rd | Copper (D)   | 04/19/11    | 33.16         | 2.5                | 2347.48             |
| Dry Creek @ Wellsford Rd | Copper (D)   | 05/10/11    | 21.39         | 2                  | 1211.40             |
| Dry Creek @ Wellsford Rd | Copper (D)   | 06/14/11    | 34.06         | 2.2                | 2121.85             |
| Dry Creek @ Wellsford Rd | Copper (D)   | 07/12/11    | 56.41         | 2                  | 3194.72             |
| Dry Creek @ Wellsford Rd | Copper (D)   | 08/09/11    | 50.1          | 1.9                | 2695.50             |
| Dry Creek @ Wellsford Rd | Copper (D)   | 09/06/11    | 39.42         | 2.2                | 2455.76             |
| Dry Creek @ Wellsford Rd | Copper (D)   | 10/11/11    | 29.5          | 2.1                | 1754.24             |
| Dry Creek @ Wellsford Rd | Copper (D)   | 11/08/11    | 0.34          | 1.3                | 12.52               |
| Dry Creek @ Wellsford Rd | Copper (D)   | 12/06/11    | 0.37          | 1.1                | 11.53               |
| Dry Creek @ Wellsford Rd | Diuron       | 04/17/07    | 30.71         | 0.29               | 252.19              |
| Dry Creek @ Wellsford Rd | Diuron       | 04/22/08    | 39.8          | 0.2                | 225.40              |

Copper (D)-Dissolved Copper

### Source Identification and Outreach

The Coalition addressed source identification in the 2011 MPUR and, in the following sections, considers 2011 monitoring results and Pesticide Use Report (PUR) data as they expand upon that discussion. The Coalition focuses its efforts on applied pesticides. During 2007 and 2008, the Coalition conducted additional and upstream MPM during those months when exceedances historically occurred to better characterize water quality in the subwatershed. From 2009 through 2011, MPM continued at Dry Creek @ Wellsford Rd to continue to assess water quality in the subwatershed as outreach in the area progressed. Assessment Monitoring occurred at the site during 2011. The PUR data are reviewed to determine the most frequent crop type and timing associated with applications. Dry Creek @ Wellsford subwatershed PUR data are available through November 2011.

Focused outreach to document current management practices and track implementation of additional management practices in the Dry Creek subwatershed began in 2009 and continued through 2011. The Coalition organized grower meetings and mailings to educate growers about management practices and their importance in achieving acceptable water quality. The Coalition contacted 100% of targeted growers (25) representing 6,392 acres within the Dry Creek @ Wellsford subwatershed, including a new grower who joined the Coalition in 2010. Twenty-three growers participated in follow up contacts to determine if additional management practices were implemented and if any are planned to be

implemented, excluding two growers who no longer claimed their parcels. Management Plan Monitoring will continue in the Dry Creek @ Wellsford subwatershed during 2012 in order to demonstrate two consecutive years of monitoring with no exceedances of high priority constituents.

### *Priority A/B Constituents*

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Chlorpyrifos is the only priority A/B constituent in the Dry Creek @ Wellsford subwatershed.

#### **Chlorpyrifos**

Ten exceedances of the chlorpyrifos WQTL (0.015 µg/L) occurred at Dry Creek during the latter months of irrigation seasons in samples collected between 2005 and 2011 (Table I-5), including one exceedance in July of 2010. The Coalition evaluates monitoring and PUR data to identify possible sources of exceedances of constituents of concern.

In every high priority subwatershed, PUR data are reviewed for the number of monthly applications and pounds of active ingredient (AI) applied of the constituent of concern, and the acres treated by the constituent of concern (Table I-8, Figure I-2). The greatest amount of chlorpyrifos use occurred in 2005 (11,429 lbs AI) with the lowest amount of use occurring in 2011 (1,871 lbs AI). The greatest chlorpyrifos use occurs consistently in the month of July and exceedances often occur in the late summer (Figure I-2). The most recent chlorpyrifos applications preceding the 2010 July chlorpyrifos exceedance occurred in June 2010 (2219.5 lbs AI). There has been a steady decline in the overall used from 2005 to the present.

The Coalition also uses PUR data from each subwatershed to determine which crops receive the most applications of the constituent of concern (Table I-9). The highest application rates of chlorpyrifos in the Dry Creek subwatershed are associated with almond/walnut orchards, corn and grapes. The largest amount of chlorpyrifos applied from 2005 through 2011 was to almonds (22,744 lbs AI) followed by walnuts (16,683 lbs AI). The most common product containing chlorpyrifos used within this subwatershed was Lorsban.

**Table I-8. Dry Creek @ Wellsford Rd site subwatershed chlorpyrifos applications, lbs AI applied, and acres treated by month (2004-2011).**

PUR data available through November 2011 for Stanislaus County. If month is not included in table, no applications were made.

| MONTH/YEAR      | NUMBER OF CHLORPYRIFOS APPLICATIONS | POUNDS OF AI APPLIED | ACRES TREATED |
|-----------------|-------------------------------------|----------------------|---------------|
| January, 2005   | 1                                   | 152.5                | 75.0          |
| February, 2005  | 3                                   | 170.4                | 94.0          |
| March, 2005     | 3                                   | 120.9                | 111.0         |
| April, 2005     | 6                                   | 464.6                | 521.5         |
| May, 2005       | 23                                  | 3565.5               | 2988.4        |
| June, 2005      | 15                                  | 1970.3               | 1244.0        |
| July, 2005      | 50                                  | 4473.6               | 2865.0        |
| August, 2005    | 14                                  | 509.8                | 381.8         |
| September, 2005 | 1                                   | 2.0                  | 0.8           |
| February, 2006  | 1                                   | 8.0                  | 83.0          |
| March, 2006     | 4                                   | 98.1                 | 60.5          |
| May, 2006       | 28                                  | 4119.7               | 2738.4        |
| June, 2006      | 15                                  | 863.3                | 559.9         |
| July, 2006      | 55                                  | 3800.6               | 3489.0        |
| August, 2006    | 28                                  | 864.6                | 481.0         |
| September, 2006 | 5                                   | 123.9                | 62.5          |
| October, 2006   | 3                                   | 137.4                | 73.9          |
| December, 2006  | 1                                   | 29.9                 | 15.0          |
| March, 2007     | 1                                   | 10.2                 | 23.0          |
| April, 2007     | 6                                   | 28.1                 | 140.4         |
| May, 2007       | 25                                  | 2604.1               | 1663.9        |
| June, 2007      | 27                                  | 965.4                | 637.0         |
| July, 2007      | 43                                  | 2638.5               | 1700.2        |
| August, 2007    | 12                                  | 470.4                | 237.8         |
| September, 2007 | 3                                   | 33.6                 | 22.0          |
| October, 2007   | 2                                   | 137.6                | 93.3          |
| November, 2007  | 4                                   | 247.4                | 133.2         |
| January, 2008   | 1                                   | 29.9                 | 14.0          |
| April, 2008     | 3                                   | 20.8                 | 10.4          |
| May, 2008       | 34                                  | 1461.1               | 998.2         |
| June, 2008      | 17                                  | 1184.9               | 905.0         |
| July, 2008      | 58                                  | 2498.8               | 1636.9        |
| August, 2008    | 14                                  | 517.7                | 367.5         |
| September, 2008 | 7                                   | 363.4                | 212.6         |
| October, 2008   | 5                                   | 68.1                 | 301.2         |
| March, 2009     | 4                                   | 381.2                | 203.0         |
| April, 2009     | 6                                   | 389.9                | 164.4         |
| May, 2009       | 22                                  | 1483.2               | 745.5         |
| June, 2009      | 16                                  | 967.7                | 814.0         |
| July, 2009      | 24                                  | 1119.8               | 641.7         |
| August, 2009    | 11                                  | 430.0                | 364.8         |
| September, 2009 | 5                                   | 132.5                | 78.8          |
| November, 2009  | 3                                   | 487.4                | 259.5         |
| February, 2010  | 1                                   | 112.7                | 60.0          |
| April, 2010     | 2                                   | 0.7                  | 0.4           |
| May, 2010       | 6                                   | 393.9                | 197.0         |

| MONTH/YEAR               | NUMBER OF CHLORPYRIFOS APPLICATIONS | POUNDS OF AI APPLIED | ACRES TREATED  |
|--------------------------|-------------------------------------|----------------------|----------------|
| June, 2010               | 8                                   | 598.3                | 346.5          |
| July, 2010               | 44                                  | 2219.5               | 1761.3         |
| August, 2010             | 17                                  | 1081.9               | 547.0          |
| September, 2010          | 5                                   | 258.6                | 200.8          |
| October, 2010            | 5                                   | 598.7                | 318.8          |
| November, 2010           | 2                                   | 27.9                 | 14.0           |
| January, 2011            | 1                                   | 3.8                  | 2.0            |
| April, 2011              | 1                                   | 0.4                  | 0.2            |
| May, 2011                | 5                                   | 184.6                | 97.0           |
| June, 2011               | 10                                  | 377.8                | 602.2          |
| July, 2011               | 20                                  | 1190.5               | 617.0          |
| August, 2011             | 4                                   | 113.1                | 53.9           |
| September, 2011          | 1                                   | 1.6                  | 27.0           |
| <b>Summaries by Year</b> |                                     |                      |                |
| 2005 Total               | 116                                 | 11429.8              | 8281.4         |
| 2006 Total               | 140                                 | 10045.5              | 7563.2         |
| 2007 Total               | 123                                 | 7135.3               | 4650.7         |
| 2008 Total               | 139                                 | 6144.6               | 4445.8         |
| 2009 Total               | 91                                  | 5391.6               | 3271.6         |
| 2010 Total               | 90                                  | 5292.2               | 3445.8         |
| 2011 Total               | 42                                  | 1871.7               | 1399.3         |
| <b>Total</b>             | <b>741</b>                          | <b>47310.7</b>       | <b>33057.8</b> |

**Figure I-2. Dry Creek @ Wellsford Rd site subwatershed lbs chlorpyrifos applied by month (2005-2011).**

Asterisk (\*) denotes months with exceedances. PUR data available through November 2011 for Stanislaus County.

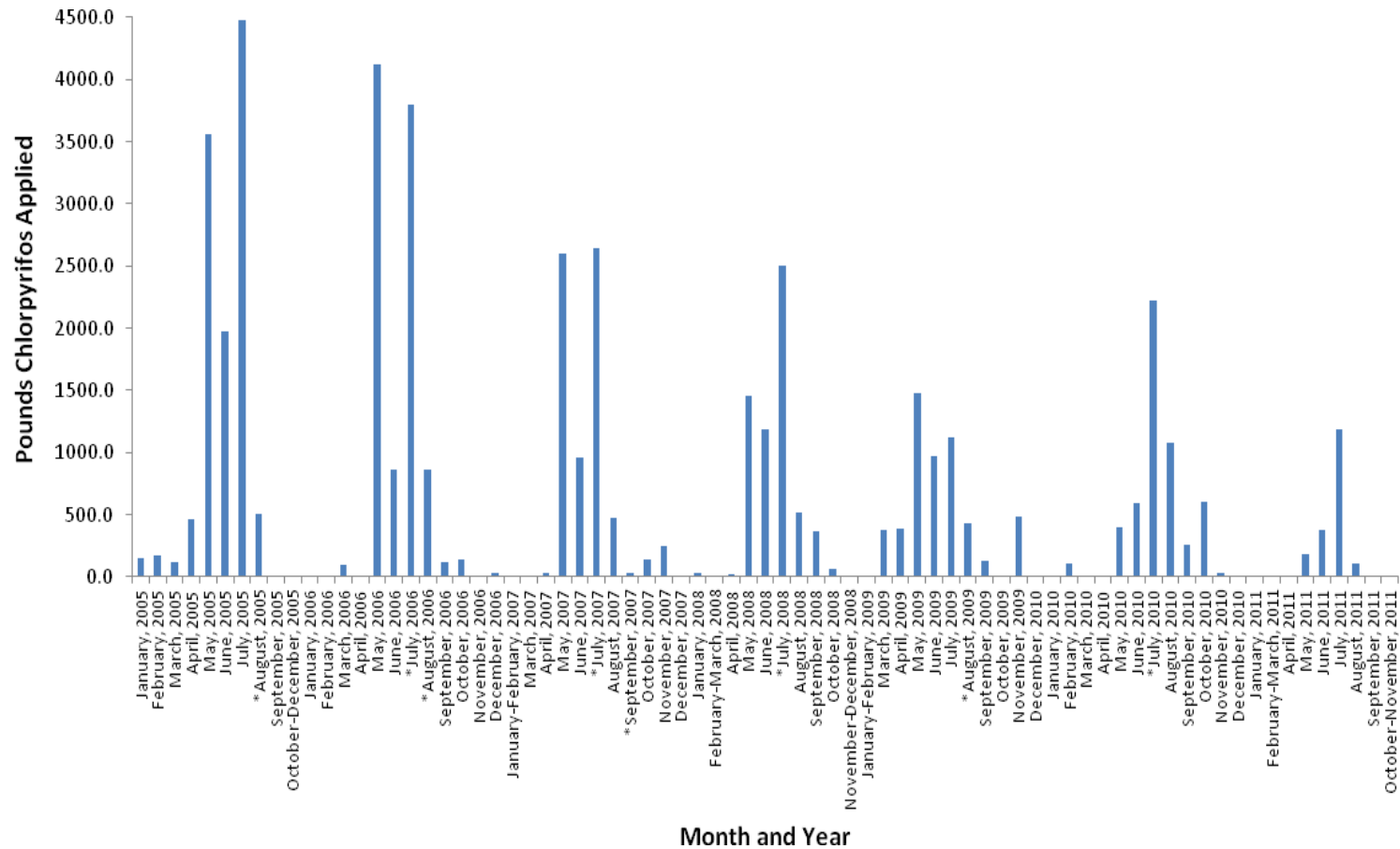


**Table I-9. Dry Creek @ Wellsford Rd site subwatershed chlorpyrifos PUR data (2005-2011).**

PUR data available through November 2011 for Stanislaus County.

| CHEMICAL NAME                                             | COMMODITY                               | PRODUCT NAME                     | LBS AI APPLIED |
|-----------------------------------------------------------|-----------------------------------------|----------------------------------|----------------|
| CHLORPYRIFOS                                              | ALFALFA (FORAGE - FODDER) (ALFALFA HAY) | NUFOS 4E                         | 21.4           |
|                                                           | ALMOND                                  | CHLORPYRIFOS 4E AG               | 371.7          |
|                                                           |                                         | GOVERN 4E INSECTICIDE            | 1173.7         |
|                                                           |                                         | LORSBAN 4E INSECTICIDE           | 716.9          |
|                                                           |                                         | LORSBAN 4E-HF                    | 2724.7         |
|                                                           |                                         | LORSBAN ADVANCED                 | 2480.3         |
|                                                           |                                         | LORSBAN-4E                       | 13491.1        |
|                                                           |                                         | NUFOS 4E                         | 1737.6         |
|                                                           |                                         | WARHAWK                          | 48.5           |
|                                                           | APPLE                                   | LORSBAN 4E-HF                    | 5.0            |
|                                                           |                                         | LORSBAN ADVANCED                 | 0.4            |
|                                                           | APRICOT                                 | LORSBAN 4E-HF                    | 9.0            |
|                                                           | CORN (FORAGE - FODDER)                  | GOVERN 4E INSECTICIDE            | 619.8          |
|                                                           |                                         | LORSBAN 15G GRANULAR INSECTICIDE | 1326.1         |
|                                                           |                                         | LORSBAN 4E-HF                    | 508.4          |
|                                                           |                                         | LORSBAN ADVANCED                 | 376.7          |
|                                                           |                                         | LORSBAN-4E                       | 476.8          |
|                                                           |                                         | NUFOS 15G                        | 618.0          |
|                                                           |                                         | NUFOS 4E                         | 97.0           |
|                                                           |                                         | WARHAWK                          | 775.0          |
|                                                           | GRAPES (WINE)                           | LORSBAN 4E-HF                    | 98.1           |
|                                                           |                                         | LORSBAN ADVANCED                 | 1648.1         |
|                                                           |                                         | LORSBAN-4E                       | 804.7          |
|                                                           | N-OUTDR CONTAINER/FLD GRWN PLANTS       | LORSBAN 15G GRANULAR INSECTICIDE | 2.3            |
|                                                           |                                         | LORSBAN 4E-HF                    | 43.9           |
|                                                           |                                         | LORSBAN 75WG                     | 25.5           |
|                                                           |                                         | LORSBAN-75WG                     | 110.6          |
|                                                           | N-OUTDR GRWN TRNSPLNT/PRPGTV MTRL       | LORSBAN-4E                       | 316.2          |
|                                                           | WALNUT                                  | CHLORPYRIFOS 4E AG               | 1357.3         |
|                                                           |                                         | GOVERN 4E INSECTICIDE            | 197.0          |
|                                                           |                                         | LORSBAN 4E INSECTICIDE           | 575.1          |
|                                                           |                                         | LORSBAN 4E-HF                    | 2488.4         |
|                                                           |                                         | LORSBAN ADVANCED                 | 1829.2         |
|                                                           |                                         | LORSBAN-4E                       | 6488.7         |
|                                                           |                                         | NUFOS 4E                         | 3647.2         |
|                                                           | WARHAWK                                 | 101.0                            |                |
|                                                           |                                         |                                  |                |
| ALFALFA - Total Pounds Chlorpyrifos Applied               |                                         |                                  | 21.4           |
| ALMOND - Total Pounds Chlorpyrifos Applied                |                                         |                                  | 22744.3        |
| APPLE - Total Pounds Chlorpyrifos Applied                 |                                         |                                  | 5.4            |
| APRICOT - Total Pounds Chlorpyrifos Applied               |                                         |                                  | 9.0            |
| CORN - Total Pounds Chlorpyrifos Applied                  |                                         |                                  | 4797.7         |
| GRAPES - Total Pounds Chlorpyrifos Applied                |                                         |                                  | 2550.8         |
| N-OUTDR CONTAINER - Total Pounds Chlorpyrifos Applied     |                                         |                                  | 182.3          |
| N-OUTDR GRWN TRNSPLNT - Total Pounds Chlorpyrifos Applied |                                         |                                  | 316.2          |
| WALNUT - Total Pounds Chlorpyrifos Applied                |                                         |                                  | 16683.7        |
| Total Pounds Chlorpyrifos Applied (2005 - 2011)           |                                         |                                  | 47310.7        |

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The Coalition determined the most probable source of chlorpyrifos in Dry Creek was spray drift from adjacent orchards, particularly during the months July and August. As described in the 2010 and 2011 MPURs, results from general management practice surveys indicated spray application and orchard and vineyard water management practices are not widely implemented across the Coalition region within the subwatershed. Farmers applying to row crop were advised of methods to better manage their irrigation tailwater and storm water runoff, whereas outreach efforts focus on encouraging management practices aimed at reducing spray drift and also to improve orchard and vineyard water management. The Coalition understands not all management practices are applicable or even necessary for all irrigated acres and thus designed their outreach to affect an increase in implementation of relevant and effective management practices in parcels adjacent to the creek, which should result in the greatest improvement in water quality.

Coalition outreach since 2007 has included grower meetings and the mailing/distribution of information such as available funding for management practice implementation. A complete list of coalition outreach during 2011 is provided in the Actions Taken to Address Water Quality Exceedances section of the 2012 AMR (Table 46, page 142).

Additionally, to gain more information about potential sources of discharge into the Dry Creek @ Wellsford Rd site subwatershed, the Stanislaus County Agricultural Commissioner's staff walked the waterway in November 2007 and documented the location all drains using GPS and digital photos. The Coalition mapped the drains and used this information to further assess possible sources of water quality impairments and to compile a list of growers targeted for outreach. The Coalition notified individuals owning the parcels where drains were found and conducted a joint meeting with the Stanislaus County Agriculture Commissioner in June 2008.

As outlined in the Coalition's Management Plan strategy, individual contacts with targeted growers began in January 2009. Targeted growers were selected based on the potential to drain or drift to the creek. The Coalition eventually developed a list of 24 targeted members with the potential to discharge to the creek. Two members who were previously dropped due to not scheduling a meeting elected to remain in the Coalition and participate in a grower meeting where they completed the management practice survey. Moreover, due to continued chlorpyrifos exceedances occurring during monitoring in 2010, a single grower was additionally contacted who had reported chlorpyrifos use on parcels that were associated with the exceedances. The grower had recently joined the Coalition and during the irrigation season of 2011 implemented new practices to address offsite movement of chlorpyrifos. No additional chlorpyrifos exceedances occurred during 2011.

The Coalition has now contacted 25 targeted growers within the Dry Creek @ Wellsford Rd subwatershed. Of the 23,331 irrigated acres in the Dry Creek subwatershed, the 25 targeted growers represent 6,392 acres of direct drainage, whereas the 22 growers only represented 6,116 acres of direct drainage (2012 MPUR, page 35).

Coalition representatives met with growers on their property to discuss the Dry Creek Management Plan and offer management practice recommendations specific to the parcel and land owner/operator. Individual meetings gave the Coalition a chance to better assess current management practices as well as planned management practice. Individual contacts focused mainly on chlorpyrifos exceedances, however, all water quality results were reviewed and discussed including exceedances of copper, diuron, *E. coli*, DO, SC, TDS, and pH, and toxicity to *S. capricornutum* and *H. azteca*.

To date, the Coalition contacted all 25 targeted members, which represent 6,392 or 27% of the total irrigated subwatershed acreage. The final targeted acreage is less than the acreage that has the potential to drain due to parcels/members being dropped from the original targeted list. Reasons for the drops include 1) the acres were not currently farmed, 2) the acres were pasture with no pesticide use, 3) the acres determined not to drain or have the potential to drift to the creek, or 4) there was no reported pesticide use.

On February 26, 2010, the Coalition hosted a Follow-Up to the 2009 Individual Contacts Grower Meeting. Using the Coalition's Interactive Survey Devices, growers were polled to determine what additional management practices were implemented in 2009 and if additional practices were planned for 2010. Members unable to attend the meeting were asked to participate in a phone interview with a Coalition representative between March 1 and August 4, 2010 to report their newly implemented management practices. Of the 25 targeted growers, three completed their initial survey late, two were not required to complete a follow up, and the additional member contacted who joined the Coalition in 2010 was followed up with in fall 2011. Therefore, 22 members were required to participate in follow up contacts. Three growers representing 524 acres received a recommendation to shut off outside nozzles when spraying outer rows next to sensitive sites, implemented the recommended management practice. The single grower farming 45 acres recommended to plant or allow vegetation to grow along ditches indicated that the drainage ditches around the fields was removed and therefore the management practice was no longer applicable. The same grower informed Coalition representatives during follow up contact that they continue to maintain vegetation buffer strips around the perimeter of their fields. Several other members with no irrigation drainage indicated they implemented new management practices in 2009 and 2011 without specific recommendations from the Coalition. One grower (107 acres) now allows grass to grow in the center of orchard rows, two growers (443 acres), began to use recirculation/tailwater return systems on their properties, a single grower (121.3 acres) constructed a drainage basin/sediment pond, a single grower (28 acres) installed filter strips at least 10 feet wide around their field perimeter and one grower (162 acres) used less water during surface irrigation. Overall, newly implemented management practices in 2009 and 2011 in the Dry Creek subwatershed included: shutting off outside nozzles when spraying outer rows next to sensitive sites, maintaining filter strips at least 10 feet wide around field perimeters, allowing grass to grow in the centers of orchard rows, using less water during surface irrigation, using recirculation/tailwater return systems, and constructing drainage basins/sediment ponds for operations with no irrigation drainage account for 2,585.5 acres. In addition, a single grower with drainage from their 2,450 acre property



indicated that they implemented new management practices but did not specify which type. This was the only implementation to property in the Dry Creek subwatershed with irrigation drainage.

All members were responsive to follow up interviews and have completed their *follow up* questions. The Coalition Assessment of implemented management practices is included in the Summary of Implemented Management Practices section of this report.

The Coalition will continue to assess water quality at Dry Creek @ Wellsford Rd through MPM during months of past exceedances. If exceedances occur, the Coalition will discuss with the Regional Board supplementary actions for outreach that may include contacting other chlorpyrifos sources such as dairy operations and/or contacting new members to the Coalition.

### *Priority C Constituents*

Copper and diuron are listed as priority C constituents for the Dry Creek @ Wellsford subwatershed.

#### **Copper**

Exceedances of the hardness based copper WQTL occurred three times in this subwatershed from 2005 through 2011 (Table I-5). The Coalition began monitoring for both the total and dissolved copper fractions in October 2008 to better characterize copper contamination in the subwatershed. During 2011 Assessment Monitoring at Dry Creek @ Wellsford Rd, copper was analyzed every month and no exceedances occurred.

PUR data are reviewed for the number of monthly copper applications, pounds AI applied, and acres treated (Table I-10, Figure I-3). PUR data for the Dry Creek @ Wellsford subwatershed are available through November 2011. The greatest amount of copper was applied in 2005 (29,768 lbs) and the lowest amount applied in 2008 (12,278 lbs). Between 2004 and 2011, the greatest amount of copper use occurred in the months of January and April. There is no relationship between exceedances and time periods with the greatest use of copper (Figure I-3).

The largest amount of copper applied was associated with almond/walnut orchards and rice (Table I-11). The largest amount of copper from 2005 through 2011 was applied to walnuts (76,809 lbs AI), followed almond (44,947 lbs AI, Table I-11). The most common product containing copper used within this subwatershed was Kocide (Table I-11). Copper use is variable over time with no trend toward decreasing use.

**Table I-10. Dry Creek @ Wellsford Rd site subwatershed copper applications, lbs AI applied and acres treated by month (2005-2011).**

PUR data available through November 2011 for Stanislaus County. If month is not included in table, no applications were made.

| MONTH/YEAR     | NUMBER OF COPPER APPLICATIONS | POUNDS OF AI APPLIED | ACRES TREATED |
|----------------|-------------------------------|----------------------|---------------|
| January, 2005  | 31.0                          | 7502.5               | 1164.4        |
| February, 2005 | 51.0                          | 3674.3               | 1670.3        |
| March, 2005    | 37.0                          | 4857.1               | 1240.5        |

| MONTH/YEAR      | NUMBER OF COPPER APPLICATIONS | POUNDS OF AI APPLIED | ACRES TREATED |
|-----------------|-------------------------------|----------------------|---------------|
| April, 2005     | 47.0                          | 6643.5               | 2055.3        |
| May, 2005       | 24.0                          | 2935.5               | 691.7         |
| June, 2005      | 3.0                           | 161.6                | 72.0          |
| July, 2005      | 1                             | 0.5                  | 10.0          |
| August, 2005    | 2                             | 84.3                 | 35.1          |
| September, 2005 | 1                             | 15.0                 | 10.0          |
| November, 2005  | 3                             | 3384.9               | 805.0         |
| December, 2005  | 7                             | 508.9                | 93.0          |
| January, 2006   | 31                            | 3440.9               | 823.5         |
| February, 2006  | 46                            | 2918.6               | 1551.5        |
| March, 2006     | 5                             | 146.7                | 103.0         |
| April, 2006     | 50                            | 4815.0               | 1139.9        |
| May, 2006       | 46                            | 8536.0               | 1657.8        |
| June, 2006      | 6                             | 816.5                | 132.0         |
| August, 2006    | 2                             | 49.5                 | 22.0          |
| October, 2006   | 1                             | 6.2                  | 2.0           |
| November, 2006  | 4                             | 177.8                | 57.5          |
| December, 2006  | 4                             | 353.9                | 51.0          |
| January, 2007   | 20                            | 6408.0               | 1517.2        |
| February, 2007  | 45                            | 2123.5               | 1348.0        |
| March, 2007     | 31                            | 3624.7               | 940.0         |
| April, 2007     | 69                            | 8186.8               | 2402.0        |
| May, 2007       | 11                            | 1542.5               | 254.8         |
| June, 2007      | 3                             | 938.1                | 100.0         |
| July, 2007      | 2                             | 129.0                | 43.0          |
| August, 2007    | 1                             | 18.0                 | 6.0           |
| October, 2007   | 1                             | 32.3                 | 3.0           |
| November, 2007  | 5                             | 1714.7               | 435.0         |
| December, 2007  | 5                             | 203.0                | 59.0          |
| January, 2008   | 23                            | 2736.1               | 603.5         |
| February, 2008  | 41                            | 1770.0               | 1270.0        |
| March, 2008     | 15                            | 1713.0               | 530.0         |
| April, 2008     | 41                            | 4943.4               | 1426.3        |
| May, 2008       | 9                             | 791.3                | 160.5         |
| November, 2008  | 4                             | 64.0                 | 28.0          |
| December, 2008  | 8                             | 260.2                | 53.0          |
| January, 2009   | 14                            | 2432.3               | 590.3         |
| February, 2009  | 48                            | 1591.9               | 1125.0        |
| March, 2009     | 2                             | 23.4                 | 23.0          |
| April, 2009     | 54                            | 5993.3               | 1539.0        |
| May, 2009       | 20                            | 3565.4               | 846.5         |
| June, 2009      | 3                             | 194.2                | 102.8         |
| November, 2009  | 4                             | 140.7                | 21.0          |
| December, 2009  | 10                            | 750.7                | 124.0         |
| January, 2010   | 26                            | 1316.9               | 368.5         |
| February, 2010  | 67                            | 2336.6               | 2098.5        |
| March, 2010     | 19                            | 756.4                | 285.0         |
| April, 2010     | 114                           | 11921.9              | 3493.0        |
| May, 2010       | 24                            | 1631.2               | 494.8         |
| September, 2010 | 2                             | 1005.9               | 380.0         |

| MONTH/YEAR               | NUMBER OF COPPER APPLICATIONS | POUNDS OF AI APPLIED | ACRES TREATED  |
|--------------------------|-------------------------------|----------------------|----------------|
| October, 2010            | 1                             | 45.2                 | 14.0           |
| November, 2010           | 2                             | 45.2                 | 14.0           |
| December, 2010           | 7                             | 359.2                | 79.0           |
| January, 2011            | 14                            | 1735.9               | 305.7          |
| February, 2011           | 60                            | 1880.9               | 1280.0         |
| March, 2011              | 25                            | 885.2                | 605.5          |
| April, 2011              | 58                            | 6996.3               | 2085.5         |
| May, 2011                | 31                            | 2307.3               | 745.0          |
| June, 2011               | 13                            | 1395.9               | 339.5          |
| September, 2011          | 1                             | 9.2                  | 5.0            |
| <b>Summaries by Year</b> |                               |                      |                |
| 2005 Total               | 207                           | 29767.9              | 7847.3         |
| 2006 Total               | 195                           | 21261.0              | 5540.1         |
| 2007 Total               | 193                           | 24920.7              | 7108.0         |
| 2008 Total               | 141                           | 12278.0              | 4071.3         |
| 2009 Total               | 155                           | 14692.0              | 4371.5         |
| 2010 Total               | 262                           | 19418.5              | 7226.8         |
| 2011 Total               | 202                           | 15210.7              | 5366.1         |
| <b>Total</b>             | <b>1355</b>                   | <b>137548.7</b>      | <b>41531.0</b> |

**Figure I-3. Dry Creek @ Wellsford Rd site subwatershed lbs copper applied by month (2005-2011).**

Asterisk (\*) denotes months with exceedances. PUR data available through November 2011 for Stanislaus County.

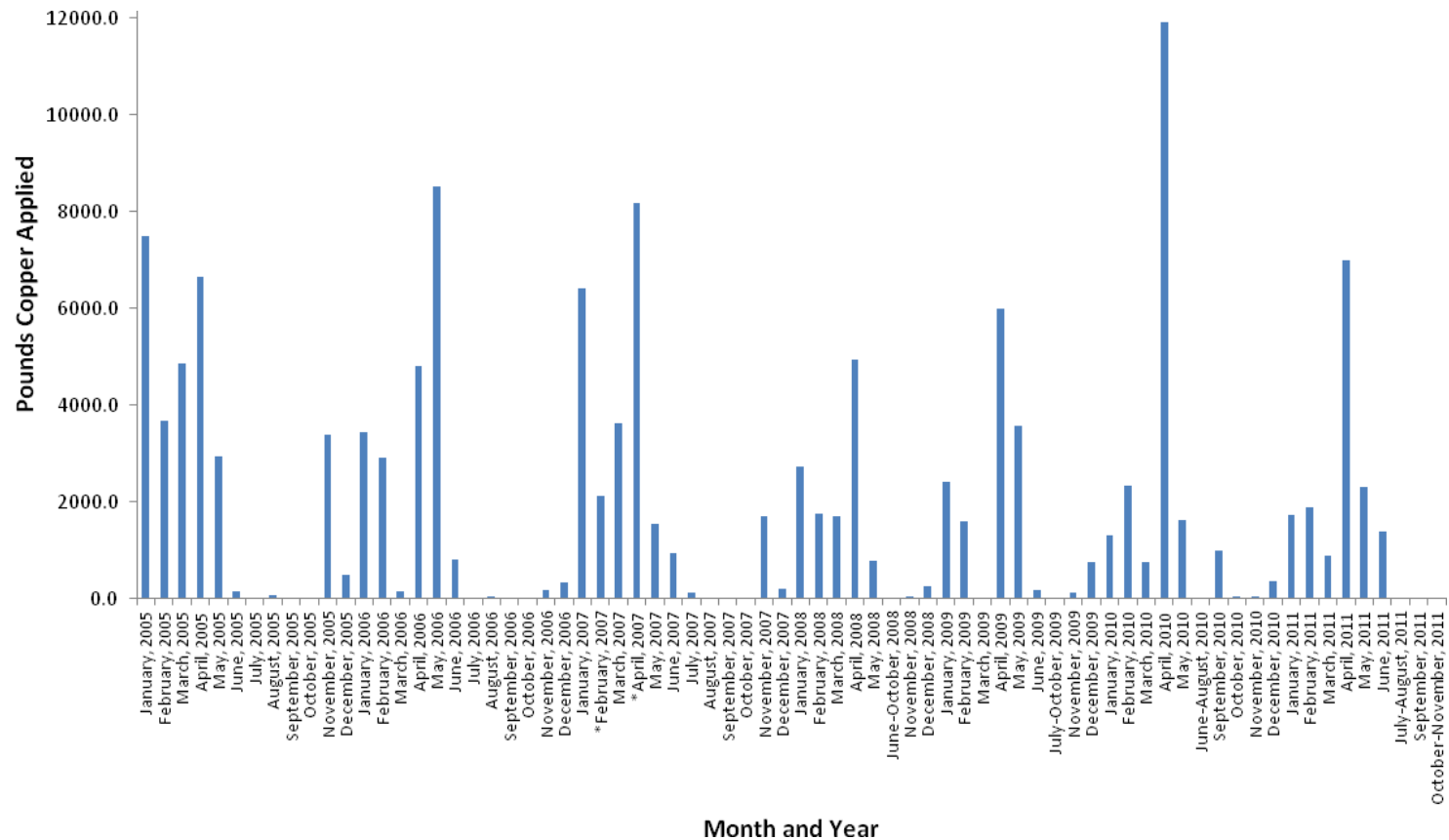


**Table I-11. Dry Creek @ Wellsford Rd site subwatershed copper PUR data (2005-2011).**

PUR data available through November 2011 for Stanislaus County.

| CHEMICAL NAME | COMMODITY                         | PRODUCT NAME                             | LBS AI APPLIED |
|---------------|-----------------------------------|------------------------------------------|----------------|
| COPPER        | ALMOND                            | BASIC COPPER 53                          | 5742.8         |
|               |                                   | BASICOP                                  | 712.9          |
|               |                                   | CHAMP FORMULA 2 FLOWABLE                 | 10060.4        |
|               |                                   | CHAMP WG                                 | 743.1          |
|               |                                   | CHAMPION WETTABLE POWDER                 | 1545.8         |
|               |                                   | CUPROFIX ULTRA 40 DISPERSS               | 1601.2         |
|               |                                   | DUPONT KOCIDE 2000 FUNGICIDE/BACTERICIDE | 2168.4         |
|               |                                   | DUPONT KOCIDE 3000 FUNGICIDE/BACTERICIDE | 379.9          |
|               |                                   | DUPONT KOCIDE DF FUNGICIDE/BACTERICIDE   | 518.2          |
|               |                                   | HYDROX                                   | 4864.9         |
|               |                                   | KENTAN DF                                | 282.0          |
|               |                                   | KOCIDE 101                               | 2943.2         |
|               |                                   | KOCIDE 2000                              | 1637.7         |
|               |                                   | KOCIDE DF                                | 1796.3         |
|               |                                   | NORDOX                                   | 49.4           |
|               |                                   | NORDOX 75 WG                             | 4256.6         |
|               |                                   | NU-COP 50 WP                             | 352.7          |
|               |                                   | NU-COP 50DF                              | 5179.8         |
|               |                                   | NUCOP DF                                 | 112.5          |
|               |                                   | NUTRA-SPRAY ZN12-MN2-CU10                | 0.5            |
|               | APRICOT                           | CHAMPION WETTABLE POWDER                 | 69.3           |
|               |                                   | COPPER SULFATE CRYSTALS                  | 89.1           |
|               |                                   | DUPONT KOCIDE 3000 FUNGICIDE/BACTERICIDE | 62.2           |
|               |                                   | NORDOX                                   | 34.5           |
|               |                                   | NORDOX 75 WG                             | 56.6           |
|               |                                   | NU-COP 50DF                              | 6.2            |
|               |                                   | TRIANGLE BRAND COPPER SULFATE            | 89.1           |
|               | CHERRY                            | CHAMPION WETTABLE POWDER                 | 107.8          |
|               |                                   | DUPONT GX-569 FUNGICIDE/BACTERICIDE      | 17.3           |
|               |                                   | KOCIDE 101                               | 57.8           |
|               | GRAPES (WINE)                     | BRITZ COPPER SULFUR 15-25 DUST           | 445.8          |
|               |                                   | CHAMP FORMULA 2 FLOWABLE                 | 979.4          |
|               |                                   | DUPONT KOCIDE 2000 FUNGICIDE/BACTERICIDE | 43.0           |
|               |                                   | KOCIDE 2000                              | 82.2           |
|               |                                   | KOCIDE DF                                | 58.4           |
|               |                                   | NU-COP 3L                                | 35.8           |
|               |                                   | WIL-DRY                                  | 1005.9         |
|               | NECTARINE                         | CHAMP WG                                 | 170.9          |
|               |                                   | CHAMPION WETTABLE POWDER                 | 862.4          |
|               |                                   | KOCIDE 101                               | 154.0          |
|               | N-OUTDR CONTAINER/FLD GRWN PLANTS | DUPONT KOCIDE 2000 FUNGICIDE/BACTERICIDE | 206.6          |
|               |                                   | KOCIDE 101                               | 146.3          |
|               |                                   | KOCIDE 2000                              | 37.1           |
|               |                                   | KOCIDE DF                                | 180.5          |
|               |                                   | PHYTON-27 BACTERICIDE & FUNGICIDE        | 2.1            |
|               | N-OUTDR GRWN TRNSPLNT/PRPGTV MTRL | CHAMP FORMULA 2 FLOWABLE                 | 386.4          |
|               | OLIVE (ALL OR UNSPEC)             | CUPROFIX ULTRA 40 DISPERSS               | 2.7            |

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| CHEMICAL<br>NAME                                    | COMMODITY                                           | PRODUCT NAME                                     | LBS AI<br>APPLIED |  |
|-----------------------------------------------------|-----------------------------------------------------|--------------------------------------------------|-------------------|--|
| COPPER                                              | PEACH                                               | BASIC COPPER 53                                  | 73.5              |  |
|                                                     |                                                     | CHAMP WG                                         | 23.1              |  |
|                                                     |                                                     | CHAMPION WETTABLE POWDER                         | 1002.5            |  |
|                                                     |                                                     | CUPROFIX ULTRA 40 DISPERSS                       | 76.8              |  |
|                                                     |                                                     | DUPONT KOCIDE 2000 FUNGICIDE/BACTERICIDE         | 63.8              |  |
|                                                     |                                                     | DUPONT KOCIDE DF FUNGICIDE/BACTERICIDE           | 30.7              |  |
|                                                     |                                                     | HYDROX                                           | 442.0             |  |
|                                                     |                                                     | KOCIDE 101                                       | 16.2              |  |
|                                                     |                                                     | KOCIDE 2000                                      | 33.9              |  |
|                                                     |                                                     | KOCIDE DF                                        | 334.0             |  |
|                                                     |                                                     | NORDOX 75 WG                                     | 490.6             |  |
|                                                     |                                                     | NU-COP 50 WP                                     | 164.8             |  |
|                                                     |                                                     | NU-COP 50DF                                      | 91.6              |  |
|                                                     | PISTACHIO (PISTACHE NUT)                            | CUPROFIX ULTRA 40 DISPERSS                       | 36.7              |  |
|                                                     |                                                     | KENTAN DF                                        | 367.8             |  |
|                                                     | PLUM (INCLUDES WILD PLUMS FOR HUMAN<br>CONSUMPTION) | CHAMPION WETTABLE POWDER                         | 314.2             |  |
|                                                     |                                                     | NORDOX 75 WG                                     | 48.5              |  |
|                                                     | RICE (ALL OR UNSPEC)                                | BLUE VIKING COPPER SULFATE STAR SHINE<br>CRYSTAL | 910.8             |  |
|                                                     |                                                     | CHIPCO COPPER SULFATE CRYSTALS                   | 5098.5            |  |
|                                                     |                                                     | KOCIDE COPPER SULFATE STAR SHINE CRYSTALS        | 782.1             |  |
|                                                     | WALNUT                                              | BLUE SHIELD DF                                   | 92.4              |  |
|                                                     |                                                     | CHAMP FLOWABLE                                   | 79.4              |  |
|                                                     |                                                     | CHAMP FORMULA 2 FLOWABLE                         | 3559.4            |  |
|                                                     |                                                     | CHAMP WG                                         | 2387.4            |  |
|                                                     |                                                     | CHAMPION WETTABLE POWDER                         | 2631.1            |  |
|                                                     |                                                     | CUPROFIX ULTRA 40 DISPERSS                       | 989.7             |  |
|                                                     |                                                     | DUPONT GX-569 FUNGICIDE/BACTERICIDE              | 1037.7            |  |
|                                                     |                                                     | DUPONT KOCIDE 101 FUNGICIDE/BACTERICIDE          | 739.2             |  |
|                                                     |                                                     | DUPONT KOCIDE 2000 FUNGICIDE/BACTERICIDE         | 12547.0           |  |
|                                                     |                                                     | DUPONT KOCIDE 3000 FUNGICIDE/BACTERICIDE         | 3483.8            |  |
|                                                     |                                                     | DUPONT KOCIDE DF FUNGICIDE/BACTERICIDE           | 175.6             |  |
|                                                     |                                                     | HYDROX                                           | 1216.6            |  |
|                                                     |                                                     | KENTAN DF                                        | 2855.4            |  |
|                                                     |                                                     | KOCIDE 101                                       | 5439.5            |  |
|                                                     |                                                     | KOCIDE 2000                                      | 8015.3            |  |
|                                                     |                                                     | KOCIDE DF                                        | 13306.0           |  |
|                                                     |                                                     | NORDOX                                           | 450.1             |  |
|                                                     |                                                     | NORDOX 75 WG                                     | 1854.2            |  |
|                                                     |                                                     | NU-COP 50 WP                                     | 802.3             |  |
|                                                     |                                                     | NU-COP 50DF                                      | 14007.8           |  |
|                                                     |                                                     | NU-COP HB                                        | 1139.6            |  |
| ALMOND - Total Pounds Copper Applied                |                                                     |                                                  | 44947.9           |  |
| APRICOT - Total Pounds Copper Applied               |                                                     |                                                  | 407.0             |  |
| CHERRY - Total Pounds Copper Applied                |                                                     |                                                  | 182.8             |  |
| GRAPES - Total Pounds Copper Applied                |                                                     |                                                  | 2650.5            |  |
| N-OUTDR CONTAINER - Total Pounds Copper Applied     |                                                     |                                                  | 572.6             |  |
| N-OUTDR GRWN TRNSPLNT - Total Pounds Copper Applied |                                                     |                                                  | 386.4             |  |
| NECTARINE - Total Pounds Copper Applied             |                                                     |                                                  | 1187.3            |  |

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| CHEMICAL NAME | COMMODITY | PRODUCT NAME                            | LBS AI APPLIED |
|---------------|-----------|-----------------------------------------|----------------|
|               |           | OLIVE - Total Pounds Copper Applied     | 2.7            |
|               |           | PEACH - Total Pounds Copper Applied     | 2843.5         |
|               |           | PISTACHIO - Total Pounds Copper Applied | 404.5          |
|               |           | PLUM - Total Pounds Copper Applied      | 362.7          |
|               |           | RICE - Total Pounds Copper Applied      | 6791.4         |
|               |           | WALNUT - Total Pounds Copper Applied    | 76809.4        |
|               |           | Total Pounds Copper Applied (2005-2011) | 137548.7       |

The Coalition determined future outreach should focus on providing information to specific growers located adjacent to Dry Creek to encourage the retention of water and sediment on the fields, especially during the dormant season when copper is known to enter the waterway. This coincides with the Coalition's Management Plan strategy outlined in the chlorpyrifos Source Identification and Outreach section above. Orchard and vineyard operators are advised to consider management practices to prevent copper from entering the waterway with runoff when applicable. Storm runoff management relevant to copper applications was recommended to reduce runoff and prevent winter exceedances. Individual contacts with growers within this subwatershed are described in the First Priority Subwatersheds Summary of Management Practices section of this report, as are discussions of copper exceedances and relevant management practices. Management practices recommended to prevent chlorpyrifos from entering the creek are also applicable in preventing offsite movement of copper. The Coalition believes that their outreach strategy and management practice implementation is responsible for the improvement in water quality since no additional copper exceedances occurred at Dry Creek @ Wellsford Rd since February 2008.

### Diuron

Diuron is a soluble herbicide applied in the Dry Creek subwatershed primarily in October through June. Between 2004 and 2011, the largest amount of diuron used was in 2006 (1,063 lbs AI) and the least amount used was in 2005 (233 lbs AI), see Table I-12. The month with the greatest amount AI applied varied over the years with the most applications occurring in January and November 2006, January 2007, November 2009, November and December 2010, and July 2011 (Table I-12, Figure I-4). The highest application rates and largest amount of diuron applied from 2005 through 2011 are associated with walnuts and grapes (including wine, Table I-13).

Two applications were associated with two storm exceedances in 2007. A third application occurred five weeks prior to the first exceedance and a fourth application occurred approximately seven weeks prior to the first exceedance. No exceedances of diuron have occurred since February 2007.

Core Monitoring took place at Dry Creek during 2009; diuron was not monitored as a part of 2009 MPM. Diuron was monitored during February 2010 MPM and monthly during 2011 Assessment Monitoring and was not detected. In 2011, a total of seven applications of diuron occurred in the Dry Creek subwatershed. Dry Creek @ Wellsford will return to Core Monitoring in 2012, and diuron MPM will occur during February 2012.

**Table I-12. Dry Creek @ Wellsford Rd site subwatershed diuron applications, lbs AI applied and acres treated by month (2005-2011).**

PUR data available through November 2011 for Stanislaus County. If month is not included in table, no applications were made.

| MONTH/YEAR               | NUMBER OF DIURON APPLICATIONS | POUNDS OF AI APPLIED | ACRES TREATED |
|--------------------------|-------------------------------|----------------------|---------------|
| January, 2005            | 2                             | 40.5                 | 42.0          |
| February, 2005           | 1                             | 9.8                  | 6.0           |
| March, 2005              | 1                             | 40.2                 | 25.8          |
| April, 2005              | 3                             | 72.4                 | 70.0          |
| June, 2005               | 1                             | 34.2                 | 17.5          |
| November, 2005           | 3                             | 36.1                 | 47.0          |
| January, 2006            | 2                             | 348.1                | 338.5         |
| February, 2006           | 3                             | 93.0                 | 38.0          |
| May, 2006                | 2                             | 41.8                 | 33.0          |
| June, 2006               | 1                             | 233.9                | 320.0         |
| November, 2006           | 4                             | 336.3                | 430.0         |
| December, 2006           | 1                             | 10.1                 | 7.0           |
| January, 2007            | 2                             | 220.4                | 156.0         |
| February, 2007           | 1                             | 29.3                 | 40.0          |
| August, 2007             | 2                             | 23.4                 | 41.0          |
| November, 2007           | 1                             | 215.6                | 275.0         |
| December, 2007           | 6                             | 128.1                | 409.0         |
| February, 2008           | 2                             | 9.0                  | 11.3          |
| March, 2008              | 1                             | 7.7                  | 24.0          |
| April, 2008              | 1                             | 58.5                 | 40.0          |
| July, 2008               | 4                             | 39.6                 | 39.0          |
| August, 2008             | 2                             | 28.4                 | 26.0          |
| October, 2008            | 2                             | 43.7                 | 142.5         |
| December, 2008           | 3                             | 111.5                | 303.0         |
| January, 2009            | 5                             | 24.0                 | 46.0          |
| February, 2009           | 1                             | 4.0                  | 5.0           |
| November, 2009           | 5                             | 237.8                | 795.0         |
| December, 2009           | 3                             | 143.6                | 489.0         |
| February, 2010           | 5                             | 68.4                 | 379.0         |
| July, 2010               | 1                             | 12.3                 | 12.3          |
| November, 2010           | 4                             | 314.7                | 825.0         |
| December, 2010           | 4                             | 292.3                | 554.0         |
| January, 2011            | 4                             | 41.2                 | 57.3          |
| February, 2011           | 1                             | 389.8                | 200.0         |
| July, 2011               | 2                             | 334.2                | 222.9         |
| <b>Summaries by Year</b> |                               |                      |               |
| 2005 Total               | 11                            | 233.1                | 208.3         |
| 2006 Total               | 13                            | 1063.2               | 1166.5        |
| 2007 Total               | 12                            | 616.8                | 921.0         |
| 2008 Total               | 15                            | 298.4                | 585.8         |
| 2009 Total               | 14                            | 409.4                | 1335.0        |
| 2010 Total               | 14                            | 687.6                | 1770.3        |
| 2011 Total               | 7                             | 765.2                | 480.3         |
| <b>Total</b>             | <b>86</b>                     | <b>4073.6</b>        | <b>6467.1</b> |



**Figure I-4. Dry Creek @ Wellsford Rd site subwatershed lbs diuron applied by month (2005-2011).**

Asterisk (\*) denotes months with exceedances. PUR data available through November 2011 for Stanislaus County.

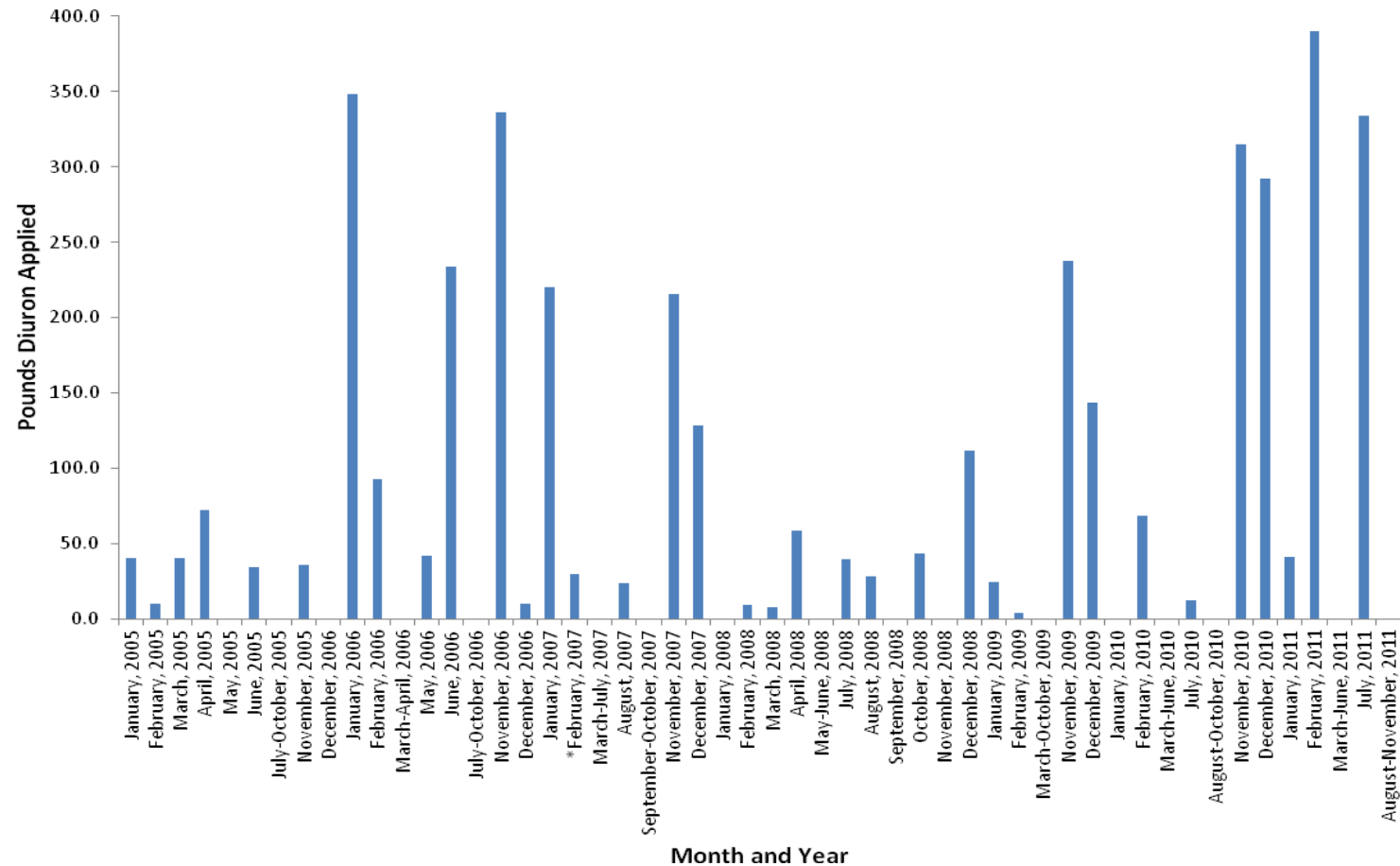


**Table I-13. Dry Creek @ Wellsford Rd site subwatershed diuron PUR data (2005-2011).**

PUR data available through November 2011 for Stanislaus County.

| CHEMICAL NAME                                           | COMMODITY                                 | PRODUCT NAME               | LBS AI APPLIED |
|---------------------------------------------------------|-------------------------------------------|----------------------------|----------------|
| DIURON                                                  | ALFALFA (FORAGE - FODDER) (ALFALFA HAY)   | DIREX 4L                   | 10.1           |
|                                                         | ALMOND                                    | DUPONT DIREX 4L HERBICIDE  | 2.6            |
|                                                         | GRAPES (WINE)                             | DIREX 4L                   | 371.5          |
|                                                         |                                           | DIURON 4L                  | 215.6          |
|                                                         |                                           | DIURON 4L HERBICIDE        | 320.2          |
|                                                         |                                           | DUPONT DIREX 4L HERBICIDE  | 843.2          |
|                                                         |                                           | PASTURES (ALL OR UNSPEC)   | DIREX 4L       |
|                                                         | UNCULTIVATED NON-AG AREAS (ALL OR UNSPEC) | DUPONT DIREX 4L HERBICIDE  | 4.0            |
|                                                         | WALNUT                                    | DIREX 4L                   | 1703.3         |
|                                                         |                                           | DIURON 4L HERBICIDE        | 47.1           |
|                                                         |                                           | DREXEL DIURON 4L HERBICIDE | 334.2          |
|                                                         |                                           | DUPONT DIREX 4L HERBICIDE  | 190.8          |
| ALFALFA -Total Pounds Diuron Applied                    |                                           |                            | 10.1           |
| ALMOND - Total Pounds Diuron Applied                    |                                           |                            | 2.6            |
| GRAPES - Total Pounds Diuron Applied                    |                                           |                            | 1750.5         |
| PASTURES - Total Pounds Diuron Applied                  |                                           |                            | 31.0           |
| UNCULTIVATED NON-AG AREAS - Total Pounds Diuron Applied |                                           |                            | 4.0            |
| WALNUT - Total Pounds Diuron Applied                    |                                           |                            | 2275.4         |
| Total Pounds Diuron Applied (2005-2011)                 |                                           |                            | 4073.6         |

The Coalition's Management Plan strategy for addressing diuron exceedances is to include diuron in discussions with individual growers. Improved and additional water management practices should reduce or eliminate diuron exceedances.

### *Priority D Constituents*

The priority D constituents in the Dry Creek @ Wellsford Rd subwatershed are water column toxicity to *S. capricornutum* and sediment toxicity to *H. azteca*.

#### ***S. capricornutum* toxicity**

*S. capricornutum* toxicity occurred once during the 2008 storm season and was associated with an exceedance of the copper WQTL. Copper exceedances and *S. capricornutum* toxicity can be closely tied as copper is used as an algaecide as well as a fungicide. Diuron can also adversely affect algae. *S. capricornutum* toxicity was monitored for but did not occur in 2011. Total and dissolved copper and diuron were also monitored in 2011 along with *S. capricornutum* toxicity and none of these constituents exceeded their WQTLs.

Since focused outreach began in 2009, *S. capricornutum* toxicity has not occurred at Dry Creek @ Wellsford Rd. The Coalition has discussed toxicity to *S. capricornutum* and associated pesticides during individual grower meetings, and has conducted outreach regarding the retention of storm water runoff. If the Coalition finds that diuron and copper exceedances are eliminated and *S. capricornutum* toxicity persists, then additional herbicides will be targeted for outreach and management. The Coalition will

conduct MPM in 2012 for *S. capricornutum* toxicity in order to demonstrate two consecutive years of monitoring with no toxicities.

#### ***H. azteca* toxicity**

As a result of *H. azteca* toxicities that occurred in March and August 2008, *H. azteca* was listed as a priority D constituent in the Dry Creek site subwatershed. In September 2011 during Assessment Monitoring/MPM, an additional *H. azteca* toxicity occurred. In 2010, the Coalition began analyzing for pyrethroids and chlorpyrifos in toxic sediment samples with 80% or less survival compared to the control. The chemistry analysis of the sediment samples collected from Dry Creek @ Wellsford Rd on September 6, 2011 indicated the samples contained sediment bound bifenthrin and chlorpyrifos. Pyrethroids have a high sorption rate to sediment particles and can be carried with suspended particles in storm water runoff and irrigation tailwater to waterways. The Coalition believes that addressing storm water and irrigation tailwater management, movement of pyrethroids to waterways will also be addressed.

#### ***Priority E Constituents***

The priority E constituents are listed under the Dry Creek @ Wellsford Rd subwatershed management plan are DO, *E. coli*, pH, SC, and TDS.

Total Dissolved Solids was added to the Dry Creek @ Wellsford Rd management plan in 2011, due to a single exceedance in January 2011. Although DO, *E. coli*, pH, SC and TDS remain low priority, the Coalition will continue to collect priority E constituent monitoring data as a part of Core, and/or Assessment Monitoring. Dry Creek @ Wellsford Rd is scheduled for Core Monitoring in 2012. The priority E constituents were discussed during individual contacts and at annual grower meetings. In addition, the Coalition plans to participate in a focus group along with other Coalitions and Regional Board staff to develop a joint Work Plan to address *E. coli* exceedances by determining the potential agricultural sources of *E. coli* and identifying management practices to prevent discharges to surface waters.

#### ***Evaluation***

This subwatershed is one of the first three priority site subwatersheds within the ESJWQC. Therefore, the Coalition focused its resources on identifying sources of agricultural discharge within this subwatershed that could result in water quality impairments by extending outreach to individual Coalition members, and setting evaluation goals based on the effectiveness of management practices (by considering changes in water quality over time).

The Coalition's strategy for the Dry Creek subwatershed is to target growers with crops located adjacent to the waterway and whose agricultural practices may result in the discharge or drift of pesticides into the creek. Outreach includes grower notification of exceedances and the need for meetings, outreach and education regarding management practices, tracking of the implementation of management practices, and providing information to growers on studies of the efficacy of those management

practices. The Coalition believes that because land use near the creek is predominately orchards and vineyards, outreach aimed toward orchard and vineyard management practices will target the appropriate audience and result in the greatest improvement of water quality.

Individual grower surveys documenting current management practices and follow up contacts assessing planned implementation strategies were completed and returned for 100% of the targeted growers. The Summary of Implemented Management Practice section of this report summarizes the results of these surveys.

Both the overall acres treated and pounds of chlorpyrifos applied decreased since 2005, which may be a result of many factors including educating growers about alternative products. Usage of chlorpyrifos has decreased in the months of July and August, when the largest number of exceedances have occurred historically. Despite this, chlorpyrifos last exceeded the WQTL in Dry Creek in July 2010. The exceedance was traced to a new member who joined the Coalition in 2010. The grower was contacted and implemented a micro-irrigation system over 68 acres. Since the management practice implementation, no additional chlorpyrifos exceedances have occurred.

During 2012, Dry Creek @ Wellsford Rd is scheduled for Core Monitoring and MPM will continue to take place during months of past exceedances. The Coalition believes continued MPM will provide the data needed to assess if additional funding and implemented management practices are improving water quality.

Although chlorpyrifos remains a high priority constituent in the Dry Creek @ Wellsford management plan, copper, diuron and SC have seen zero exceedances for two or more consecutive years of monitoring in months of past exceedances. Additionally, there has been no toxicity to *S. capricornutum* for two consecutive years of monitoring in months of past exceedances. A letter was submitted to the Regional Board on January 6, 2012 petitioning to remove these constituents from the Dry Creek @ Wellsford management plan. Until the letter is approved, the constituents will continue to be monitored as scheduled.

## II. DUCK SLOUGH @ HWY 99

### Management Plan Constituents

#### Priority A/B

- Chlorpyrifos

#### Priority C

- Copper

#### Priority D

- *Selenastrum capricornutum* water column toxicity

#### Priority E

- Dissolved Oxygen
- *E. coli*
- pH
- Lead

### Description of Duck Slough @ Hwy 99 Site Subwatershed

Duck Slough @ Hwy 99 (10,149 irrigated acres) – This site subwatershed is located upstream of the Duck Slough @ Gurr Road site and was selected to determine the relative contribution of water quality impairments from the upstream portion of the Duck Slough subwatershed to the overall waterway. Duck Slough originates in the Sierra foothills and flows west eventually joining with Deadman Creek in the western portion of the Coalition region. The monitoring site is located just east of Highway 99, south of Planada and Merced (Table II-1). This site subwatershed includes an upstream location (Duck Slough @ Whealan Rd) which was sampled in 2008. Irrigated agriculture in this site subwatershed is primarily deciduous nuts with some truck crops, field crops, and irrigated pasture (Figure II-1).

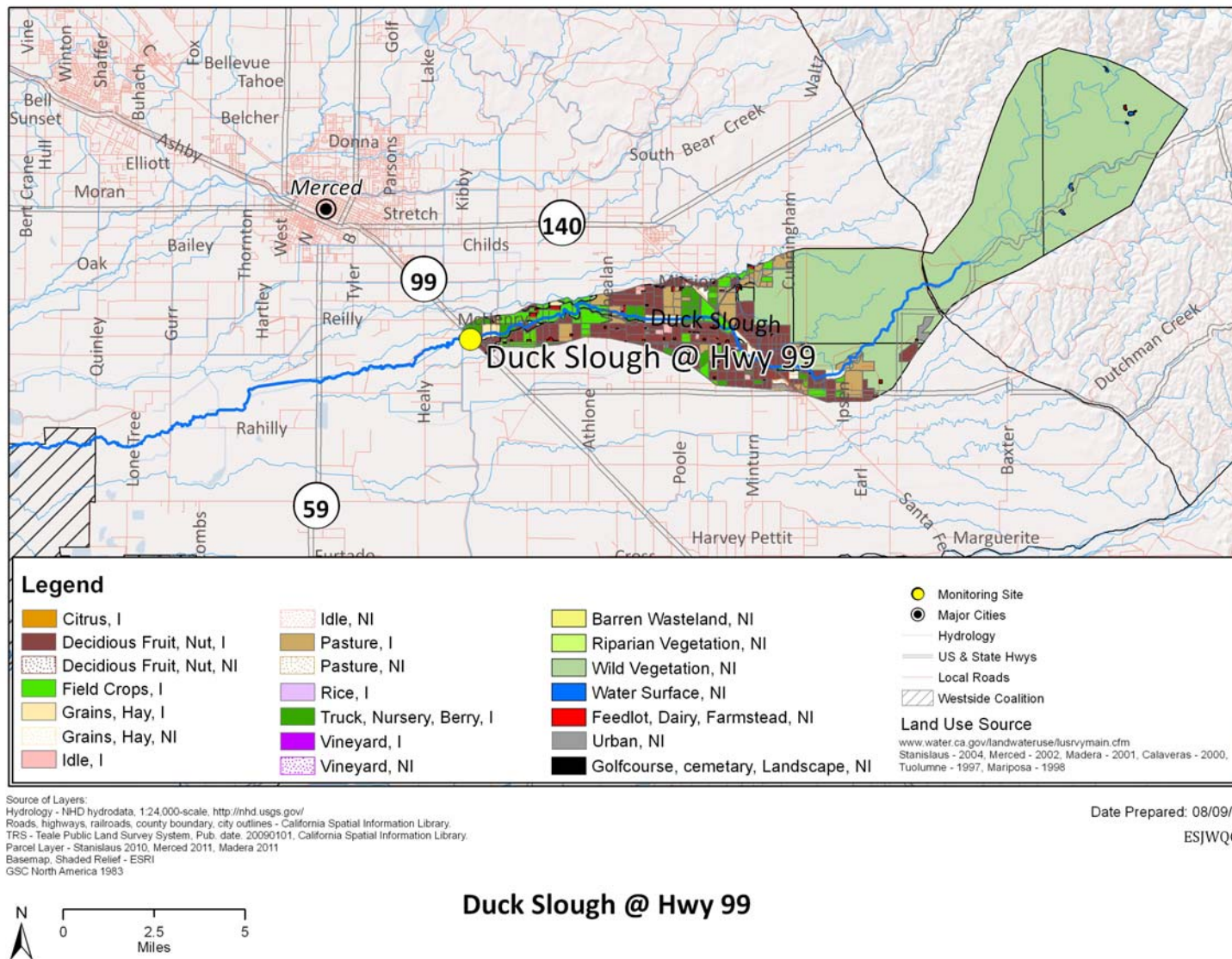
**Table II-1. Duck Slough @ Hwy 99 site subwatershed sampling locations coordinates.**

| SITE NAME                             | STATION CODE | TARGET LATITUDE | TARGET LONGITUDE |
|---------------------------------------|--------------|-----------------|------------------|
| Duck Slough @ Hwy 99*                 | 535XDSAHN    | 37.2502         | -120.4100        |
| Duck Slough @ Whealan Rd <sup>U</sup> | 535XDSAWH    | 37.2615         | -120.3433        |

<sup>U</sup> Upstream sites

\*Original ESJWQC sampling site

Figure II-1. Duck Slough @ Hwy 99 site subwatershed land use map.



Date Prepared: 08/09/11

ESJWQC

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### Subwatershed Monitoring History

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Monitoring at Duck Slough was initiated in the storm season of 2005 at Duck Slough @ Highway 99 and continued throughout the storm and irrigation seasons from 2006 through 2008 (Table II-2). Duck Slough @ Hwy 99's upstream site, Duck Slough @ Whealan Rd, was sampled during the 2008 irrigation season. Starting in October 2008, Duck Slough @ Hwy 99 was removed from the monitoring schedule except for MPM events which occurred during the irrigation season of 2009 and 2010 and the storm and irrigation seasons of 2011. The constituents sampled at this location from 2005 through 2011 are listed in Table II-3. Assessment Monitoring is scheduled to occur at the site during the 2013 through 2014 sampling years.

Beginning as early as May 2012, sampling access to Duck Slough @ Hwy 99 will be blocked by construction crews while Highway 99 is expanded, samples from the site will no longer be representative of agricultural irrigation due to runoff from construction, and once the highway expansion is complete the current sampling location will no longer exist. The Coalition is in the process of drafting a letter to the Regional Board requesting that Duck Slough @ Hwy 99 be dropped from the Coalition's monitoring program. All Duck Slough @ Hwy 99 MPM will occur at the downstream location, Duck Slough @ Gurr Rd, once the Duck Slough @ Hwy 99 location removal is approved.

Management Plan Monitoring occurred at Duck Slough @ Hwy 99 in 2007 through 2011 for copper and chlorpyrifos. Water column toxicity MPM for *S. capricornutum* was added in 2009 (April and July), and lead MPM (April-September) began in 2011 (Table II-4).

Duck Slough is currently on California's 2008-2010 303d List of Impaired Waterbodies for chlorpyrifos, *E. coli*, sediment toxicity and unknown water column toxicity.



**Table II-2. Duck Slough @ Hwy 99 site subwatershed sampling events per season and year (including MPM).**

| YEAR | SEASON     | EVENTS SAMPLED | EVENTS NOT SAMPLED <sup>1</sup> | TOTAL |
|------|------------|----------------|---------------------------------|-------|
| 2004 | Irrigation | NA             | NA                              | NA    |
| 2005 | Storm      | 2              | 0                               | 2     |
|      | Irrigation | 5              | 0                               | 5     |
| 2006 | Storm      | 2              | 0                               | 2     |
|      | Irrigation | 5              | 0                               | 5     |
| 2007 | Storm      | 2              | 0                               | 2     |
|      | Irrigation | 9              | 0                               | 9     |
| 2008 | Storm      | 2              | 0                               | 2     |
|      | Irrigation | 6              | 0                               | 6     |
|      | Fall       | NA             | NA                              | NA    |
| 2009 | Winter     | NA             | NA                              | NA    |
|      | Storm      | NA             | NA                              | NA    |
|      | Irrigation | 6              | 0                               | 6     |
|      | Fall       | NA             | NA                              | NA    |
| 2010 | Winter     | NA             | NA                              | NA    |
|      | Storm      | 1              | 0                               | 1     |
|      | Irrigation | 5              | 0                               | 5     |
|      | Fall       | NA             | NA                              | NA    |
| 2011 | Winter     | NA             | NA                              | NA    |
|      | Storm      | 1              | 0                               | 1     |
|      | Irrigation | 6              | 0                               | 6     |
|      | Fall       | NA             | NA                              | NA    |

<sup>1</sup>If an event was not sampled during scheduled monitoring, the site was dry.

NA - Not applicable. This site was not scheduled for sampling during this season/year.



**Table II-3. Duck Slough @ Hwy 99 site subwatershed analyses per sampling season and year.**

Only environmental samples with a sample replicate and lab replicate number of one are shown.

| METHOD                        | ANALYTE               | 2005  |            | 2006  |            | 2007  |            | 2008  |            |        | 2009    |        |            |        | 2010    |       |            | 2011   |         |       |            |
|-------------------------------|-----------------------|-------|------------|-------|------------|-------|------------|-------|------------|--------|---------|--------|------------|--------|---------|-------|------------|--------|---------|-------|------------|
|                               |                       | STORM | IRRIGATION | STORM | IRRIGATION | STORM | IRRIGATION | STORM | IRRIGATION | FALL * | WINTER* | STORM* | IRRIGATION | FALL * | WINTER* | STORM | IRRIGATION | FALL * | WINTER* | STORM | IRRIGATION |
| Field and Physical Parameters |                       |       |            |       |            |       |            |       |            |        |         |        |            |        |         |       |            |        |         |       |            |
| EPA 110.2                     | Color                 | 2     | 5          | 2     | 5          | 2     | 6          | 2     | 6          |        |         |        |            |        |         |       |            |        |         |       |            |
| EPA 160.1                     | Dissolved Solids      | 2     | 5          | 2     | 5          | 2     | 6          | 2     | 6          |        |         |        |            |        |         |       |            |        |         |       |            |
| EPA 180.1                     | Turbidity             | 2     | 5          | 2     | 5          | 2     | 6          | 2     | 6          |        |         |        |            |        |         |       |            |        |         |       |            |
| EPA 405.1                     | BOD                   |       |            |       | 1          | 2     | 2          |       |            |        |         |        |            |        |         |       |            |        |         |       |            |
| EPA 415.1                     | Total Organic Carbon  | 2     | 5          | 2     | 5          | 2     | 6          | 2     | 6          |        |         |        |            |        |         |       |            |        |         |       |            |
| SM 9223 B                     | <i>E. coli</i>        | 2     | 5          | 2     | 5          | 2     | 6          | 2     | 6          |        |         |        |            |        |         |       |            |        |         |       |            |
| NA                            | Dissolved Oxygen      | 2     | 6          | 3     | 6          | 3     | 10         | 3     | 7          |        |         |        | 6          |        |         | 1     | 5          |        |         | 1     | 6          |
| NA                            | Specific Conductivity | 2     | 6          | 3     | 6          | 3     | 10         | 3     | 7          |        |         |        | 6          |        |         | 1     | 5          |        |         | 1     | 6          |
| NA                            | pH                    | 2     | 6          | 3     | 6          | 3     | 10         | 3     | 7          |        |         |        | 6          |        |         | 1     | 5          |        |         | 1     | 6          |
| Carbamates                    |                       |       |            |       |            |       |            |       |            |        |         |        |            |        |         |       |            |        |         |       |            |
| EPA 8321A                     | Aldicarb              |       |            |       | 5          | 2     | 6          | 2     | 6          |        |         |        |            |        |         |       |            |        |         |       |            |
| EPA 8321A                     | Carbaryl              |       |            |       | 5          | 2     | 6          | 2     | 6          |        |         |        |            |        |         |       |            |        |         |       |            |
| EPA 8321A                     | Carbofuran            |       |            |       | 5          | 2     | 6          | 2     | 6          |        |         |        |            |        |         |       |            |        |         |       |            |
| EPA 8321A                     | Diuron                |       |            |       | 5          | 2     | 6          | 2     | 6          |        |         |        |            |        |         |       |            |        |         |       |            |
| EPA 8321A                     | Linuron               |       |            |       | 5          | 2     | 6          | 2     | 6          |        |         |        |            |        |         |       |            |        |         |       |            |
| EPA 8321A                     | Methiocarb            |       |            |       | 5          | 2     | 6          | 2     | 6          |        |         |        |            |        |         |       |            |        |         |       |            |
| EPA 8321A                     | Methomyl              |       |            |       | 5          | 2     | 6          | 2     | 6          |        |         |        |            |        |         |       |            |        |         |       |            |
| EPA 8321A                     | Oxamyl                |       |            |       | 5          | 2     | 6          | 2     | 6          |        |         |        |            |        |         |       |            |        |         |       |            |
| Organochlorines               |                       |       |            |       |            |       |            |       |            |        |         |        |            |        |         |       |            |        |         |       |            |
| EPA 8081A                     | DDD(p,p')             |       |            |       | 5          | 2     | 6          | 2     | 6          |        |         |        |            |        |         |       |            |        |         |       |            |
| EPA 8081A                     | DDE(p,p')             |       |            |       | 5          | 2     | 6          | 2     | 6          |        |         |        |            |        |         |       |            |        |         |       |            |
| EPA 8081A                     | DDT(p,p')             |       |            |       | 5          | 2     | 6          | 2     | 6          |        |         |        |            |        |         |       |            |        |         |       |            |
| EPA 8081A                     | Dicofol               |       |            |       | 5          | 2     | 6          | 2     | 6          |        |         |        |            |        |         |       |            |        |         |       |            |
| EPA 8081A                     | Dieldrin              |       |            |       | 5          | 2     | 6          | 2     | 6          |        |         |        |            |        |         |       |            |        |         |       |            |
| EPA 8081A                     | Endrin                |       |            |       | 5          | 2     | 6          | 2     | 6          |        |         |        |            |        |         |       |            |        |         |       |            |
| EPA 8081A                     | Methoxychlor          |       |            |       | 5          | 2     | 6          | 2     | 6          |        |         |        |            |        |         |       |            |        |         |       |            |
| Organophosphates              |                       |       |            |       |            |       |            |       |            |        |         |        |            |        |         |       |            |        |         |       |            |
| EPA 8141A                     | Azinphos methyl       |       |            |       | 5          | 2     | 7          | 2     | 6          |        |         |        |            |        |         |       |            |        |         |       |            |

| METHOD         | ANALYTE                              | 2005  |            | 2006  |            | 2007  |            | 2008  |            |       | 2009    |        |            |       | 2010    |       |            |       | 2011    |       |            |       |
|----------------|--------------------------------------|-------|------------|-------|------------|-------|------------|-------|------------|-------|---------|--------|------------|-------|---------|-------|------------|-------|---------|-------|------------|-------|
|                |                                      | STORM | IRRIGATION | STORM | IRRIGATION | STORM | IRRIGATION | STORM | IRRIGATION | FALL* | WINTER* | STORM* | IRRIGATION | FALL* | WINTER* | STORM | IRRIGATION | FALL* | WINTER* | STORM | IRRIGATION | FALL* |
| EPA 8141A      | Chlorpyrifos                         | 2     | 5          | 2     | 5          | 2     | 7          | 2     | 6          |       |         |        | 3          |       |         |       | 3          |       |         |       | 3          |       |
| EPA 8141A      | Diazinon                             | 2     | 5          | 2     | 5          | 2     | 7          | 2     | 6          |       |         |        |            |       |         |       |            |       |         |       |            |       |
| EPA 8141A      | Dimethoate                           |       |            |       | 5          | 2     | 7          | 2     | 6          |       |         |        |            |       |         |       |            |       |         |       |            |       |
| EPA 8141A      | Disulfoton                           |       |            |       | 5          | 2     | 7          | 2     | 6          |       |         |        |            |       |         |       |            |       |         |       |            |       |
| EPA 8141A      | Malathion                            |       |            |       | 5          | 2     | 7          | 2     | 6          |       |         |        |            |       |         |       |            |       |         |       |            |       |
| EPA 8141A      | Methamidophos                        |       |            |       | 5          | 2     | 6          | 2     | 6          |       |         |        |            |       |         |       |            |       |         |       |            |       |
| EPA 8141A      | Methidathion                         |       |            |       | 5          | 2     | 7          | 2     | 6          |       |         |        |            |       |         |       |            |       |         |       |            |       |
| EPA 8141A      | Molinate                             |       |            |       | 5          | 2     | 7          | 2     | 6          |       |         |        |            |       |         |       |            |       |         |       |            |       |
| EPA 8141A      | Parathion, Methyl                    |       |            |       | 5          | 2     | 7          | 2     | 6          |       |         |        |            |       |         |       |            |       |         |       |            |       |
| EPA 8141A      | Phorate                              |       |            |       | 5          | 2     | 7          | 2     | 6          |       |         |        |            |       |         |       |            |       |         |       |            |       |
| EPA 8141A      | Phosmet                              |       |            |       | 5          | 2     | 7          | 2     | 6          |       |         |        |            |       |         |       |            |       |         |       |            |       |
| EPA 8141A      | Thiobencarb                          |       |            |       | 5          | 2     | 7          | 2     | 6          |       |         |        |            |       |         |       |            |       |         |       |            |       |
| Pyrethroids    |                                      |       |            |       |            |       |            |       |            |       |         |        |            |       |         |       |            |       |         |       |            |       |
| EPA 8081A      | Bifenthrin                           |       |            | 2     | 5          | 2     | 6          |       |            |       |         |        |            |       |         |       |            |       |         |       |            |       |
| EPA 8081A      | Cyfluthrin, total                    |       |            | 2     | 5          | 2     | 6          |       |            |       |         |        |            |       |         |       |            |       |         |       |            |       |
| EPA 8081A      | Cyhalothrin, lambda, total           | 2     | 5          | 2     | 5          | 2     | 6          |       |            |       |         |        |            |       |         |       |            |       |         |       |            |       |
| EPA 8081A      | Cypermethrin, total                  | 2     | 5          | 2     | 5          | 2     | 6          |       |            |       |         |        |            |       |         |       |            |       |         |       |            |       |
| EPA 8081A      | Esfenvalerate/<br>Fenvalerate, total | 2     | 5          | 2     | 5          | 2     | 6          |       |            |       |         |        |            |       |         |       |            |       |         |       |            |       |
| EPA 8081A      | Permethrin, total                    | 2     | 5          | 2     | 5          | 2     | 6          |       |            |       |         |        |            |       |         |       |            |       |         |       |            |       |
| Triazines      |                                      |       |            |       |            |       |            |       |            |       |         |        |            |       |         |       |            |       |         |       |            |       |
| EPA 547M       | Glyphosate                           |       |            |       | 5          | 2     | 6          | 2     | 6          |       |         |        |            |       |         |       |            |       |         |       |            |       |
| EPA 549.2M     | Paraquat dichloride                  |       |            |       | 5          | 2     | 6          | 2     | 6          |       |         |        |            |       |         |       |            |       |         |       |            |       |
| EPA 619        | Atrazine                             |       |            |       | 5          | 2     | 6          | 2     | 6          |       |         |        |            |       |         |       |            |       |         |       |            |       |
| EPA 619        | Cyanazine                            |       |            |       | 5          | 2     | 6          | 2     | 6          |       |         |        |            |       |         |       |            |       |         |       |            |       |
| EPA 619        | Simazine                             |       |            |       | 5          | 2     | 6          | 2     | 6          |       |         |        |            |       |         |       |            |       |         |       |            |       |
| Metals (Total) |                                      |       |            |       |            |       |            |       |            |       |         |        |            |       |         |       |            |       |         |       |            |       |
| EPA 200.8      | Arsenic                              |       |            |       | 5          | 2     | 6          | 2     | 6          |       |         |        |            |       |         |       |            |       |         |       |            |       |
| EPA 200.8      | Boron                                |       |            |       | 5          | 2     | 6          | 2     | 6          |       |         |        |            |       |         |       |            |       |         |       |            |       |
| EPA 200.8      | Cadmium                              |       |            |       | 5          | 2     | 6          | 2     | 6          |       |         |        |            |       |         |       |            |       |         |       |            |       |
| EPA 200.8      | Copper                               |       |            |       | 5          | 2     | 8          | 2     | 6          |       |         |        | 4          |       |         | 1     | 4          |       |         | 1     | 5          |       |

| METHOD             | ANALYTE                          | 2005  |            | 2006  |            | 2007  |            | 2008  |            |       | 2009    |        |            |       | 2010    |       |            |       | 2011    |       |            |       |  |
|--------------------|----------------------------------|-------|------------|-------|------------|-------|------------|-------|------------|-------|---------|--------|------------|-------|---------|-------|------------|-------|---------|-------|------------|-------|--|
|                    |                                  | STORM | IRRIGATION | STORM | IRRIGATION | STORM | IRRIGATION | STORM | IRRIGATION | FALL* | WINTER* | STORM* | IRRIGATION | FALL* | WINTER* | STORM | IRRIGATION | FALL* | WINTER* | STORM | IRRIGATION | FALL* |  |
| EPA 200.8          | Lead                             |       |            |       | 5          | 2     | 6          | 2     | 6          |       |         |        |            |       |         |       |            |       |         |       |            | 6     |  |
| EPA 200.8          | Molybdenum                       |       |            |       |            |       |            |       |            |       |         |        |            |       |         |       |            |       |         |       |            |       |  |
| EPA 200.8          | Nickel                           |       |            |       | 5          | 2     | 6          | 2     | 6          |       |         |        |            |       |         |       |            |       |         |       |            |       |  |
| EPA 200.8          | Selenium                         |       |            |       | 5          | 2     | 2          | 2     | 6          |       |         |        |            |       |         |       |            |       |         |       |            |       |  |
| EPA 200.8          | Zinc                             |       |            |       | 5          | 2     | 6          | 2     | 6          |       |         |        |            |       |         |       |            |       |         |       |            |       |  |
| Metals (Dissolved) |                                  |       |            |       |            |       |            |       |            |       |         |        |            |       |         |       |            |       |         |       |            |       |  |
| EPA 200.8          | Cadmium                          |       |            |       |            |       |            |       |            |       |         |        |            |       |         |       |            |       |         |       |            |       |  |
| EPA 200.8          | Copper                           |       |            |       |            |       |            |       |            |       |         |        | 4          |       |         | 1     | 4          |       |         | 1     | 5          |       |  |
| EPA 200.8          | Lead                             |       |            |       |            |       |            |       |            |       |         |        |            |       |         |       |            |       |         |       | 6          |       |  |
| EPA 200.8          | Nickel                           |       |            |       |            |       |            |       |            |       |         |        |            |       |         |       |            |       |         |       |            |       |  |
| EPA 200.8          | Zinc                             |       |            |       |            |       |            |       |            |       |         |        |            |       |         |       |            |       |         |       |            |       |  |
| Nutrients          |                                  |       |            |       |            |       |            |       |            |       |         |        |            |       |         |       |            |       |         |       |            |       |  |
| SM 2340 C          | Hardness as CaCO3                |       |            |       | 5          | 2     | 8          | 2     | 6          |       |         |        | 4          |       |         | 1     | 4          |       |         | 1     | 6          |       |  |
| EPA 300.0          | Nitrate as N                     |       |            |       | 5          | 2     | 6          | 2     | 6          |       |         |        |            |       |         |       |            |       |         |       |            |       |  |
| EPA 350.2          | Ammonia as N                     |       |            |       | 5          | 2     | 6          | 2     | 6          |       |         |        |            |       |         |       |            |       |         |       |            |       |  |
| EPA 351.3          | Nitrogen, Total Kjeldahl         |       |            |       | 5          | 2     | 6          | 2     | 6          |       |         |        |            |       |         |       |            |       |         |       |            |       |  |
| EPA 354.1          | Nitrite as N                     |       |            |       | 5          | 2     | 6          | 2     | 6          |       |         |        |            |       |         |       |            |       |         |       |            |       |  |
| EPA 353.2          | Nitrate + Nitrite as N           |       |            |       |            |       |            |       |            |       |         |        |            |       |         |       |            |       |         |       |            |       |  |
| EPA 365.2          | OrthoPhosphate as P              |       |            |       | 5          | 2     | 6          | 2     | 6          |       |         |        |            |       |         |       |            |       |         |       |            |       |  |
| EPA 365.2          | Phosphate as P                   |       |            |       | 5          | 2     | 6          | 2     | 6          |       |         |        |            |       |         |       |            |       |         |       |            |       |  |
| Toxicity           |                                  |       |            |       |            |       |            |       |            |       |         |        |            |       |         |       |            |       |         |       |            |       |  |
| EPA 821/R-02-012   | <i>Ceriodaphnia dubia</i>        | 2     | 5          | 2     | 6          | 2     | 7          | 2     | 6          |       |         |        |            |       |         |       |            |       |         |       |            |       |  |
| EPA 821/R-02-012   | <i>Pimephales promelas</i>       | 2     | 5          | 2     | 5          | 2     | 7          | 2     | 6          |       |         |        |            |       |         |       |            |       |         |       |            |       |  |
| EPA 821/R-02-013   | <i>Selenastrum capricornutum</i> | 2     | 7          | 2     | 5          | 2     | 7          | 2     | 7          |       |         |        | 1          |       |         | 1     | 1          |       |         |       | 2          |       |  |
| EPA 600/R-99-064   | <i>Hyalella azteca</i>           |       |            | 1     | 1          | 1     | 1          | 1     | 2          |       |         |        |            |       |         |       |            |       |         |       |            |       |  |

\*Site not sampled during the 2008 fall, 2009 winter, storm and fall seasons, 2010 winter and fall seasons, and 2011 winter and fall seasons.

**Table II-4. Duck Slough @ Hwy 99 site subwatershed Management Plan Monitoring Schedule (2007-2011).**

Upstream locations included.

| SITE NAME                | SAMPLE DATE | MONITORING TYPE | COPPER | LEAD | CHLORPYRIFOS | S. CAPRICORNUTUM |
|--------------------------|-------------|-----------------|--------|------|--------------|------------------|
| Duck Slough @ Hwy 99     | 24-Jul-07   | A               |        |      | X            |                  |
| Duck Slough @ Hwy 99     | 21-Aug-07   | A               | X      |      |              |                  |
| Duck Slough @ Hwy 99     | 18-Sep-07   | A               | X      |      |              |                  |
| Duck Slough @ Whealan Rd | 29-Apr-08   | U               | X      |      |              |                  |
| Duck Slough @ Whealan Rd | 27-May-08   | U               |        |      | X            |                  |
| Duck Slough @ Whealan Rd | 24-Jun-08   | U               | X      |      |              |                  |
| Duck Slough @ Whealan Rd | 29-Jul-08   | U               | X      |      | X            |                  |
| Duck Slough @ Whealan Rd | 26-Aug-08   | U               | X      |      |              |                  |
| Duck Slough @ Whealan Rd | 30-Sep-08   | U               | X      |      |              |                  |
| Duck Slough @ Hwy 99     | 21-Apr-09   | MPM             |        |      |              | X                |
| Duck Slough @ Hwy 99     | 19-May-09   | MPM             |        |      | X            |                  |
| Duck Slough @ Hwy 99     | 16-Jun-09   | MPM             | X      |      |              |                  |
| Duck Slough @ Hwy 99     | 21-Jul-09   | MPM             | X      |      | X            |                  |
| Duck Slough @ Hwy 99     | 18-Aug-09   | MPM             | X      |      |              |                  |
| Duck Slough @ Hwy 99     | 22-Sep-09   | MPM             | X      |      | X            |                  |
| Duck Slough @ Hwy 99     | 20-Apr-10   | MPM             | X      |      |              | X                |
| Duck Slough @ Hwy 99     | 18-May-10   | MPM             |        |      | X            |                  |
| Duck Slough @ Hwy 99     | 15-Jun-10   | MPM             | X      |      |              |                  |
| Duck Slough @ Hwy 99     | 20-Jul-10   | MPM             | X      |      | X            | X                |
| Duck Slough @ Hwy 99     | 17-Aug-10   | MPM             | X      |      |              |                  |
| Duck Slough @ Hwy 99     | 14-Sept-10  | MPM             | X      |      | X            |                  |
| Duck Slough @ Hwy 99     | 17-Feb-11   | MPM             | X      |      |              |                  |
| Duck Slough @ Hwy 99     | 19-Apr-11   | MPM             | X      | X    |              | X                |
| Duck Slough @ Hwy 99     | 17-May-11   | MPM             |        | X    | X            |                  |
| Duck Slough @ Hwy 99     | 21-Jun-11   | MPM             | X      | X    |              |                  |
| Duck Slough @ Hwy 99     | 19-Jul-11   | MPM             | X      | X    | X            | X                |
| Duck Slough @ Hwy 99     | 16-Aug-11   | MPM             | X      | X    |              |                  |
| Duck Slough @ Hwy 99     | 13-Sept-11  | MPM             | X      | X    | X            |                  |

A – Additional sampling

U – Upstream sampling

X – Constituent sampled for Management Plan Monitoring (MPM)

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### Exceedance History

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Samples collected from Duck Slough @ Hwy 99 from 2005 through 2011 exceeded the WQTLs for field parameters, *E. coli*, metals, and chlorpyrifos, as well as water column and sediment toxicity (Table II-5). Table II-5 includes exceedances in this subwatershed (including upstream sampling at Duck Slough @ Whealan Rd), of DO (2), pH (3), *E. coli* (12), chlorpyrifos (4), copper (14), lead (11), toxicity to *C. dubia* (1), *S. capricornutum* (3) and *H. azteca* sediment (2). However, sediment toxicity to *H. azteca* is not prioritized because both toxic samples were from the same sampling event (sample and resample to test for persistence).

No exceedances of the chlorpyrifos or copper WQTL occurred at Duck Slough @ Hwy 99 during MPM in 2011.

All exceedances are listed in Table II-5 by season and date and are based on WQTLs listed in the introduction to the ESJWQC Management Plan. The highest priority constituents in the Duck Slough @ Hwy 99 subwatershed are chlorpyrifos (A/B), copper (C), and toxicity to *S. capricornutum* (D).

**Table II-5. Duck Slough @ Hwy 99 site subwatershed exceedances (2005-2011).**

The WQTL used to evaluate the data are listed in the header after the analyte. Upstream site is italicized.

| SITE NAME            | SEASON     | SAMPLE DATE | OXYGEN, DISSOLVED, <7 mg/L | PH, <6.5 AND >8.5 UNITS | E. COLI, > 235 MPN/100 mL | COPPER, TOTAL <sup>1</sup> , > 1,300 µg/L | LEAD, TOTAL <sup>1</sup> , > 15 µg/L | CHLORPYRIFOS, > 0.015 µg/L | C. DUBIA, (% CONTROL) | S. CAPRICORNUTUM, (% CONTROL) | H. AZTECA, (% CONTROL) |
|----------------------|------------|-------------|----------------------------|-------------------------|---------------------------|-------------------------------------------|--------------------------------------|----------------------------|-----------------------|-------------------------------|------------------------|
| Duck Slough @ Hwy 99 | Storm      | 3/21/2005   |                            |                         | 1600                      |                                           |                                      |                            |                       |                               |                        |
| Duck Slough @ Hwy 99 | Irrigation | 5/10/2005   |                            |                         | 1600                      |                                           |                                      |                            |                       |                               |                        |
| Duck Slough @ Hwy 99 | Irrigation | 7/12/2005   |                            |                         |                           |                                           |                                      | 0.026                      |                       | 77                            |                        |
| Duck Slough @ Hwy 99 | Storm      | 3/15/2006   |                            |                         | 900                       |                                           |                                      |                            |                       |                               |                        |
| Duck Slough @ Hwy 99 | Irrigation | 5/17/2006   |                            | 8.57                    | 280                       |                                           | 5.2 (3.02)                           | 0.27                       | 0                     |                               |                        |
| Duck Slough @ Hwy 99 | Irrigation | 6/14/2006   |                            |                         | 260                       |                                           |                                      |                            |                       |                               |                        |
| Duck Slough @ Hwy 99 | Irrigation | 8/8/2006    |                            |                         |                           | 3.4 (2.4)                                 | 2.3 (0.41)                           |                            |                       |                               |                        |
| Duck Slough @ Hwy 99 | Irrigation | 9/13/2006   | 6.72                       |                         | 340                       | 19 (5.0)                                  | 24 (1.25)                            |                            |                       |                               |                        |
| Duck Slough @ Hwy 99 | Storm      | 2/12/2007   |                            |                         | 2400                      | 31 (10.1)                                 | 15 (3.59)                            |                            |                       |                               |                        |
| Duck Slough @ Hwy 99 | Storm      | 2/28/2007   |                            |                         | 2400                      |                                           |                                      |                            |                       |                               |                        |
| Duck Slough @ Hwy 99 | Irrigation | 4/24/2007   |                            |                         |                           | 4.1 (3.7)                                 | 1.5 (0.81)                           |                            |                       |                               |                        |
| Duck Slough @ Hwy 99 | Irrigation | 6/26/2007   |                            |                         |                           | 3.0 (2.4)                                 | 0.68 (0.41)                          |                            |                       |                               |                        |
| Duck Slough @ Hwy 99 | Irrigation | 7/24/2007   |                            |                         |                           | 3.5 (3.0)                                 | 0.64 (0.57)                          |                            |                       |                               |                        |
| Duck Slough @ Hwy 99 | Irrigation | 7/31/2007   |                            | 8.8                     |                           |                                           |                                      | 0.042                      |                       |                               |                        |
| Duck Slough @ Hwy 99 | Irrigation | 8/21/2007   |                            |                         |                           | 5.5 (3.3)                                 | 1.1 (0.69)                           |                            |                       |                               |                        |
| Duck Slough @ Hwy 99 | Irrigation | 8/28/2007   |                            |                         |                           | 3.1 (2.4)                                 |                                      |                            |                       |                               |                        |
| Duck Slough @ Hwy 99 | Irrigation | 9/18/2007   |                            |                         | 610                       | 6.9 (2.8)                                 | 1.8 (0.52)                           |                            |                       |                               |                        |
| Duck Slough @ Hwy 99 | Storm      | 1/25/2008   |                            |                         | >2400                     |                                           |                                      |                            |                       |                               |                        |
| Duck Slough @ Hwy 99 | Storm      | 2/25/2008   |                            |                         | >2400                     | 9.9 (8.0)                                 |                                      |                            |                       |                               |                        |

| SITE NAME                       | SEASON            | SAMPLE DATE      | OXYGEN, DISSOLVED, <7 MG/L | pH, <6.5 AND >8.5 UNITS | E. COLI, > 235 MPN/100 ML | COPPER, TOTAL <sup>1</sup> , > 1,300 µG/L | LEAD, TOTAL <sup>1</sup> , > 15 µG/L | CHLORPYRIFOS, > 0.015 µG/L | C. DUBIA, (% CONTROL) | S. CAPRICORNUTUM,<br>(% CONTROL) | H. AZTECA, (% CONTROL) |
|---------------------------------|-------------------|------------------|----------------------------|-------------------------|---------------------------|-------------------------------------------|--------------------------------------|----------------------------|-----------------------|----------------------------------|------------------------|
| Duck Slough @ Hwy 99            | Sediment          | 3/4/2008         |                            | 8.65                    |                           |                                           |                                      |                            |                       |                                  |                        |
| Duck Slough @ Hwy 99            | Irrigation        | 4/29/2008        |                            |                         | 280                       |                                           |                                      |                            |                       | 86                               |                        |
| Duck Slough @ Hwy 99            | Irrigation        | 5/7/2008         |                            |                         |                           |                                           |                                      |                            |                       | 5                                |                        |
| <i>Duck Slough @ Whealan Rd</i> | <i>Irrigation</i> | <i>6/24/2008</i> |                            |                         |                           | 73 (5.0)                                  |                                      |                            |                       |                                  |                        |
| Duck Slough @ Hwy 99            | Irrigation        | 7/29/2008        |                            |                         |                           | 2.7 (2.6)                                 | 0.69 (0.5)                           |                            |                       |                                  |                        |
| Duck Slough @ Hwy 99            | Irrigation        | 8/26/2008        |                            |                         |                           |                                           | 0.72 (0.69)                          |                            |                       |                                  |                        |
| <i>Duck Slough @ Whealan Rd</i> | <i>Irrigation</i> | <i>8/26/2008</i> |                            |                         |                           | 3.4 (1.9)                                 |                                      |                            |                       |                                  |                        |
| Duck Slough @ Hwy 99            | Sediment          | 8/28/2008        |                            |                         |                           |                                           |                                      |                            |                       |                                  | 86                     |
| Duck Slough @ Hwy 99            | Irrigation        | 9/30/2008        |                            |                         |                           |                                           |                                      | 0.034                      |                       |                                  |                        |
| <i>Duck Slough @ Whealan Rd</i> | <i>Irrigation</i> | <i>9/30/2008</i> |                            |                         |                           | 3.7 (1.3)                                 |                                      |                            |                       |                                  |                        |
| Duck Slough @ Hwy 99            | Sediment          | 10/2/2008        |                            |                         |                           |                                           |                                      |                            |                       |                                  | 90                     |
| Duck Slough @ Hwy 99            | Irrigation        | 6/16/2009        | 6.78                       |                         |                           |                                           |                                      |                            |                       |                                  |                        |
| Constituent Priority            |                   |                  | E                          | E                       | E                         | C                                         | E                                    | A/B                        | NP                    | D                                | NP <sup>T</sup>        |

<sup>1</sup>Total metal WQTL variable based on hardness.

NP – Not Prioritized; less than two exceedances within three consecutive monitoring years and currently no TMDL.

NP<sup>T</sup> – Not prioritized; both toxic samples were from the same sampling event (sample and resample to test for persistence).

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## 2007-2011 Management Plan Monitoring Results

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All monitoring results for high priority management plan constituents in the Duck Slough @ Hwy 99 subwatershed are listed in Table II-6. These constituents include chlorpyrifos, copper, lead, and water column toxicity to *S. capricornutum*.

Chlorpyrifos exceeded the WQTL (0.015 µg/L) once during each of the first four years of monitoring at Duck Slough @ Hwy 99 (2005-2008). Normal Monitoring occurred during 2005 and 2006 and chlorpyrifos exceeded the WQTL in July 2005 and May 2006. Normal Monitoring and additional MPM occurred during 2007 resulting in a single chlorpyrifos exceedance during the July additional MPM event (Table II-6). The upstream site, Duck Slough @ Whealan Rd, was sampled during May and July of 2008 along with Normal Monitoring at Duck Slough @ Hwy 99. A single chlorpyrifos exceedance occurred in September 2008. As part of the current 2008 MRPP, Normal Monitoring for chlorpyrifos did not occur in the Duck Slough @ Hwy 99 subwatershed starting in 2009. In 2009 through 2011, chlorpyrifos was only monitored as part of MPM during months of past exceedances (May, July, and September). There were no exceedances of chlorpyrifos at the Duck Slough @ Hwy 99 site from 2009 through 2011. Currently, chlorpyrifos at Duck Slough @ Hwy 99 is scheduled for MPM in 2012 (May, July, and September), but the Coalition is in the process of drafting a letter to the Regional Board requesting to drop the location from the Coalition's monitoring program due to the site disappearing in lieu of the expansion of Highway 99. When approved, Duck Slough @ Hwy 99 chlorpyrifos MPM will occur at the downstream site location, Duck Slough @ Gurr Rd.

Copper exceeded the WQTL (calculated from associated hardness value) twice during 2006 monitoring (August and September). In 2007, Normal Monitoring and additional MPM (August) occurred resulting in exceedances (based on total copper) during all months from February through September except for May (Table II-6). During 2008, Normal Monitoring and upstream MPM occurred at Duck Slough @ Whealan Rd for copper (April, June, July, August and September) resulting in exceedances once during Normal Monitoring (July) and three times at the upstream location (June, August and September, Table II-6). The 2009 monitoring year was the first year copper was analyzed for both total and dissolved copper fractions. Samples collected for MPM (June-September) were analyzed for both fractions and no exceedances of copper occurred in 2009. In previous years, the WQTL was based on total copper which included water hardness in the determination of the concentration of copper considered toxic. In 2009 the determination was based on the dissolved copper fraction only. During 2010, Duck Slough @ Hwy 99 MPM for copper occurred during irrigation season (April, June-September); Normal Monitoring did not occur in this subwatershed during 2010 (Table II-6). None of the 2010 MPM samples collected for copper exceeded the copper WQTL. During 2011, MPM occurred for copper (February, April and June-September) and there were no exceedances (Table II-6). Duck Slough @ Hwy 99 is scheduled for copper MPM in 2012 during months of past exceedances (February, April and June- September).

Exceedances of lead occurred at Duck Slough @ Hwy 99 in 2006 (May, August and September), in 2007 (February, April and June-September) and in 2008 (July and August). In 2011, MPM for lead occurred



during April and June through September and no exceedance of lead occurred. In 2012, Duck Slough @ Hwy 99 is scheduled for lead MPM (April and June-September).

Toxicity to *S. capricornutum* occurred three times in July 2005, and in April and May 2008. Starting in 2009, the Coalition began MPM for *S. capricornutum* toxicity at Duck Slough @ Hwy 99 during April and samples were not toxic. In 2010, MPM for *S. capricornutum* toxicity occurred during April and July and did not result in toxicity. There are no other instances of *S. capricornutum* toxicity to occur since 2008. In 2012, MPM for *S. capricornutum* toxicity is scheduled to occur during months of previous instances of toxicity (April and July).

**Table II-6. Duck Slough @ Hwy 99 site subwatershed monitoring results for high priority constituents (2007-2011).**

Exceedance values are in bold. Resampling (RS) due to toxicity not included in table.

| MONTH:                                       |                                              | JAN     | FEB        |         | APR        | MAY             | JUN         | JUL         | AUG         | SEP          |
|----------------------------------------------|----------------------------------------------|---------|------------|---------|------------|-----------------|-------------|-------------|-------------|--------------|
| 2007 NM<br>(@ Hwy 99)                        | Date                                         | NA      | 2/12/07    | 2/28/07 | 4/24/07    | 5/29/07         | 6/26/07     | 7/24/07     | 8/21/07     | 9/18/07      |
|                                              | Copper (µg/L)                                | NA      | NA         | NA      | <b>4.1</b> | <0.06           | <b>3</b>    | <b>3.5</b>  | <b>5.5</b>  | <b>6.9</b>   |
|                                              | Lead (µg/L)                                  | NA      | <b>15</b>  | 1.6     | <b>1.5</b> | 0.35            | <b>0.68</b> | <b>0.64</b> | <b>1.1</b>  | <b>1.8</b>   |
|                                              | Chlorpyrifos (µg/L)                          | NA      | NA         | NA      | <0.003     | <0.003          | <0.003      | 0.011       | <0.003      | <0.003       |
| 2007 MPM A<br>(@ Hwy 99)                     | Date                                         | NA      | NA         | NA      | NA         | NA              | NA          | 7/31/07     | 8/28/07     | 9/25/07      |
|                                              | Copper (µg/L)                                | NA      | NA         | NA      | NA         | NA              | NA          | NA          | <b>3.1</b>  | 2.5          |
|                                              | Chlorpyrifos (µg/L)                          | NA      | NA         | NA      | NA         | NA <sup>1</sup> | NA          | <b>0.42</b> | NA          | NA           |
| 2008 NM<br>(@ Hwy 99)                        | Date                                         | 1/25/08 | 2/25/08    |         | 4/29/08    | 5/27/08         | 6/24/08     | 7/29/08     | 8/26/08     | 9/30/08      |
|                                              | Copper (µg/L)                                | 7.1     | <b>9.9</b> |         | 3.3        | 2.4             | 2.9         | <b>2.7</b>  | 3           | 3.8          |
|                                              | Lead (µg/L)                                  | 1.2     | 2.1        |         | 1.4        | 0.42            | 0.53        | <b>0.69</b> | <b>0.72</b> | 0.71         |
|                                              | Chlorpyrifos (µg/L)                          | NA      | 0.0035     |         | <0.003     | <0.003          | <0.0026     | 0.0067      | <0.003      | <b>0.034</b> |
| 2008 MPM US<br>(@ Whealan Rd)                | Date                                         | NA      | NA         |         | 4/29/08    | 5/27/08         | 6/24/08     | 7/29/08     | 8/26/08     | 9/30/08      |
|                                              | Copper (µg/L)                                | NA      | NA         |         | 3.5        | NA              | <b>73</b>   | 3           | <b>3.4</b>  | <b>3.7</b>   |
|                                              | Chlorpyrifos (µg/L)                          | NA      | NA         |         | NA         | <0.003          | NA          | 0.0081      | NA          | NA           |
| 2009 MPM<br>(@ Hwy 99)                       | Date                                         | NA      | NA         |         | 4/21/09    | 5/19/09         | 6/16/09     | 7/21/09     | 8/18/09     | 9/22/09      |
|                                              | Copper, dissolved (µg/L)                     | NA      | NA         |         | NA         | NA              | 0.61        | 0.7         | 0.61        | 0.25         |
|                                              | Copper, total (µg/L)                         | NA      | NA         |         | NA         | NA              | 2.3         | 2.5         | 2.4         | 2.7          |
|                                              | Chlorpyrifos (µg/L)                          | NA      | NA         |         | NA         | <0.003          | NA          | <0.003      | NA          | <0.003       |
|                                              | <i>S. capricornutum</i> toxicity (% control) | NA      | NA         |         | 222        | NA              | NA          | NA          | NA          | NA           |
| 2010 MPM<br>(@ Hwy 99)                       | Date                                         | NA      | NA         |         | 4/20/10    | 5/18/10         | 6/15/10     | 7/20/10     | 8/17/10     | 9/14/10      |
|                                              | Copper, dissolved (µg/L)                     | NA      | NA         |         | 1.2        | NA              | 1.2         | 0.63        | 0.48        | 0.46         |
|                                              | Copper, total (µg/L)                         | NA      | NA         |         | 2.6        | NA              | 2.3         | 2.7         | 5.1         | 2            |
|                                              | Chlorpyrifos (µg/L)                          | NA      | NA         |         | NA         | 0.0048          | NA          | <0.003      | NA          | <0.003       |
|                                              | <i>S. capricornutum</i> toxicity (% control) | NA      | NA         |         | 1846       | NA              | NA          | 378         | NA          | NA           |
| 2011 MPM<br>(@ Hwy 99)                       | Date                                         | NA      | 2/17/11    |         | 4/19/11    | 5/17/11         | 6/21/11     | 7/19/11     | 8/16/11     | 9/13/11      |
|                                              | Copper, dissolved (µg/L)                     | NA      | 2.6        |         | 1.2        | NA              | 0.59        | 0.71        | 0.61        | .27          |
|                                              | Copper, total (µg/L)                         | NA      | 2.4        |         | 2.8        | NA              | 2.8         | 1.9         | 5.7         | 1.4          |
|                                              | Lead, dissolved (µg/L)                       | NA      | NA         |         | 0.06       | 0.04            | 0.05        | 0.04        | 0.22        | 0.05         |
|                                              | Lead, total (µg/L)                           | NA      | NA         |         | 0.4        | 0.38            | 1           | 0.55        | 7.9         | 0.64         |
|                                              | Chlorpyrifos (µg/L)                          | NA      | NA         |         | NA         | <0.003          | NA          | <0.003      | NA          | <0.003       |
| <i>S. capricornutum</i> toxicity (% control) |                                              | NA      | NA         |         | 541        | NA              | NA          | 404         | NA          | NA           |

<sup>1</sup>Additional (A) monitoring (2007 only) was initiated in June 2007; therefore no sample was collected for scheduled May additional monitoring. US – Upstream MPM conducted in 2008 only.

MPM – Management Plan Monitoring (see Table 4 for MPM schedule)

NA – Not applicable. No monitoring occurred on this date for this constituent.

NM – Normal Monitoring

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## Load Calculations

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Loads were calculated for the chlorpyrifos and copper detections (Table II-7) based on the following formula:

$$\text{Load} = \text{Discharge (cfs)} \times 28.317\text{L/ft}^3 \times \text{Concentration (mg/L} \times 1000 \text{ or } \mu\text{g/L)}.$$

The load values presented for constituents in this report represent instantaneous loads only. These values should not be used to extrapolate loading over any period of time (e.g. weekly, monthly, seasonal or annual). The primary purpose for reporting instantaneous loads is to provide a normalization of the concentrations by flow for various constituents at the time the samples were collected.

Very few discharge measurements have been taken at the Duck Slough @ Hwy 99 site since it is usually too deep to wade. Table II-7, indicates exceedances and/or detections which occurred when discharge was measured during a sampling event.

**Table II-7. Duck Slough @ Hwy 99 site subwatershed instantaneous load calculations for chlorpyrifos and copper.**

Upstream site is italicized. Sorted by analyte and date.

| SITE NAME                       | ANALYTE NAME        | SAMPLE DATE | DISCHARGE CFS | CONCENTRATION $\mu\text{G/L}$ | LOADING RATE $\mu\text{G/SEC}$ |
|---------------------------------|---------------------|-------------|---------------|-------------------------------|--------------------------------|
| <i>Duck Slough @ Whealan Rd</i> | <i>Chlorpyrifos</i> | 07/29/08    | 18.73         | 0.0081                        | 4.30                           |
| Duck Slough @ Hwy 99            | Copper              | 07/12/06    | 58.3          | 2.7                           | 4457.38                        |
| Duck Slough @ Hwy 99            | Copper              | 09/18/07    | 0             | 6.9                           | 0                              |
| <i>Duck Slough @ Whealan Rd</i> | <i>Copper</i>       | 04/29/08    | 5.73          | 3.5                           | 567.90                         |
| <i>Duck Slough @ Whealan Rd</i> | <i>Copper</i>       | 06/24/08    | 22.15         | 73                            | 45787.17                       |
| <i>Duck Slough @ Whealan Rd</i> | <i>Copper</i>       | 07/29/08    | 18.73         | 3                             | 1591.13                        |
| <i>Duck Slough @ Whealan Rd</i> | <i>Copper</i>       | 08/26/08    | 21.6          | 3.4                           | 2079.60                        |
| <i>Duck Slough @ Whealan Rd</i> | <i>Copper</i>       | 09/30/08    | 7.56          | 3.7                           | 792.08                         |

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## Source Identification and Outreach

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The Coalition addressed source identification in the 2011 MPUR and, in the following sections, considers 2011 monitoring results and PUR data as they expand upon that discussion. The Coalition focuses its efforts on applied pesticide. During 2007 and 2008, the Coalition conducted additional and upstream MPM during those months when exceedances historically occurred to better characterize water quality in the subwatershed. During 2009 through 2011, MPM continued at the Duck Slough @ Hwy 99 site to continue to assess water quality in the subwatershed as outreach in the area progressed. PUR data are reviewed to determine the most frequent crop type and timing associated with applications. Duck Slough @ Hwy 99 subwatershed PUR data are available through October 2011.

Since the Duck Slough subwatershed became high priority in 2008, the Coalition actively engaged in grower outreach and education to address the Duck Slough Management Plan's highest priority constituents. The Coalition organized grower meetings and mailings to educate growers about

management practices and their importance in achieving acceptable water quality. The Coalition contacted 100% of targeted growers (24) representing 4,016 acres within the Duck Slough @ Hwy 99 subwatershed. All 24 growers participated in follow up contacts, including two who submitted their surveys late, to determine if additional management practices were implemented and if any are planned to be implemented. Management Plan Monitoring will continue in the Duck Slough @ Hwy 99 subwatershed during 2012 in order to demonstrate two consecutive years of monitoring with no exceedances of high priority constituents. Once the planned construction near Duck Slough @ Hwy 99 begins and the Regional Board approves to drop the site from the MRPP schedule, all remaining MPM for the site will take place at the downstream location, Duck Slough @ Gurr Rd.

### *Priority A/B Constituents*

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Chlorpyrifos is the only priority A/B constituent in the Duck Slough @ Hwy 99 subwatershed.

#### **Chlorpyrifos**

Four exceedances of the chlorpyrifos WQTL (0.015 µg/L) occurred during the irrigation season at Duck Slough @ Hwy 99 from 2005 through 2011 (May, twice in July, and September); there were no chlorpyrifos exceedances since September 2008 (Table II-5). The Coalition evaluates monitoring and PUR data to identify possible sources of exceedances of constituents of concern.

In every high priority subwatershed, PUR data are reviewed for the number of monthly applications, pounds AI applied of the constituent of concern, and acres treated of the constituent of concern (Table II-8, Figure II-2). The greatest amount of chlorpyrifos applied was in 2005 (4,684 lbs AI) with the lowest amount applied in 2009 (153 lbs AI). From 2009 through 2011, there was significantly less chlorpyrifos use compared to the previous four years; only 815 lbs of active ingredient were applied to 1302 acres as compared to 9146 lbs of active ingredient over 5728 acres from 2005 through 2008. Over the years, the greatest amounts of chlorpyrifos use occurred in the months of March, May and July. Three of the four chlorpyrifos exceedances in the subwatershed occurred during months of greatest use (Figure II-2).

The Coalition also used PUR data to assess which crops receive the most applications of chlorpyrifos (Table II-9). The highest application rates in the Duck Slough subwatershed from 2005 through 2011 are associated with almonds (6685 lbs AI) and alfalfa (1981 lbs AI). The most common product used within this subwatershed containing chlorpyrifos was Lorsban.

**Table II-8. Duck Slough @ Hwy 99 site subwatershed chlorpyrifos applications, lbs AI applied, and acres treated by month (2005-2011).**

PUR data available through October 2011 for Merced County. If month is not included in table, no applications were made.

| MONTH/YEAR               | NUMBER OF CHLORPYRIFOS APPLICATIONS | POUNDS OF AI APPLIED | ACRES TREATED |
|--------------------------|-------------------------------------|----------------------|---------------|
| January, 2005            | 4.0                                 | 76.9                 | 38.1          |
| March, 2005              | 14.0                                | 408.7                | 695.0         |
| June, 2005               | 2.0                                 | 50.0                 | 30.0          |
| July, 2005               | 15.0                                | 4120.1               | 760.0         |
| September, 2005          | 1.0                                 | 28.0                 | 14.0          |
| January, 2006            | 6.0                                 | 119.7                | 59.0          |
| March, 2006              | 3.0                                 | 56.1                 | 151.0         |
| May, 2006                | 12.0                                | 634.7                | 397.0         |
| June, 2006               | 1.0                                 | 137.6                | 69.0          |
| July, 2006               | 5.0                                 | 570.2                | 508.0         |
| August, 2006             | 4.0                                 | 190.6                | 131.0         |
| September, 2006          | 3.0                                 | 168.4                | 92.5          |
| January, 2007            | 2.0                                 | 29.9                 | 15.0          |
| March, 2007              | 15.0                                | 370.0                | 433.8         |
| April, 2007              | 3.0                                 | 28.8                 | 57.4          |
| May, 2007                | 3.0                                 | 327.3                | 177.8         |
| July, 2007               | 3.0                                 | 567.5                | 328.0         |
| August, 2007             | 3.0                                 | 150.1                | 232.3         |
| March, 2008              | 15.0                                | 290.4                | 347.5         |
| May, 2008                | 2.0                                 | 140.1                | 70.0          |
| June, 2008               | 1.0                                 | 10.2                 | 8.0           |
| July, 2008               | 10.0                                | 343.1                | 655.5         |
| August, 2008             | 10.0                                | 328.0                | 458.0         |
| March, 2009              | 1.0                                 | 57.5                 | 136.0         |
| July, 2009               | 2.0                                 | 70.1                 | 140.0         |
| September, 2009          | 2.0                                 | 25.9                 | 103.4         |
| March, 2010              | 9.0                                 | 216.8                | 261.5         |
| July, 2010               | 3.0                                 | 61.1                 | 169.0         |
| September, 2010          | 1.0                                 | 17.5                 | 35.0          |
| August, 2011             | 3.0                                 | 176.8                | 146.0         |
| September, 2011          | 1.0                                 | 87.5                 | 175.0         |
| October, 2011            | 1.0                                 | 102.1                | 136.0         |
| <b>Summaries by Year</b> |                                     |                      |               |
| 2005 Total               | 36.0                                | 4683.7               | 1537.1        |
| 2006 Total               | 34.0                                | 1877.2               | 1407.5        |
| 2007 Total               | 29.0                                | 1473.5               | 1244.4        |
| 2008 Total               | 38.0                                | 1111.8               | 1539.0        |
| 2009 Total               | 5.0                                 | 153.5                | 379.4         |
| 2010 Total               | 13.0                                | 295.5                | 465.5         |
| 2011 Total               | 5.0                                 | 366.3                | 457.0         |
| <b>Total</b>             | <b>160.0</b>                        | <b>9961.4</b>        | <b>7029.9</b> |

**Figure II-2. Duck Slough @ Hwy 99 site subwatershed lbs chlorpyrifos applied by month (2005-2011).**

Asterisk (\*) denotes months with exceedances. PUR data available through October 2011 for Merced County.

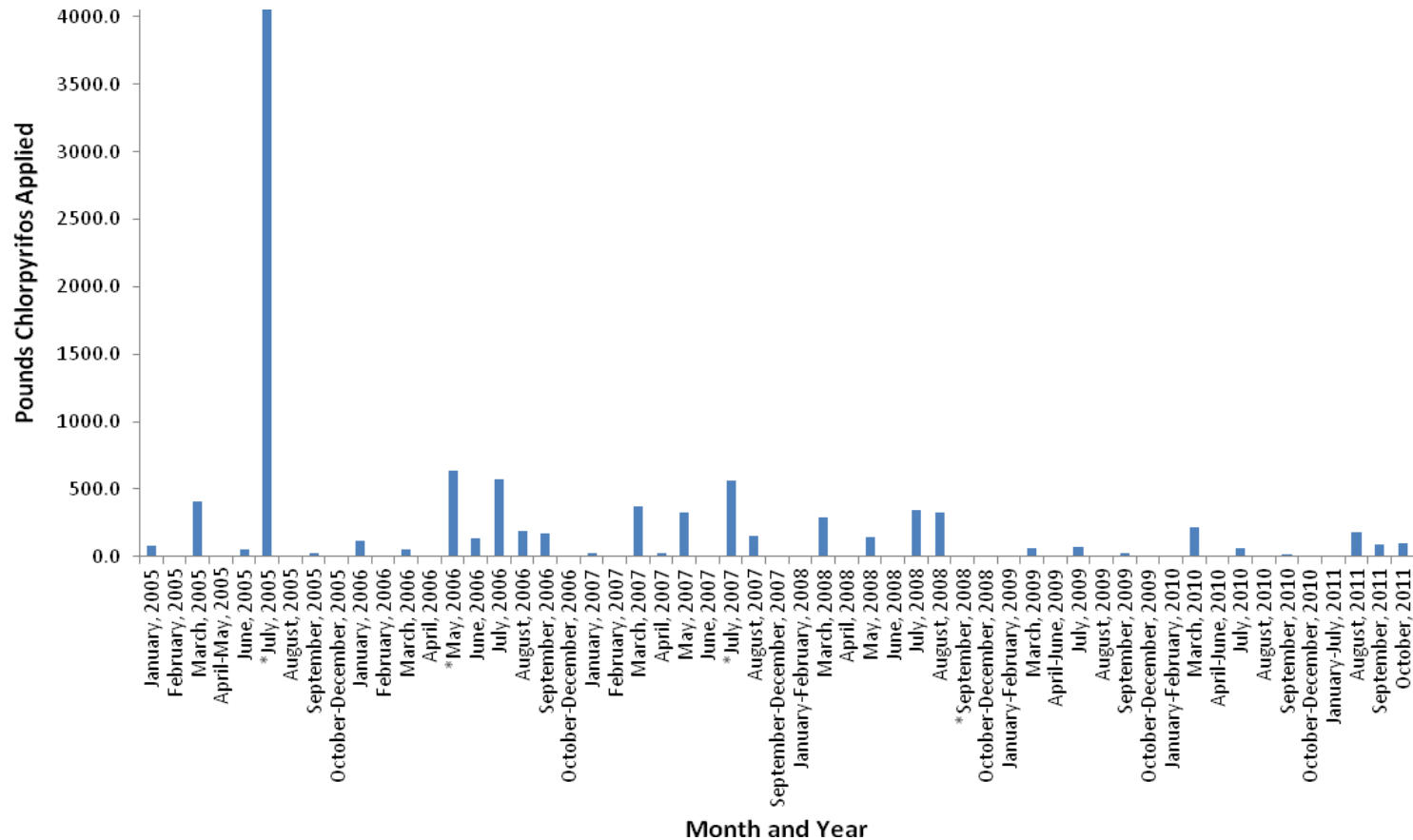


**Table II-9. Duck Slough @ Hwy 99 site subwatershed chlorpyrifos PUR data (2005-2011).**

PUR data available through October 2011 for Merced County.

| CHEMICAL NAME                                   | COMMODITY                               | PRODUCT NAME                     | LBS AI APPLIED |
|-------------------------------------------------|-----------------------------------------|----------------------------------|----------------|
| CHLORPYRIFOS                                    | ALFALFA (FORAGE - FODDER) (ALFALFA HAY) | COBALT                           | 57.5           |
|                                                 |                                         | GOVERN 4E INSECTICIDE            | 184.6          |
|                                                 |                                         | LOCK-ON INSECTICIDE              | 472.4          |
|                                                 |                                         | LORSBAN 4E INSECTICIDE           | 63.9           |
|                                                 |                                         | LORSBAN 4E-HF                    | 658.1          |
|                                                 |                                         | LORSBAN 4E-HF INSECTICIDE        | 63.4           |
|                                                 |                                         | LORSBAN-4E                       | 144.5          |
|                                                 |                                         | NUFOS 4E                         | 221.2          |
|                                                 |                                         | WHIRLWIND                        | 115.0          |
|                                                 | ALMOND                                  | CHLORPYRIFOS 4E AG               | 84.7           |
|                                                 |                                         | GOVERN 4E INSECTICIDE            | 993.9          |
|                                                 |                                         | LORSBAN 4E INSECTICIDE           | 198.5          |
|                                                 |                                         | LORSBAN 4E-HF                    | 973.0          |
|                                                 |                                         | LORSBAN ADVANCED                 | 10.9           |
|                                                 |                                         | LORSBAN-4E                       | 3592.1         |
|                                                 |                                         | NUFOS 4E                         | 155.5          |
|                                                 |                                         | WHIRLWIND                        | 675.9          |
|                                                 | CORN (FORAGE - FODDER)                  | CHLORPYRIFOS 4E AG               | 131.8          |
|                                                 |                                         | LORSBAN 15G GRANULAR INSECTICIDE | 262.1          |
|                                                 |                                         | LORSBAN-4E                       | 23.5           |
|                                                 |                                         | NUFOS 4E                         | 20.3           |
|                                                 | PEACH                                   | CHLORPYRIFOS 4E AG               | 76.9           |
|                                                 |                                         | LORSBAN 4E-HF                    | 121.6          |
|                                                 | WALNUT                                  | GOVERN 4E INSECTICIDE            | 15.2           |
|                                                 |                                         | LORSBAN-4E                       | 489.1          |
|                                                 |                                         | QUALI-PRO CHLORPYRIFOS 4E        | 155.8          |
| ALFALFA - Total Pounds Chlorpyrifos Applied     |                                         |                                  | 1980.6         |
| ALMOND - Total Pounds Chlorpyrifos Applied      |                                         |                                  | 6684.5         |
| CORN - Total Pounds Chlorpyrifos Applied        |                                         |                                  | 437.8          |
| PEACH - Total Pounds Chlorpyrifos Applied       |                                         |                                  | 198.5          |
| WALNUT - Total Pounds Chlorpyrifos Applied      |                                         |                                  | 660.0          |
| Total Pounds Chlorpyrifos Applied (2005 - 2011) |                                         |                                  | 9961.4         |

The Coalition determined that parcels associated with past chlorpyrifos exceedances are located in close proximity to Duck Slough suggesting that spray drift could play a major role in generating the exceedances. Management of chlorpyrifos in this subwatershed focused on providing information to inform targeted growers of the proper management of irrigation tailwater and spray drift.

Growers were targeted for outreach prior to the irrigation season and heavy application periods. Growers were encouraged to review their operation to determine if irrigation return flows are managed properly. Owners with orchards were instructed to evaluate their applications to minimize spray drift. Row crop farmers were advised of methods to better manage their irrigation tailwater and storm water

runoff, whereas outreach efforts to orchard and vineyard growers focused on reducing spray drift and improving orchard and vineyard water management.

Coalition outreach since 2007 has included grower meetings and the mailing/distribution of information such as available funding for management practice implementation. A complete list of coalition outreach during 2011 is provided in the Actions Taken to Address Water Quality Exceedances section of the 2012 AMR (Table 46, page 142).

In accordance with the Coalition's Management Plan strategy, individual contacts with targeted growers began in May 2009 and continued through August 2009. Targeted growers were identified by the use of chlorpyrifos and parcels that have the potential to drain or drift to the creek. Of the 10,695 irrigated acres in the Duck Slough @ Hwy 99 subwatershed, the Coalition developed a list of 24 targeted members that represented 4,016 acres with the potential to discharge to the creek. Coalition representatives then met with growers on their property to discuss the Duck Slough management plan and offer management practice recommendations specific to the land owner. Current management practices were assessed by Coalition representatives and additional management practices were discussed and encouraged. Individual contacts focused mainly on chlorpyrifos exceedances; however, all water quality results were reviewed and discussed including copper, *E. coli*, DO, lead, and pH, and toxicity to *S. capricornutum*.

The Coalition contacted all 24 targeted members, representing 4,016 acres or 38% of the irrigated acreage in the subwatershed. On February 19, 2010, the Coalition hosted a follow up to the 2009 Individual Contacts Grower Meeting. Using the Coalition's Interactive Survey Devices, growers were polled to determine what additional management practices were implemented in 2009 and if additional practices were planned for 2010. Members unable to attend the meeting were asked to participate in a phone interview with a Coalition representative between March and August 2010 to report their newly implemented management practices. Of the initial 24 targeted growers, two members were not required to participate in follow up contacts. Two other members were initially unresponsive to repeated attempts by the Coalition to schedule a follow up phone interview and were in the process of being dropped from the Coalition. The two growers have since elected to remain in the Coalition and have completed their follow up surveys. Of the two or more management practices recommended, newly implemented management practices to acreages in the Duck Slough @ Hwy 99 include: reduced amount of water used in surface irrigation (32%), microirrigation system (11%), other not specified (19%), install device to control discharge (20%), shut off outside nozzles during spray (18%). The Coalition Assessment of implemented management practices is included in the Summary of Implemented Management Practices section of this report.

There are no exceedances of the chlorpyrifos WQTL for two consecutive years of monitoring during months of past exceedances. A letter was submitted to the Regional Board on January 6, 2012, petitioning to remove chlorpyrifos from the Duck Slough management plan. Until the approval from the Regional Board, the Coalition will continue to assess water quality at Duck Slough @ Hwy 99 (eventually



all MPM for Duck Slough @ Hwy 99 will occur at Duck Slough @ Gurr Rd) through MPM during those months of past chlorpyrifos exceedances. If any exceedances occur, the Coalition will discuss with the Regional Board supplementary actions for outreach that may include contacting other chlorpyrifos sources such as dairy operations and/or contacting new members to the Coalition.

### *Priority C Constituents*

Copper is the only priority C constituent for the Duck Slough @ Hwy 99 subwatershed.

#### **Copper**

Exceedances of the hardness based copper WQTL occurred numerous times in this subwatershed from 2005 through 2008 (Table II-5). Starting in 2009 in the Duck Slough @ Hwy 99 subwatershed, the Coalition began monitoring for both the total and dissolved copper fractions to better characterize copper contamination. There were no copper exceedances from 2009 through 2011 monitoring.

PUR data are reviewed for the number of monthly copper applications, pounds AI applied, and acres treated (Table II-10, Figure II-3). The amount of copper applied within the subwatershed decreased from 2005 through 2010, but increased again in 2011. The greatest amount of copper applied was in 2005 (4,459 lbs AI) and the lowest amount applied was in 2010 (1,463 lbs AI). The greatest use of copper occurred in the months of January 2005, 2006 and 2011 and in December 2005 respectively (Table II-10, Figure II-3) indicating winter season use is the most common in this subwatershed. Not all exceedances occurred during months of the greatest use, and interestingly several exceedances occurred in later irrigation season months when there were few or no reported applications (Figure II-3).

The largest amount of copper applied was associated with almonds, walnuts, and outdoor container operations (Table II-11). The largest amount of copper applied from 2005 through 2011 was to almonds (6,454 lbs AI) followed by walnuts (5,329 lbs AI), see Table II-11. The most common products containing copper used within this subwatershed were Kocide and DuPont™ Kocide (Table II-11).

**Table II-10. Duck Slough @ Hwy 99 site subwatershed lbs copper applied by month (2005-2011).**

PUR data available through October 2011 for Merced County. If month is not included in table, no applications were made.

| MONTH/YEAR      | NUMBER OF COPPER APPLICATIONS | POUNDS OF AI APPLIED | ACRES TREATED |
|-----------------|-------------------------------|----------------------|---------------|
| January, 2005   | 8.0                           | 1061.0               | 209.1         |
| February, 2005  | 5.0                           | 514.8                | 159.7         |
| March, 2005     | 2.0                           | 203.6                | 45.0          |
| April, 2005     | 20.0                          | 881.3                | 340.3         |
| May, 2005       | 8.0                           | 358.5                | 103.5         |
| August, 2005    | 3.0                           | 139.8                | 127.8         |
| September, 2005 | 2.0                           | 82.4                 | 74.7          |
| October, 2005   | 1.0                           | 25.8                 | 21.0          |
| November, 2005  | 1.0                           | 69.1                 | 45.0          |
| December, 2005  | 5.0                           | 1122.8               | 153.0         |
| January, 2006   | 11.0                          | 1718.8               | 289.0         |
| February, 2006  | 4.0                           | 340.1                | 128.0         |
| March, 2006     | 3.0                           | 248.7                | 232.0         |

| MONTH/YEAR               | NUMBER OF COPPER APPLICATIONS | POUNDS OF AI APPLIED | ACRES TREATED |
|--------------------------|-------------------------------|----------------------|---------------|
| April, 2006              | 7.0                           | 537.2                | 116.5         |
| May, 2006                | 6.0                           | 493.1                | 175.0         |
| August, 2006             | 1.0                           | 113.0                | 103.0         |
| December, 2006           | 2.0                           | 539.0                | 70.0          |
| January, 2007            | 8.0                           | 1330.6               | 191.0         |
| February, 2007           | 5.0                           | 441.3                | 215.0         |
| March, 2007              | 1.0                           | 264.9                | 43.0          |
| April, 2007              | 12.0                          | 536.6                | 183.5         |
| December, 2007           | 5.0                           | 247.0                | 88.0          |
| January, 2008            | 4.0                           | 601.0                | 110.0         |
| February, 2008           | 1.0                           | 23.1                 | 10.0          |
| April, 2008              | 1.0                           | 27.7                 | 15.0          |
| May, 2008                | 3.0                           | 168.3                | 95.5          |
| November, 2008           | 1.0                           | 166.0                | 60.0          |
| December, 2008           | 3.0                           | 901.0                | 100.0         |
| January, 2009            | 1.0                           | 220.5                | 70.0          |
| February, 2009           | 1.0                           | 35.6                 | 58.0          |
| April, 2009              | 5.0                           | 341.6                | 161.0         |
| May, 2009                | 5.0                           | 278.1                | 139.5         |
| August, 2009             | 1.0                           | 69.3                 | 30.0          |
| November, 2009           | 1.0                           | 77.0                 | 10.0          |
| December, 2009           | 4.0                           | 861.0                | 73.0          |
| January, 2010            | 5.0                           | 551.7                | 117.3         |
| February, 2010           | 3.0                           | 22.9                 | 51.0          |
| March, 2010              | 6.0                           | 151.3                | 105.0         |
| April, 2010              | 8.0                           | 539.4                | 259.0         |
| May, 2010                | 10.0                          | 197.6                | 212.0         |
| January, 2011            | 12.0                          | 2231.9               | 595.0         |
| February, 2011           | 4.0                           | 172.4                | 188.0         |
| April, 2011              | 10.0                          | 729.4                | 209.0         |
| May, 2011                | 11.0                          | 480.1                | 404.3         |
| June, 2011               | 10.0                          | 185.9                | 399.5         |
| October, 2011            | 1.0                           | 27.7                 | 60.0          |
| <b>Summaries by Year</b> |                               |                      |               |
| 2005 Total               | 55.0                          | 4459.1               | 1279.1        |
| 2006 Total               | 34.0                          | 3990.0               | 1113.5        |
| 2007 Total               | 31.0                          | 2820.4               | 720.5         |
| 2008 Total               | 13.0                          | 1886.9               | 390.5         |
| 2009 Total               | 18.0                          | 1883.2               | 541.5         |
| 2010 Total               | 32.0                          | 1462.9               | 744.3         |
| 2011 Total               | 48.0                          | 3827.4               | 1855.8        |
| <b>Total</b>             | <b>231.0</b>                  | <b>20329.8</b>       | <b>6645.2</b> |

**Figure II-3. Duck Slough @ Hwy 99 site subwatershed lbs copper applied by month (2005-2011).**

Asterisk (\*) denotes months with exceedances. PUR data available through October 2011 for Merced County.

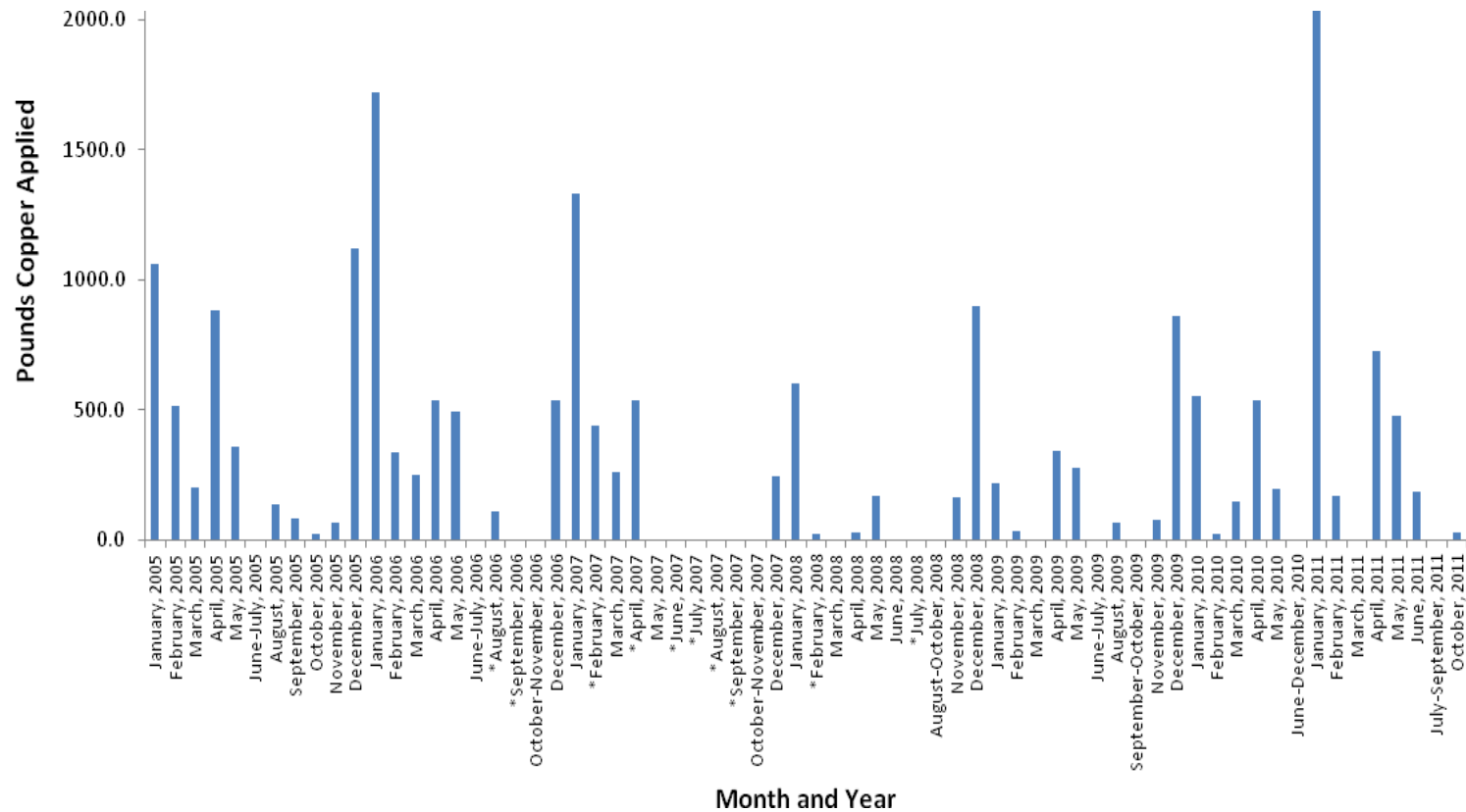


**Table II-11. Duck Slough @ Hwy 99 site subwatershed copper PUR data (2005-2011).**

PUR data available through October 2011 for Merced County.

| CHEMICAL NAME | COMMODITY                                         | PRODUCT NAME                                                                     | LBS AI APPLIED |
|---------------|---------------------------------------------------|----------------------------------------------------------------------------------|----------------|
| COPPER        | ALFALFA (FORAGE - FODDER) (ALFALFA HAY)           | KOCIDE 2000                                                                      | 63.8           |
|               | ALMOND                                            | BASIC COPPER 53                                                                  | 230.3          |
|               |                                                   | CUPROFIX ULTRA 40 DISPERSS                                                       | 1539.9         |
|               |                                                   | DUPONT KOCIDE 2000 FUNGICIDE/BACTERICIDE                                         | 1472.5         |
|               |                                                   | DUPONT KOCIDE 3000 FUNGICIDE/BACTERICIDE                                         | 29.5           |
|               |                                                   | DUPONT KOCIDE DF FUNGICIDE/BACTERICIDE                                           | 35.6           |
|               |                                                   | KOCIDE 101                                                                       | 471.2          |
|               |                                                   | KOCIDE 2000                                                                      | 35.0           |
|               |                                                   | KOCIDE DF                                                                        | 742.9          |
|               |                                                   | NORDOX                                                                           | 76.7           |
|               |                                                   | NORDOX 75 WG                                                                     | 1768.6         |
|               |                                                   | NU-COP 50 WP                                                                     | 52.4           |
|               | APRICOT                                           | BASIC COPPER 53                                                                  | 58.8           |
|               |                                                   | KOCIDE 2000                                                                      | 118.4          |
|               |                                                   | KOCIDE DF                                                                        | 122.8          |
|               | CHERRY                                            | NU-COP 50DF                                                                      | 154.0          |
|               | NECTARINE                                         | BASIC COPPER 53                                                                  | 98.0           |
|               |                                                   | DUPONT GX-569 FUNGICIDE/BACTERICIDE                                              | 27.7           |
|               |                                                   | DUPONT KOCIDE 2000 FUNGICIDE/BACTERICIDE                                         | 42.4           |
|               |                                                   | DUPONT KOCIDE 3000 FUNGICIDE/BACTERICIDE                                         | 23.1           |
|               |                                                   | KOCIDE 101                                                                       | 1155.0         |
|               |                                                   | KOCIDE 2000                                                                      | 201.8          |
|               | N-OUTDR CONTAINER/FLD GRWN PLANTS                 | BASIC COPPER 53                                                                  | 1519.0         |
|               |                                                   | CUPROFIX ULTRA 40 DISPERSS                                                       | 113.8          |
|               |                                                   | DUPONT GX-569 FUNGICIDE/BACTERICIDE                                              | 53.4           |
|               |                                                   | DUPONT KOCIDE 2000 FUNGICIDE/BACTERICIDE                                         | 64.6           |
|               |                                                   | DUPONT KOCIDE 3000 FUNGICIDE/BACTERICIDE                                         | 497.9          |
|               |                                                   | KOCIDE 101                                                                       | 473.6          |
|               | PEACH                                             | BASIC COPPER 53                                                                  | 1078.0         |
|               |                                                   | DUPONT KOCIDE 3000 FUNGICIDE/BACTERICIDE                                         | 8.7            |
|               |                                                   | KOCIDE 101                                                                       | 154.0          |
|               |                                                   | KOCIDE DF                                                                        | 608.5          |
|               | PEPPERS (FRUITING VEGETABLE), (BELL, CHILI, ETC.) | DUPONT KOCIDE 3000 FUNGICIDE/BACTERICIDE                                         | 144.0          |
|               |                                                   | KOCIDE 101                                                                       | 21.9           |
|               | PISTACHIO (PISTACHE NUT)                          | CUPROFIX DISPERSS DRY FLOWABLE FUNGICIDE/BACTERICIDE FOR TURF AND ORNAMENTAL USE | 8.3            |
|               | PLUM (INCLUDES WILD PLUMS FOR HUMAN CONSUMPTION)  | DUPONT KOCIDE 2000 FUNGICIDE/BACTERICIDE                                         | 80.7           |
|               |                                                   | KOCIDE 101                                                                       | 154.0          |
|               | PRUNE                                             | NORDOX 75 WG                                                                     | 171.2          |
|               | TOMATO                                            | CHAMPION WETTABLE POWDER                                                         | 69.3           |
|               |                                                   | DUPONT KOCIDE 2000 FUNGICIDE/BACTERICIDE                                         | 65.3           |
|               |                                                   | DUPONT KOCIDE 3000 FUNGICIDE/BACTERICIDE                                         | 308.2          |
|               |                                                   | DUPONT KOCIDE DF FUNGICIDE/BACTERICIDE                                           | 151.7          |
|               |                                                   | KOCIDE 101                                                                       | 147.3          |
|               |                                                   | KOCIDE 2000                                                                      | 427.3          |
|               |                                                   | KOCIDE DF                                                                        | 106.5          |
|               |                                                   | NU-COP 50DF                                                                      | 52.4           |
|               |                                                   | NU-COP HB                                                                        | 1.2            |

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Appendix I

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| CHEMICAL NAME                                   | COMMODITY | PRODUCT NAME                             | Lbs AI APPLIED |
|-------------------------------------------------|-----------|------------------------------------------|----------------|
| COPPER                                          | WALNUT    | DUPONT KOCIDE 2000 FUNGICIDE/BACTERICIDE | 1121.6         |
|                                                 |           | DUPONT KOCIDE 3000 FUNGICIDE/BACTERICIDE | 875.6          |
|                                                 |           | KOCIDE 101                               | 843.9          |
|                                                 |           | KOCIDE 2000                              | 1497.5         |
|                                                 |           | KOP-HYDROXIDE 50W                        | 396.6          |
|                                                 |           | NU-COP 50DF                              | 259.9          |
|                                                 |           | NU-COP HB                                | 334.2          |
|                                                 |           |                                          |                |
| ALFALFA - Total Pounds Copper Applied           |           |                                          | 63.8           |
| ALMOND - Total Pounds Copper Applied            |           |                                          | 6454.6         |
| APRICOT - Total Pounds Copper Applied           |           |                                          | 300.0          |
| CHERRY - Total Pounds Copper Applied            |           |                                          | 154.0          |
| N-OUTDR CONTAINER - Total Pounds Copper Applied |           |                                          | 2722.2         |
| NECTARINE - Total Pounds Copper Applied         |           |                                          | 1547.8         |
| PEACH - Total Pounds Copper Applied             |           |                                          | 1849.1         |
| PEPPERS - Total Pounds Copper Applied           |           |                                          | 165.9          |
| PISTACHIO - Total Pounds Copper Applied         |           |                                          | 8.3            |
| PLUM - Total Pounds Copper Applied              |           |                                          | 234.7          |
| PRUNE - Total Pounds Copper Applied             |           |                                          | 171.2          |
| TOMATO - Total Pounds Copper Applied            |           |                                          | 1329.0         |
| WALNUT - Total Pounds Copper Applied            |           |                                          | 5329.2         |
| Total Pounds Copper Applied (2005-2011)         |           |                                          | 20329.8        |

The Coalition determined future outreach should focus on providing information to growers located adjacent to Duck Slough to encourage the retention of water and sediment on the fields, especially during the dormant season when copper is known to enter the waterway. This coincides with the Coalition's Management Plan strategy outlined in the chlorpyrifos Source Identification and Outreach section above. Individual contacts with growers within this subwatershed are described, as are discussions of copper exceedances and relevant management practices in the First Priority Subwatersheds Summary of Management Practices section of this report. Orchard operators are advised to manage storm water runoff occurring after copper applications. The Coalition believes that their outreach strategy and management practice implementation has lead to improvement in water quality concerning copper since no additional copper exceedances have occurred at Duck Slough @ Hwy 99 since September 2008.

### *Priority D Constituents*

Water column toxicity to *S. capricornutum* is a priority D constituent in the Duck Slough @ Hwy 99 subwatershed.

#### ***S. capricornutum* toxicity**

Toxicity to *S. capricornutum* occurred in July 2005 and in April 2008 and was persistent in the resample collected in May 2008. Although there were no copper WQTL exceedances associated with *S. capricornutum* toxicity, the Coalition elected to list water column toxicity to *S. capricornutum* as a priority D constituent because of the high frequency of copper WQTL exceedances at this site. There

was no toxicity associated with the MPM samples collected in April 2009 and April and July 2010 and 2011. Total and dissolved copper were also monitored in 2010 and 2011 alongside *S. capricornutum* toxicity and none of these constituents exceeded their WQTLs.

Since focused outreach began in 2009, *S. capricornutum* toxicity has not occurred at Duck Slough @ Hwy 99. The Coalition discussed toxicity to *S. capricornutum* focusing on copper individual grower meetings and conducted outreach regarding the retention of storm water and irrigation tailwater runoff. If the Coalition finds that copper exceedances are eliminated and *S. capricornutum* toxicity persists, then additional herbicides will be targeted for outreach and management. The Coalition will conduct MPM in 2012 for *S. capricornutum* toxicity in order to demonstrate two consecutive years of monitoring with no toxicities.

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### *Priority E Constituents*

The priority E constituents listed under the Duck Slough @ Hwy 99 subwatershed management plan are DO, *E. coli*, pH, and lead.

Due to an oversight, MPM for lead began in April 2011 instead of 2010.

Although DO, *E. coli*, pH and lead remain low priority, the Coalition will continue to collect DO and pH during each monitoring event, *E. coli* during Core and Assessment Monitoring events, and lead during Assessment Monitoring and MPM. Currently, Duck Slough @ Hwy 99 is scheduled for Assessment Monitoring in 2013-2014. All priority E constituent monitoring results were discussed during individual contacts and at annual grower meetings. In addition, the Coalition plans to participate in a focus group along with other Coalitions and Regional Board staff to develop a joint Work Plan to address *E. coli* exceedances by determining the potential agricultural sources of *E. coli* and identifying management practices to prevent discharges to surface waters.

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### *Evaluation*

Duck Slough @ Hwy 99 is one of the first three priority site subwatersheds within the ESJWQC. Therefore, the Coalition focused its resources on identifying sources of agricultural discharge within this subwatershed that could result in water quality impairments by extending outreach to individual Coalition members, and setting evaluation goals based on the effectiveness of management practices (by considering changes in water quality over time).

The Coalition's strategy for the Duck Slough subwatershed is to target growers located adjacent to the waterway and whose agricultural practices may result in the discharge or drift of pesticides into the creek. Outreach focus is on both aerial application and tailwater retention. Outreach includes grower notification of exceedances, management practice outreach and education, tracking of management practice implementation, and providing information on special studies of the efficacy of those management practices.

Individual grower surveys documenting current management practices and follow up contacts assessing planned implementation strategies were completed and returned by 100% of targeted growers. The Summary of Implemented Management Practice section of this report summarizes the results of these surveys. The Coalition will continue to notify growers of funding opportunities for management practice implementation and will continue to encourage growers to take advantage of such opportunities.

Both the overall acres treated and pounds of chlorpyrifos applied decreased since 2005, which may be a result of many factors including educating growers about alternative products. Usage of chlorpyrifos decreased in the months of July, May and September, when the exceedances occurred historically at the site. Since grower outreach and management practice implementation, no additional chlorpyrifos exceedances occurred at the Duck Slough @ Hwy 99 subwatershed.

During 2012, Duck Slough @ Hwy 99 is scheduled to continue MPM during months of past exceedances. If and when the Regional Board approves dropping the Duck Slough @ Hwy 99 site due to the expansion of highway 99 over the site area, all Duck Slough @ Hwy 99 MPM constituents will continue to be monitored at the Duck Slough @ Gurr Rd downstream location. Any additional water quality impairments that arise will be discussed with the Regional Board and outreach may then include dairy and new member contacts within the subwatershed.

Monitoring for chlorpyrifos, DO and toxicity to *S. capricornutum* indicates no exceedances/toxicities for two or more consecutive years of monitoring during months of past exceedances. A letter was submitted to the Regional Board on January 6, 2012 petitioning to remove these constituents from the active Duck Slough @ Hwy 99 management plan; until the letter is approved, the constituents will continue to be monitored as scheduled.

### III. PRAIRIE FLOWER DRAIN @ CROWS LANDING RD

#### Management Plan Constituents

##### Priority A/B

- Chlorpyrifos

##### Priority C

- Dimethoate
- Nitrate / Nitrate + Nitrite

##### Priority D

- *Ceriodaphnia dubia* water column toxicity
- *Pimephales promelas* water column toxicity
- *Hyalella azteca* sediment toxicity

##### Priority E

- Ammonia
- Dissolved Oxygen
- *E. coli*
- Molybdenum
- pH
- Specific Conductivity
- *Selenastrum capricornutum* water column toxicity
- Total Dissolved Solids

#### Description of Prairie Flower Drain @ Crows Landing Rd Site Subwatershed

Prairie Flower Drain @ Crows Landing Rd (2,714 irrigated acres) – This site is located southwest of Turlock near the southern border of Stanislaus county (Table III-1). This site subwatershed includes an upstream location (Prairie Flower Drain @ Morgan Rd) which was sampled in 2008. Relative to other drains in the western portion of the Coalition region, Prairie Flower Drain is longer. Dairies and feedlots are ubiquitous in this part of the Coalition region and this drain may receive runoff from several dairies immediately upstream. Many of the drains in the eastern part of the Coalition region, including Prairie Flower Drain, were constructed to intercept shallow ground water and lower the water table sufficiently to allow agriculture. Consequently, agriculture in the subwatershed tends to be dominated by shallow rooted field crops and pastures (Figure III-1).

**Table III-1. Prairie Flower Drain site subwatershed sampling locations coordinates.**

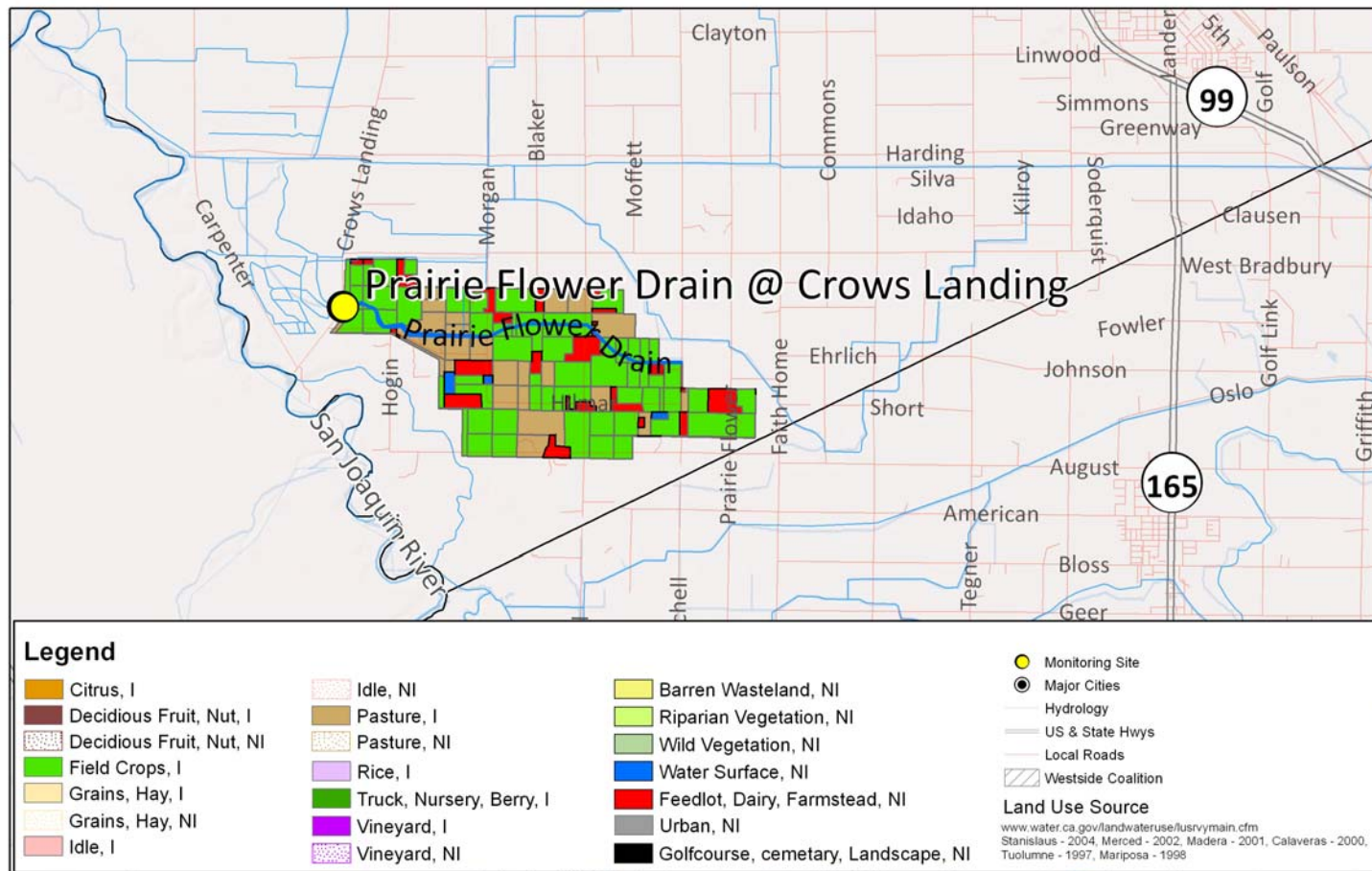
| SITE NAME                                     | STATION CODE | TARGET LATITUDE | TARGET LONGITUDE |
|-----------------------------------------------|--------------|-----------------|------------------|
| Prairie Flower Drain @ Crows Landing Road*    | 535XPFDCL    | 37.4422         | -121.0024        |
| Prairie Flower Drain @ Morgan Rd <sup>U</sup> | 535XPFDMR    | 37.4379         | -120.9757        |

<sup>U</sup> Upstream sites

\* Original ESJWQC sampling site



Figure III-1. Prairie Flower Drain @ Crows Landing Rd site subwatershed land use map.



Source of Layers:  
 Hydrology - NHD hydrodata, 1:24,000-scale, <http://nhd.usgs.gov/>  
 Roads, highways, railroads, county boundary, city outlines - California Spatial Information Library  
 TRS - Teale Public Land Survey System, Pub. date. 20090101, California Spatial Information Library  
 Parcel Layer - Stanislaus 2010, Merced 2011, Madera 2011  
 Basemap, Shaded Relief - ESR  
 GSC North America 1983

Date Prepared: 08/09/11

ESJWQC



## Prairie Flower Drain @ Crows Landing

## Subwatershed Monitoring History

Monitoring of ambient water began at Prairie Flower Drain @ Crows Landing Rd during the storm season of 2005 and continued uninterrupted through 2011 (Table III-2). Prairie Flower Drain @ Crows Landing Rd is the Zone 2 Core Monitoring location under the current 2008 MRPP. Assessment Monitoring occurred at the site during 2011 and is scheduled to recur every third year (e.g. 2014, 2017). Core Monitoring resumed at this location in 2012. All constituents sampled at the Prairie Flower Drain subwatershed from 2005 through 2011 are listed in (Table III-3).

During the 2007 irrigation season, MPM was initiated. Additional monitoring for chlorpyrifos and toxicity to *Pimephales promelas* occurred in 2007 (Table III-4). Upstream monitoring at Prairie Flower Drain @ Morgan Rd occurred for chlorpyrifos, nitrate, and toxicity to *C. dubia* and *P. promelas* in 2008 (Table III-4). Management Plan Monitoring during months of past exceedances occurred at Prairie Flower Drain @ Crows Landing Rd in 2009 (chlorpyrifos and *S. capricornutum* toxicity), and in 2010 and 2011 (chlorpyrifos, *C. dubia*, *S. capricornutum* and *H. azteca* toxicity).

Prairie Flower Drain is not considered impaired on California's 2008-2010 303d List of Impaired Waterbodies. However, the section of the San Joaquin River which receives water from Prairie Flower Drain (Harding Drain) is listed as impaired for BHC-alpha, chlorpyrifos, DDE, HCB, HCH and *E. coli*.

**Table III-2. Prairie Flower Drain site subwatershed sampling events per season and year (including MPM).**

| YEAR | SEASON     | EVENTS SAMPLED | EVENTS NOT SAMPLED <sup>1</sup> | TOTAL |
|------|------------|----------------|---------------------------------|-------|
| 2004 | Irrigation | NA             | NA                              | NA    |
| 2005 | Storm      | 2              | 0                               | 2     |
|      | Irrigation | 5              | 0                               | 5     |
| 2006 | Storm      | 2              | 0                               | 2     |
|      | Irrigation | 5              | 0                               | 5     |
| 2007 | Storm      | 2              | 0                               | 2     |
|      | Irrigation | 9              | 0                               | 9     |
| 2008 | Storm      | 3              | 0                               | 3     |
|      | Irrigation | 6              | 0                               | 6     |
|      | Fall       | 2              | 0                               | 2     |
| 2009 | Winter     | 2              | 0                               | 2     |
|      | Storm      | 2              | 0                               | 2     |
|      | Irrigation | 6              | 0                               | 6     |
|      | Fall       | 2              | 0                               | 2     |
| 2010 | Winter     | 1              | 0                               | 1     |
|      | Storm      | 3              | 0                               | 3     |
|      | Irrigation | 5              | 0                               | 5     |
|      | Fall       | 3              | 0                               | 3     |
| 2011 | Winter     | 2              | 0                               | 2     |
|      | Storm      | 1              | 0                               | 1     |
|      | Irrigation | 6              | 0                               | 6     |
|      | Fall       | 3              | 0                               | 3     |

<sup>1</sup>If an event was not sampled during scheduled monitoring, the site was dry.

NA - Not applicable. This site was not scheduled for sampling during this season/year.

**Table III-3. Prairie Flower Drain @ Crows Landing Rd site subwatershed analyses per sampling season and year.**

Only environmental samples with a sample replicate and lab replicate number of one are shown.

| METHOD                        | ANALYTE                         | 2005  |            | 2006  |            | 2007  |            | 2008  |            |      | 2009   |       |            |      |        | 2010  |            |      |        |       | 2011       |      |  |  |
|-------------------------------|---------------------------------|-------|------------|-------|------------|-------|------------|-------|------------|------|--------|-------|------------|------|--------|-------|------------|------|--------|-------|------------|------|--|--|
|                               |                                 | STORM | IRRIGATION | STORM | IRRIGATION | STORM | IRRIGATION | STORM | IRRIGATION | FALL | WINTER | STORM | IRRIGATION | FALL | WINTER | STORM | IRRIGATION | FALL | WINTER | STORM | IRRIGATION | FALL |  |  |
| Field and Physical Parameters |                                 |       |            |       |            |       |            |       |            |      |        |       |            |      |        |       |            |      |        |       |            |      |  |  |
| EPA 110.2                     | Color                           | 2     | 5          | 2     | 5          | 3     | 6          | 2     | 6          |      |        |       |            |      |        |       |            |      |        |       |            |      |  |  |
| EPA 160.1                     | Dissolved Solids                | 2     | 5          | 2     | 5          | 2     | 6          | 3     | 6          | 2    | 2      | 2     | 6          | 2    | 1      | 3     | 5          | 3    | 2      | 1     | 6          | 3    |  |  |
| EPA 160.2                     | Suspended Solids                |       |            |       |            |       |            | 1     |            | 2    | 2      | 2     | 6          | 2    | 1      | 3     | 5          | 3    | 2      | 1     | 6          | 3    |  |  |
| EPA 180.1                     | Turbidity                       | 2     | 5          | 2     | 5          | 2     | 6          | 3     | 6          | 2    | 2      | 2     | 6          | 2    | 1      | 3     | 5          | 3    | 2      | 1     | 6          | 3    |  |  |
| EPA 405.1                     | BOD                             |       |            |       | 1          | 2     | 2          |       |            |      |        |       |            |      |        |       |            |      |        |       |            |      |  |  |
| EPA 415.1                     | Total Organic Carbon            | 2     | 5          | 2     | 5          | 2     | 6          | 3     | 6          | 2    | 2      | 2     | 6          | 2    | 1      | 3     | 5          | 3    | 2      | 1     | 6          | 3    |  |  |
| SM 9223 B                     | <i>E. coli</i>                  | 2     | 5          | 2     | 5          | 2     | 6          | 3     | 6          | 2    | 2      | 2     | 6          | 2    | 1      | 3     | 5          | 3    | 2      | 1     | 6          | 3    |  |  |
| Walkley-Black                 | Total Organic Carbon (sediment) |       |            |       |            |       |            |       |            |      |        |       |            |      |        |       |            | 1    |        | 1     |            |      |  |  |
| ASTM D422 or ASTM D4464       | Grain size (sediment)           |       |            |       |            |       |            |       |            |      |        |       |            |      |        |       |            | 1    |        | 1     |            |      |  |  |
| NA                            | Dissolved Oxygen                | 2     | 5          | 4     | 6          | 3     | 13         | 5     | 10         | 2    | 2      | 2     | 6          | 2    | 1      | 3     | 5          | 3    | 3      | 1     | 7          | 3    |  |  |
| NA                            | Specific Conductivity           | 2     | 5          | 4     | 6          | 3     | 13         | 5     | 10         | 2    | 2      | 2     | 6          | 2    | 1      | 3     | 5          | 3    | 3      | 1     | 7          | 3    |  |  |
| NA                            | pH                              | 2     | 5          | 4     | 6          | 3     | 13         | 5     | 10         | 2    | 2      | 2     | 6          | 2    | 1      | 3     | 5          | 3    | 3      | 1     | 7          | 3    |  |  |
| Carbamates                    |                                 |       |            |       |            |       |            |       |            |      |        |       |            |      |        |       |            |      |        |       |            |      |  |  |
| EPA 8321A                     | Aldicarb                        |       |            |       | 5          | 2     | 6          | 2     | 6          |      |        |       |            |      |        |       |            | 2    | 1      | 6     | 3          |      |  |  |
| EPA 8321A                     | Carbaryl                        |       |            |       | 5          | 2     | 6          | 2     | 6          |      |        |       |            |      |        |       |            | 2    | 1      | 6     | 3          |      |  |  |
| EPA 8321A                     | Carbofuran                      |       |            |       | 5          | 2     | 6          | 2     | 6          |      |        |       |            |      |        |       |            | 2    | 1      | 6     | 3          |      |  |  |
| EPA 8321A                     | Diuron                          |       |            |       | 5          | 2     | 6          | 2     | 6          |      |        |       |            |      |        |       |            | 2    | 1      | 6     | 3          |      |  |  |
| EPA 8321A                     | Linuron                         |       |            |       | 5          | 2     | 6          | 2     | 6          |      |        |       |            |      |        |       |            | 2    | 1      | 6     | 3          |      |  |  |
| EPA 8321A                     | Methiocarb                      |       |            |       | 5          | 2     | 6          | 2     | 6          |      |        |       |            |      |        |       |            | 2    | 1      | 6     | 3          |      |  |  |
| EPA 8321A                     | Methomyl                        |       |            |       | 5          | 2     | 6          | 2     | 6          |      |        |       |            |      |        |       |            | 2    | 1      | 6     | 3          |      |  |  |
| EPA 8321A                     | Oxamyl                          |       |            |       | 5          | 2     | 6          | 2     | 6          |      |        |       |            |      |        |       |            | 2    | 1      | 6     | 3          |      |  |  |
| Organochlorines               |                                 |       |            |       |            |       |            |       |            |      |        |       |            |      |        |       |            |      |        |       |            |      |  |  |
| EPA 8081A                     | DDD(p,p')                       |       |            |       | 5          | 2     | 6          | 2     | 6          |      |        |       |            |      |        |       |            | 2    | 1      | 4     |            |      |  |  |
| EPA 8081A                     | DDE(p,p')                       |       |            |       | 5          | 2     | 6          | 2     | 6          |      |        |       |            |      |        |       |            | 2    | 1      | 4     |            |      |  |  |
| EPA 8081A                     | DDT(p,p')                       |       |            |       | 5          | 2     | 6          | 2     | 6          |      |        |       |            |      |        |       |            | 2    | 1      | 4     |            |      |  |  |
| EPA 8081A                     | Dicofol                         |       |            |       | 5          | 2     | 6          | 2     | 6          |      |        |       |            |      |        |       |            | 2    | 1      | 4     |            |      |  |  |
| EPA 8081A                     | Dieldrin                        |       |            |       | 5          | 2     | 6          | 2     | 6          |      |        |       |            |      |        |       |            | 2    | 1      | 4     |            |      |  |  |
| EPA 8081A                     | Endrin                          |       |            |       | 5          | 2     | 6          | 2     | 6          |      |        |       |            |      |        |       |            | 2    | 1      | 4     |            |      |  |  |

| METHOD             | ANALYTE            | 2005  |            | 2006  |            | 2007  |            | 2008  |            |      | 2009   |       |            |      |        | 2010  |            |      |        |       | 2011       |      |  |  |
|--------------------|--------------------|-------|------------|-------|------------|-------|------------|-------|------------|------|--------|-------|------------|------|--------|-------|------------|------|--------|-------|------------|------|--|--|
|                    |                    | STORM | IRRIGATION | STORM | IRRIGATION | STORM | IRRIGATION | STORM | IRRIGATION | FALL | WINTER | STORM | IRRIGATION | FALL | WINTER | STORM | IRRIGATION | FALL | WINTER | STORM | IRRIGATION | FALL |  |  |
| EPA 8081A          | Methoxychlor       |       |            |       | 5          | 2     | 6          | 2     | 6          |      |        |       |            |      |        |       |            |      | 2      | 1     | 4          |      |  |  |
| Group A Pesticides |                    |       |            |       |            |       |            |       |            |      |        |       |            |      |        |       |            |      |        |       |            |      |  |  |
| EPA 8081A          | Aldrin             |       |            |       |            |       |            |       |            |      |        |       |            |      |        |       |            |      | 2      | 1     | 4          |      |  |  |
| EPA 8081A          | Chlordane          |       |            |       |            |       |            |       |            |      |        |       |            |      |        |       |            |      | 2      | 1     | 4          |      |  |  |
| EPA 8081A          | Endosulfan I       |       |            |       |            |       |            |       |            |      |        |       |            |      |        |       |            |      | 2      | 1     | 4          |      |  |  |
| EPA 8081A          | Endosulfan II      |       |            |       |            |       |            |       |            |      |        |       |            |      |        |       |            |      | 2      | 1     | 4          |      |  |  |
| EPA 8081A          | HCH, alpha         |       |            |       |            |       |            |       |            |      |        |       |            |      |        |       |            |      | 2      | 1     | 4          |      |  |  |
| EPA 8081A          | HCH, beta          |       |            |       |            |       |            |       |            |      |        |       |            |      |        |       |            |      | 2      | 1     | 4          |      |  |  |
| EPA 8081A          | HCH, delta         |       |            |       |            |       |            |       |            |      |        |       |            |      |        |       |            |      | 2      | 1     | 4          |      |  |  |
| EPA 8081A          | HCH, gamma         |       |            |       |            |       |            |       |            |      |        |       |            |      |        |       |            |      | 2      | 1     | 4          |      |  |  |
| EPA 8081A          | Heptachlor         |       |            |       |            |       |            |       |            |      |        |       |            |      |        |       |            |      | 2      | 1     | 4          |      |  |  |
| EPA 8081A          | Heptachlor epoxide |       |            |       |            |       |            |       |            |      |        |       |            |      |        |       |            |      | 2      | 1     | 4          |      |  |  |
| EPA 8081A          | Toxaphene          |       |            |       |            |       |            |       |            |      |        |       |            |      |        |       |            |      | 2      | 1     | 4          |      |  |  |
| Organophosphates   |                    |       |            |       |            |       |            |       |            |      |        |       |            |      |        |       |            |      |        |       |            |      |  |  |
| EPA 8141A          | Azinphos methyl    |       |            |       | 5          | 2     | 6          | 2     | 6          |      |        |       |            |      |        |       |            |      | 2      | 1     | 6          | 3    |  |  |
| EPA 8141A          | Chlorpyrifos       | 2     | 5          | 2     | 5          | 2     | 8          | 2     | 6          |      |        |       | 1          |      |        |       | 2          |      | 2      | 1     | 6          | 3    |  |  |
| EPA 8141A          | Demeton-s          |       |            |       |            |       |            |       |            |      |        |       |            |      |        |       |            |      | 2      | 1     | 6          | 3    |  |  |
| EPA 8141A          | Diazinon           | 2     | 5          | 2     | 5          | 2     | 6          | 2     | 6          |      |        |       |            |      |        |       |            |      | 2      | 1     | 6          | 3    |  |  |
| EPA 8141A          | Dimethoate         |       |            |       | 5          | 2     | 6          | 2     | 6          |      |        |       |            |      |        |       |            |      | 2      | 1     | 6          | 3    |  |  |
| EPA 8141A          | Disulfoton         |       |            |       | 5          | 2     | 6          | 2     | 6          |      |        |       |            |      |        |       |            |      | 2      | 1     | 6          | 3    |  |  |
| EPA 8141A          | Malathion          |       |            |       | 5          | 2     | 6          | 2     | 6          |      |        |       |            |      |        |       |            |      | 2      | 1     | 6          | 3    |  |  |
| EPA 8141A          | Methamidophos      |       |            |       | 5          | 2     | 6          | 2     | 6          |      |        |       |            |      |        |       |            |      | 2      | 1     | 6          | 3    |  |  |
| EPA 8141A          | Methidathion       |       |            |       | 5          | 2     | 6          | 2     | 6          |      |        |       |            |      |        |       |            |      | 2      | 1     | 6          | 3    |  |  |
| EPA 8141A          | Molinate           |       |            |       | 5          | 2     | 6          | 2     | 6          |      |        |       |            |      |        |       |            |      |        |       |            |      |  |  |
| EPA 8141A          | Parathion, Methyl  |       |            |       | 5          | 2     | 6          | 2     | 6          |      |        |       |            |      |        |       |            |      | 2      | 1     | 6          | 3    |  |  |
| EPA 8141A          | Phorate            |       |            |       | 5          | 2     | 6          | 2     | 6          |      |        |       |            |      |        |       |            |      | 2      | 1     | 6          | 3    |  |  |
| EPA 8141A          | Phosmet            |       |            |       | 5          | 2     | 6          | 2     | 6          |      |        |       |            |      |        |       |            |      | 2      | 1     | 6          | 3    |  |  |
| EPA 8141A          | Thiobencarb        |       |            |       | 5          | 2     | 6          | 2     | 6          |      |        |       |            |      |        |       |            |      |        |       |            |      |  |  |
| EPA 8141A          | Trifluralin        |       |            |       |            |       |            |       |            |      |        |       |            |      |        |       |            |      | 2      | 1     | 6          | 3    |  |  |
| Pyrethroids        |                    |       |            |       |            |       |            |       |            |      |        |       |            |      |        |       |            |      |        |       |            |      |  |  |
| EPA 8081A          | Bifenthrin         |       | 1          | 2     | 5          | 2     | 6          |       |            |      |        |       |            |      |        |       |            |      |        |       |            |      |  |  |
| EPA 8081A          | Cyfluthrin, total  |       | 1          | 2     | 5          | 2     | 6          |       |            |      |        |       |            |      |        |       |            |      |        |       |            |      |  |  |

| METHOD             | ANALYTE                           | 2005  |            | 2006  |            | 2007  |            | 2008  |            |      | 2009   |       |            |      | 2010   |       |            |      | 2011   |       |            |      |
|--------------------|-----------------------------------|-------|------------|-------|------------|-------|------------|-------|------------|------|--------|-------|------------|------|--------|-------|------------|------|--------|-------|------------|------|
|                    |                                   | STORM | IRRIGATION | STORM | IRRIGATION | STORM | IRRIGATION | STORM | IRRIGATION | FALL | WINTER | STORM | IRRIGATION | FALL | WINTER | STORM | IRRIGATION | FALL | WINTER | STORM | IRRIGATION | FALL |
| EPA 8081A          | Cyhalothrin, lambda, total        | 2     | 5          | 2     | 5          | 2     | 6          |       |            |      |        |       |            |      |        |       |            |      |        |       |            |      |
| EPA 8081A          | Cypermethrin, total               | 2     | 5          | 2     | 5          | 2     | 6          |       |            |      |        |       |            |      |        |       |            |      |        |       |            |      |
| EPA 8081A          | Esfenvalerate/ Fenvalerate, total | 2     | 5          | 2     | 5          | 2     | 6          |       |            |      |        |       |            |      |        |       |            |      |        |       |            |      |
| EPA 8081A          | Permethrin, total                 | 2     | 5          | 2     | 5          | 2     | 6          |       |            |      |        |       |            |      |        |       |            |      |        |       |            |      |
| Triazines          |                                   |       |            |       |            |       |            |       |            |      |        |       |            |      |        |       |            |      |        |       |            |      |
| EPA 547M           | Glyphosate                        |       |            |       | 5          | 2     | 6          | 2     | 6          |      |        |       |            |      |        |       |            |      | 2      |       | 4          |      |
| EPA 549.2M         | Paraquat dichloride               |       |            |       | 5          | 2     | 6          | 2     | 6          |      |        |       |            |      |        |       |            |      | 2      |       | 4          |      |
| EPA 619            | Atrazine                          |       |            |       | 5          | 2     | 6          | 2     | 6          |      |        |       |            |      |        |       |            |      | 2      | 1     | 6          | 3    |
| EPA 619            | Cyanazine                         |       |            |       | 5          | 2     | 6          | 2     | 6          |      |        |       |            |      |        |       |            |      | 2      | 1     | 6          | 3    |
| EPA 619            | Simazine                          |       |            |       | 5          | 2     | 6          | 2     | 6          |      |        |       |            |      |        |       |            |      | 2      | 1     | 6          | 3    |
| Metals (Total)     |                                   |       |            |       |            |       |            |       |            |      |        |       |            |      |        |       |            |      |        |       |            |      |
| EPA 200.8          | Arsenic                           |       |            |       | 5          | 2     | 6          | 2     | 6          |      |        |       |            |      |        |       |            |      | 2      | 1     | 5          |      |
| EPA 200.8          | Boron                             |       |            |       | 5          | 2     | 6          | 2     | 6          |      |        |       |            |      |        |       |            |      | 2      | 1     | 6          | 3    |
| EPA 200.8          | Cadmium                           |       |            |       | 5          | 2     | 6          | 2     | 6          |      |        |       |            |      |        |       |            |      | 2      | 1     | 5          |      |
| EPA 200.8          | Copper                            |       |            |       | 5          | 2     | 6          | 2     | 6          |      |        |       |            |      |        |       |            |      | 2      | 1     | 6          | 3    |
| EPA 200.8          | Lead                              |       |            |       | 5          | 2     | 6          | 2     | 6          |      |        |       |            |      |        |       |            |      | 2      | 1     | 5          |      |
| EPA 200.8          | Molybdenum                        |       |            |       |            |       |            |       |            |      |        |       |            |      |        |       |            |      | 2      | 1     | 5          |      |
| EPA 200.8          | Nickel                            |       |            |       | 5          | 2     | 6          | 2     | 6          |      |        |       |            |      |        |       |            |      | 2      | 1     | 6          | 3    |
| EPA 200.8          | Selenium                          |       |            |       | 5          | 2     | 2          | 2     | 6          |      |        |       |            |      |        |       |            |      | 2      | 1     | 6          | 3    |
| EPA 200.8          | Zinc                              |       |            |       | 5          | 2     | 6          | 2     | 6          |      |        |       |            |      |        |       |            |      | 2      | 1     | 6          | 3    |
| Metals (Dissolved) |                                   |       |            |       |            |       |            |       |            |      |        |       |            |      |        |       |            |      |        |       |            |      |
| EPA 200.8          | Cadmium                           |       |            |       |            |       |            |       |            |      |        |       |            |      |        |       |            |      | 2      | 1     | 5          |      |
| EPA 200.8          | Copper                            |       |            |       |            |       |            |       |            |      |        |       |            |      |        |       |            |      | 2      | 1     | 6          | 3    |
| EPA 200.8          | Lead                              |       |            |       |            |       |            |       |            |      |        |       |            |      |        |       |            |      | 2      | 1     | 5          |      |
| EPA 200.8          | Nickel                            |       |            |       |            |       |            |       |            |      |        |       |            |      |        |       |            |      | 2      | 1     | 6          | 3    |
| EPA 200.8          | Zinc                              |       |            |       |            |       |            |       |            |      |        |       |            |      |        |       |            |      | 2      | 1     | 6          | 3    |
| Nutrients          |                                   |       |            |       |            |       |            |       |            |      |        |       |            |      |        |       |            |      |        |       |            |      |
| SM 2340 C          | Hardness as CaCO3                 |       |            |       | 5          | 2     | 6          | 2     | 6          |      |        |       |            |      |        |       |            |      | 2      | 1     | 6          | 3    |
| EPA 300.0          | Nitrate as N                      |       |            |       | 5          | 2     | 6          | 2     | 6          |      |        |       |            |      |        |       |            |      |        |       |            |      |
| EPA 350.2          | Ammonia as N                      |       |            |       | 5          | 2     | 6          | 3     | 6          | 2    | 2      | 2     | 6          | 2    | 1      | 3     | 5          | 3    | 2      | 1     | 6          | 3    |
| EPA 351.3          | Nitrogen, Total Kjeldahl          |       |            |       | 5          | 2     | 6          | 3     | 6          | 2    | 2      | 1     | 1          |      |        |       | 3          | 3    | 2      | 1     | 6          | 3    |
| EPA 354.1          | Nitrite as N                      |       |            |       | 5          | 2     | 6          | 2     | 6          |      |        |       |            |      |        |       |            |      |        |       |            |      |

| METHOD           | ANALYTE                          | 2005  |            | 2006  |            | 2007  |            | 2008  |            |      | 2009   |       |            | 2010 |        |       | 2011       |      |        |       |            |      |
|------------------|----------------------------------|-------|------------|-------|------------|-------|------------|-------|------------|------|--------|-------|------------|------|--------|-------|------------|------|--------|-------|------------|------|
|                  |                                  | STORM | IRRIGATION | STORM | IRRIGATION | STORM | IRRIGATION | STORM | IRRIGATION | FALL | WINTER | STORM | IRRIGATION | FALL | WINTER | STORM | IRRIGATION | FALL | WINTER | STORM | IRRIGATION | FALL |
| EPA 353.2        | Nitrate + Nitrite as N           |       |            |       |            |       |            | 1     |            | 2    | 2      | 2     | 6          | 2    | 1      | 3     | 5          | 3    | 2      | 1     | 6          | 3    |
| EPA 365.2        | OrthoPhosphate as P              |       |            |       | 5          | 2     | 6          | 3     | 6          | 2    | 2      | 1     | 1          |      |        |       | 3          | 3    | 2      | 1     | 6          | 3    |
| EPA 365.2        | Phosphate as P                   |       |            |       | 5          | 2     | 6          | 3     | 6          | 2    | 2      | 2     | 6          | 2    | 1      | 3     | 5          | 3    | 2      | 1     | 6          | 3    |
| Toxicity         |                                  |       |            |       |            |       |            |       |            |      |        |       |            |      |        |       |            |      |        |       |            |      |
| EPA 821/R-02-012 | <i>Ceriodaphnia dubia</i>        | 2     | 5          | 3     | 5          | 2     | 8          | 2     | 6          |      |        |       |            |      |        |       | 1          |      | 2      | 1     | 6          | 3    |
| EPA 821/R-02-012 | <i>Pimephales promelas</i>       | 2     | 5          | 2     | 6          | 2     | 8          | 2     | 6          |      |        |       |            |      |        |       |            |      | 2      | 1     | 6          | 3    |
| EPA 821/R-02-013 | <i>Selenastrum capricornutum</i> | 2     | 5          | 2     | 5          | 2     | 8          | 4     | 8          |      |        |       | 2          |      |        | 3     | 1          |      | 2      | 1     | 6          | 3    |
| EPA 600/R-99-064 | <i>Hyalella azteca</i>           |       | 5          | 1     | 1          | 1     | 3          | 1     | 2          |      |        |       |            |      |        |       | 1          |      | 1      |       | 1          |      |

**Table III-4. Prairie Flower Drain site subwatershed Management Plan Monitoring schedule (2007-2011).**

Upstream locations included.

| SITE NAME                               | SAMPLE DATE | MONITORING TYPE | CHLORPYRIFOS | NITRATE | C. DUBIA | P. PROMELAS | S. CAPRICORNUTUM | H. AZTECA |
|-----------------------------------------|-------------|-----------------|--------------|---------|----------|-------------|------------------|-----------|
| Prairie Flower @ Crows Landing Rd       | 31-Jul-07   | A               |              |         |          | X           |                  |           |
| Prairie Flower @ Crows Landing Rd       | 28-Aug-07   | A               | X            |         |          |             |                  |           |
| Prairie Flower @ Crows Landing Rd       | 25-Sep-07   | A               | X            |         |          |             |                  |           |
| Prairie Flower @ Morgan Rd              | 22-Apr-08   | U               |              | X       |          |             |                  |           |
| Prairie Flower @ Morgan Rd              | 20-May-08   | U               |              | X       |          |             |                  |           |
| Prairie Flower @ Morgan Rd              | 17-Jun-08   | U               |              | X       |          |             |                  |           |
| Prairie Flower @ Morgan Rd              | 22-Jul-08   | U               |              | X       |          | X           |                  |           |
| Prairie Flower @ Morgan Rd              | 19-Aug-08   | U               | X            | X       |          |             |                  |           |
| Prairie Flower @ Morgan Rd              | 23-Sep-08   | U               | X            | X       | X        |             |                  |           |
| Prairie Flower Drain @ Crows Landing Rd | 21-Apr-09   | MPM             |              |         |          |             | X                |           |
| Prairie Flower Drain @ Crows Landing Rd | 19-May-09   | MPM             |              |         |          |             | X                |           |
| Prairie Flower Drain @ Crows Landing Rd | 18-Aug-09   | MPM             | X            |         |          |             |                  |           |
| Prairie Flower Drain @ Crows Landing Rd | 19-Jan-10   | MPM             |              |         |          |             | X                |           |
| Prairie Flower Drain @ Crows Landing Rd | 23-Feb-10   | MPM             |              |         |          |             | X                |           |
| Prairie Flower Drain @ Crows Landing Rd | 20-Apr-10   | MPM             |              |         |          |             | X                |           |
| Prairie Flower Drain @ Crows Landing Rd | 18-May-10   | MPM             |              |         |          |             | X                |           |
| Prairie Flower Drain @ Crows Landing Rd | 17-Aug-10   | MPM             | X            |         |          |             |                  |           |
| Prairie Flower Drain @ Crows Landing Rd | 14-Sep-10   | MPM             | X            |         | X        |             |                  | X         |
| Prairie Flower Drain @ Crows Landing Rd | 18-Jan-11   | MPM             |              |         |          |             | X                |           |
| Prairie Flower Drain @ Crows Landing Rd | 17-Feb-11   | MPM             |              |         |          |             | X                |           |
| Prairie Flower Drain @ Crows Landing Rd | 15-Mar-11   | MPM             |              |         | X        |             |                  |           |
| Prairie Flower Drain @ Crows Landing Rd | 17-Mar-11   | MPM             |              |         |          |             |                  | X         |
| Prairie Flower Drain @ Crows Landing Rd | 19-Apr-11   | MPM             |              |         |          |             | X                |           |
| Prairie Flower Drain @ Crows Landing Rd | 10-May-11   | MPM             |              |         |          |             | X                |           |
| Prairie Flower Drain @ Crows Landing Rd | 9-Aug-11    | MPM             | X            |         |          |             |                  |           |
| Prairie Flower Drain @ Crows Landing Rd | 6-Sep-11    | MPM             | X            |         | X        |             |                  | X         |

A – Additional sampling

U – Upstream sampling

X – Constituent sampled for Management Plan Monitoring (MPM)

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### Exceedance History

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Samples collected from the Prairie Flower Drain subwatershed (Prairie Flower Drain @ Crows Landing Rd and Prairie Flower Drain @ Morgan Rd) from 2005 through 2011 exceeded the WQTLs for field and physical parameters, *E. coli*, nutrients, metals, pesticides, and water column and sediment toxicity occurred in the Prairie Flower Drain site subwatershed (Table III-5). Samples collected over the entire five years of monitoring at the Prairie Flower Drain sample site resulted in exceedances of DO (23), pH (6), SC (90), TDS (67), *E. coli* (51), nitrate (23), nitrite (1), nitrate + nitrite (37), ammonia (11), chlorpyrifos (4), arsenic (1), dimethoate (3), malathion (1), molybdenum (5), and carbaryl (1). Toxicity to *C. dubia* (3), *S. capricornutum* (12), *P. promelas* (3), and *H. azteca* sediment (6) occurred (Table III-5).

During 2011, exceedances detected during NM and MPM included DO (3), specific conductivity (13), TDS (11), *E. coli* (19), ammonia (5), dimethoate (2), nitrate + nitrite (10), molybdenum (5), and carbaryl (1). Toxicity to *C. dubia* (1) and *S. capricornutum* (3) occurred.

All exceedances are listed in Table III-5 by season and date and are based on WQTLs listed in the introduction to the ESJWQC Management Plan. The highest priority constituents in the Prairie Flower Drain subwatershed are chlorpyrifos (A/B), Nitrate/Nitrite and dimethoate (C) and toxicity to *C. dubia*, *P. promelas* and *H. azteca* (D).



**Table III-5. Prairie Flower Drain site subwatershed exceedances (2005-2011).**

The WQTL used to evaluate the data are listed in the header after the analyte. Upstream site is italicized.

| SITE NAME                               | SEASON     | SAMPLE DATE | OXYGEN, DISSOLVED, <7 MG/L | pH, <6.5 AND >8.5 UNITS | SPECIFIC CONDUCTIVITY, >700 µS/CM | DISSOLVED SOLIDS, >450 MG/L | E. COLI, >235 MPN/100 ML | AMMONIA <sup>1</sup> , >1.5 MG/L | NITRATE AS N, >10 MG/L | NITRITE AS N, >1 MG/L | NITRATE + NITRITE AS N, >10 MG/L | ARSENIC, >10 µG/L | MOLYBDENUM, >10 µG/L | CARBARYL, > 2.53 µG/L | CHLORPYRIFOS, >0.015 µG/L | DIMETHOATE, >1µ G/L | MALATHION, >0 µG/L | C. DUBIA, (% CONTROL) | P. PROMELAS, (% CONTROL) | S. CAPRICORNUTUM, (% CONTROL) | H. AZTECA, (% CONTROL) |
|-----------------------------------------|------------|-------------|----------------------------|-------------------------|-----------------------------------|-----------------------------|--------------------------|----------------------------------|------------------------|-----------------------|----------------------------------|-------------------|----------------------|-----------------------|---------------------------|---------------------|--------------------|-----------------------|--------------------------|-------------------------------|------------------------|
| Prairie Flower Drain @ Crows Landing Rd | Storm      | 2/15/2005   |                            |                         | 2561                              | 1600                        |                          |                                  |                        |                       |                                  |                   |                      |                       |                           |                     |                    |                       |                          |                               |                        |
| Prairie Flower Drain @ Crows Landing Rd | Storm      | 3/22/2005   | 6.5                        |                         | 2568                              | 1600                        | 1600                     |                                  |                        |                       |                                  |                   |                      |                       |                           |                     |                    |                       |                          |                               |                        |
| Prairie Flower Drain @ Crows Landing Rd | Irrigation | 5/11/2005   |                            |                         | 3168                              | 1600                        | 500                      |                                  |                        |                       |                                  |                   |                      |                       |                           |                     |                    |                       |                          |                               |                        |
| Prairie Flower Drain @ Crows Landing Rd | Irrigation | 6/15/2005   |                            |                         | 1705                              | 1300                        | 300                      |                                  |                        |                       |                                  |                   |                      |                       |                           |                     |                    |                       |                          |                               |                        |
| Prairie Flower Drain @ Crows Landing Rd | Irrigation | 7/13/2005   | 3.2                        |                         | 1723                              | 1100                        | 1600                     |                                  |                        |                       |                                  |                   |                      |                       |                           |                     |                    |                       |                          |                               |                        |
| Prairie Flower Drain @ Crows Landing Rd | Irrigation | 8/17/2005   |                            |                         | 1779                              | 990                         | 1600                     |                                  |                        |                       |                                  |                   |                      |                       | 0.029                     |                     |                    |                       |                          |                               |                        |
| Prairie Flower Drain @ Crows Landing Rd | Irrigation | 9/21/2005   | 5.22                       |                         | 791                               | 460                         | 500                      |                                  |                        |                       |                                  |                   |                      |                       | 0.018                     |                     |                    |                       |                          |                               | 86                     |
| Prairie Flower Drain @ Crows Landing Rd | Storm      | 3/1/2006    |                            |                         | 2419                              | 1600                        | 900                      |                                  |                        |                       |                                  |                   |                      |                       |                           |                     |                    |                       |                          |                               |                        |
| Prairie Flower Drain @ Crows Landing Rd | Storm      | 3/16/2006   |                            | 8.77                    | 2728                              | 1600                        | 300                      |                                  |                        |                       |                                  |                   |                      |                       |                           |                     |                    | 75                    |                          |                               |                        |
| Prairie Flower Drain @ Crows Landing Rd | Storm      | 3/24/2006   |                            |                         | 2782                              |                             |                          |                                  |                        |                       |                                  |                   |                      |                       |                           |                     |                    |                       |                          |                               |                        |
| Prairie Flower Drain @ Crows Landing Rd | Storm      | 5/2/2006    |                            |                         | 2724                              |                             |                          |                                  |                        |                       |                                  |                   |                      |                       |                           |                     |                    |                       |                          |                               | 92                     |
| Prairie Flower Drain @ Crows Landing Rd | Irrigation | 5/18/2006   |                            |                         | 2958                              | 1700                        | 550                      |                                  |                        |                       |                                  |                   |                      |                       |                           |                     |                    |                       |                          |                               |                        |
| Prairie Flower Drain @ Crows Landing Rd | Irrigation | 6/15/2006   |                            |                         | 2660                              | 1700                        | 1300                     |                                  | 21                     |                       |                                  |                   |                      |                       |                           |                     |                    |                       |                          |                               |                        |
| Prairie Flower Drain @ Crows Landing Rd | Irrigation | 7/13/2006   | 5.45                       | 8.85                    | 1560                              | 720                         | 790                      | 18                               |                        |                       |                                  |                   |                      |                       |                           |                     |                    | 8                     |                          |                               |                        |
| Prairie Flower Drain @ Crows Landing Rd | Irrigation | 7/20/2006   | 6.41                       |                         | 1950                              |                             |                          |                                  |                        |                       |                                  |                   |                      |                       |                           |                     |                    | 70                    |                          |                               |                        |

| SITE NAME                               | SEASON     | SAMPLE DATE | OXYGEN, DISSOLVED, <7 MG/L | PH, <6.5 AND >8.5 UNITS | SPECIFIC CONDUCTIVITY, >700 µS/CM | DISSOLVED SOLIDS, >450 MG/L | E. COLI, >235 MPN/100 ML | AMMONIA <sup>1</sup> , >1.5 MG/L | NITRATE AS N, >10 MG/L | NITRITE AS N, >1 MG/L | NITRATE + NITRITE AS N, >10 MG/L | ARSENIC, >10 µG/L | MOLYBDENUM, >10 µG/L | CARBARYL, > 2.53 µG/L | CHLORPYRIFOS, >0.015 µG/L | DIMETHOATE, >1µ G/L | MALATHION, >0 µG/L | C. DUBIA, (% CONTROL) | P. PROMELAS, (% CONTROL) | S. CAPRICORNUTUM, (% CONTROL) | H. AZTECA, (% CONTROL) |
|-----------------------------------------|------------|-------------|----------------------------|-------------------------|-----------------------------------|-----------------------------|--------------------------|----------------------------------|------------------------|-----------------------|----------------------------------|-------------------|----------------------|-----------------------|---------------------------|---------------------|--------------------|-----------------------|--------------------------|-------------------------------|------------------------|
| Prairie Flower Drain @ Crows Landing Rd | Irrigation | 8/10/2006   |                            |                         | 2302                              | 1800                        | 820                      |                                  | 17                     | 1.1                   |                                  |                   |                      |                       |                           |                     |                    |                       |                          |                               |                        |
| Prairie Flower Drain @ Crows Landing Rd | Irrigation | 9/14/2006   | 6.01                       |                         | 1276                              | 760                         | 2400                     |                                  | 11                     |                       |                                  |                   |                      |                       |                           |                     |                    |                       |                          |                               |                        |
| Prairie Flower Drain @ Crows Landing Rd | Storm      | 2/11/2007   |                            | 6.12                    | 2659                              | 1600                        | 2400                     |                                  | 24                     |                       |                                  |                   |                      |                       |                           |                     |                    |                       |                          |                               |                        |
| Prairie Flower Drain @ Crows Landing Rd | Storm      | 3/1/2007    |                            | 8.57                    | 2592                              | 1500                        |                          |                                  | 42                     |                       |                                  |                   |                      |                       |                           |                     |                    |                       |                          |                               |                        |
| Prairie Flower Drain @ Crows Landing Rd | Storm      | 3/7/2007    |                            |                         | 4798                              |                             |                          |                                  |                        |                       |                                  |                   |                      |                       |                           |                     |                    |                       |                          |                               |                        |
| Prairie Flower Drain @ Crows Landing Rd | Irrigation | 4/17/2007   |                            |                         | 2127                              | 1700                        |                          |                                  | 25                     |                       |                                  |                   |                      |                       |                           |                     |                    |                       |                          |                               |                        |
| Prairie Flower Drain @ Crows Landing Rd | Irrigation | 5/15/2007   | 5.59                       |                         | 2473                              | 1500                        | 920                      |                                  | 32                     |                       |                                  |                   |                      |                       |                           |                     |                    |                       |                          | 88                            |                        |
| Prairie Flower Drain @ Crows Landing Rd | Irrigation | 5/23/2007   |                            |                         | 2390                              |                             |                          |                                  |                        |                       |                                  |                   |                      |                       |                           |                     |                    |                       |                          |                               |                        |
| Prairie Flower Drain @ Crows Landing Rd | Irrigation | 6/19/2007   |                            | 8.54                    | 2304                              | 1500                        |                          |                                  | 41                     |                       |                                  | 12                |                      |                       |                           |                     |                    |                       |                          |                               |                        |
| Prairie Flower Drain @ Crows Landing Rd | Irrigation | 7/17/2007   | 4.3                        |                         | 1067                              | 730                         |                          |                                  | 13                     |                       |                                  |                   |                      |                       |                           |                     |                    |                       |                          |                               |                        |
| Prairie Flower Drain @ Crows Landing Rd | Irrigation | 8/14/2007   |                            |                         | 1126                              | 700                         | 260                      |                                  | 16                     |                       |                                  |                   |                      |                       |                           |                     |                    |                       |                          |                               |                        |
| Prairie Flower Drain @ Crows Landing Rd | Irrigation | 8/16/2007   |                            |                         | 2562                              |                             |                          |                                  |                        |                       |                                  |                   |                      |                       |                           |                     |                    |                       |                          |                               | 59                     |
| Prairie Flower Drain @ Crows Landing Rd | Irrigation | 8/28/2007   | 3.64                       |                         | 1015                              |                             |                          |                                  |                        |                       |                                  |                   |                      |                       | 0.094                     |                     |                    |                       |                          |                               |                        |
| Prairie Flower Drain @ Crows Landing Rd | Irrigation | 9/11/2007   | 7.86                       |                         | 1097                              | 540                         | 2400                     |                                  |                        |                       |                                  |                   |                      |                       |                           |                     |                    | 0                     |                          |                               | 17                     |
| Prairie Flower Drain @ Crows Landing Rd | Irrigation | 9/18/2007   |                            |                         | 2262                              |                             |                          |                                  |                        |                       |                                  |                   |                      |                       |                           |                     |                    |                       |                          |                               |                        |
| Prairie Flower Drain @ Crows Landing Rd | Irrigation | 9/25/2007   |                            |                         | 2489                              |                             |                          |                                  |                        |                       |                                  |                   |                      |                       |                           |                     |                    |                       |                          |                               |                        |

| SITE NAME                               | SEASON            | SAMPLE DATE      | OXYGEN, DISSOLVED, <7 MG/L | PH, <6.5 AND >8.5 UNITS | SPECIFIC CONDUCTIVITY, >700 µS/CM | DISSOLVED SOLIDS, >450 MG/L | E. COLI, >235 MPN/100 ML | AMMONIA <sup>1</sup> , >1.5 MG/L | NITRATE AS N, >10 MG/L | NITRITE AS N, >1 MG/L | NITRATE + NITRITE AS N, >10 MG/L | ARSENIC, >10 µG/L | MOLYBDENUM, >10 µG/L | CARBARYL, > 2.53 µG/L | CHLORPYRIFOS, >0.015 µG/L | DIMETHOATE, >1µ G/L | MALATHION, >0 µG/L | C. DUBIA, (% CONTROL) | P. PROMELAS, (% CONTROL) | S. CAPRICORNUTUM, (% CONTROL) | H. AZTECA, (% CONTROL) |
|-----------------------------------------|-------------------|------------------|----------------------------|-------------------------|-----------------------------------|-----------------------------|--------------------------|----------------------------------|------------------------|-----------------------|----------------------------------|-------------------|----------------------|-----------------------|---------------------------|---------------------|--------------------|-----------------------|--------------------------|-------------------------------|------------------------|
| Prairie Flower Drain @ Crows Landing Rd | Storm             | 1/24/2008        |                            |                         | 2371                              | 1500                        | 1100                     |                                  | 23                     |                       |                                  |                   |                      |                       |                           |                     |                    |                       |                          | 71                            |                        |
| Prairie Flower Drain @ Crows Landing Rd | Storm             | 1/30/2008        |                            |                         | 2944                              |                             |                          |                                  |                        |                       |                                  |                   |                      |                       |                           |                     |                    |                       |                          |                               |                        |
| Prairie Flower Drain @ Crows Landing Rd | Storm             | 2/26/2008        |                            |                         | 2722                              | 1600                        |                          |                                  | 28                     |                       |                                  |                   |                      |                       |                           |                     |                    |                       |                          | 39                            |                        |
| Prairie Flower Drain @ Crows Landing Rd | Sediment          | 3/4/2008         |                            |                         | 2639                              |                             |                          |                                  |                        |                       |                                  |                   |                      |                       |                           |                     |                    |                       |                          |                               |                        |
| Prairie Flower Drain @ Crows Landing Rd | Irrigation        | 4/22/2008        |                            |                         | 2548                              | 1700                        | 370                      |                                  | 23                     |                       |                                  |                   |                      |                       |                           |                     |                    |                       |                          | 29                            |                        |
| <i>Prairie Flower Drain @ Morgan Rd</i> | <i>Irrigation</i> | <i>4/22/2008</i> | 3.29                       |                         | 2574                              |                             |                          |                                  | 35                     |                       |                                  |                   |                      |                       |                           |                     |                    |                       |                          |                               |                        |
| Prairie Flower Drain @ Crows Landing Rd | Irrigation        | 4/29/2008        | 5.44                       |                         | 1739                              |                             |                          |                                  |                        |                       |                                  |                   |                      |                       |                           |                     |                    |                       |                          | 56                            |                        |
| Prairie Flower Drain @ Crows Landing Rd | Irrigation        | 5/20/2008        |                            |                         | 2526                              | 1600                        | 610                      |                                  | 26                     |                       |                                  |                   |                      |                       |                           |                     |                    |                       |                          | 61                            |                        |
| <i>Prairie Flower Drain @ Morgan Rd</i> | <i>Irrigation</i> | <i>5/20/2008</i> | 1.17                       |                         | 2026                              |                             |                          |                                  | 22                     |                       |                                  |                   |                      |                       |                           |                     |                    |                       |                          |                               |                        |
| Prairie Flower Drain @ Crows Landing Rd | Irrigation        | 5/27/2008        |                            |                         | 2273                              |                             |                          |                                  |                        |                       |                                  |                   |                      |                       |                           |                     |                    |                       |                          | 88                            |                        |
| Prairie Flower Drain @ Crows Landing Rd | Irrigation        | 6/17/2008        |                            |                         | 2049                              | 1200                        | 1300                     | 2.1                              | 19                     |                       |                                  |                   |                      |                       |                           |                     |                    |                       |                          |                               |                        |
| <i>Prairie Flower Drain @ Morgan Rd</i> | <i>Irrigation</i> | <i>6/17/2008</i> |                            |                         | 2893                              |                             |                          |                                  | 30                     |                       |                                  |                   |                      |                       |                           |                     |                    |                       |                          |                               |                        |
| Prairie Flower Drain @ Crows Landing Rd | Irrigation        | 7/22/2008        | 2.51                       |                         | 1012                              | 620                         | 250                      |                                  | 11                     |                       |                                  |                   |                      |                       |                           | 2.7                 |                    |                       |                          |                               |                        |
| <i>Prairie Flower Drain @ Morgan Rd</i> | <i>Irrigation</i> | <i>7/22/2008</i> | 2.76                       |                         | 1417                              |                             |                          |                                  |                        |                       |                                  |                   |                      |                       |                           |                     |                    |                       |                          |                               |                        |
| Prairie Flower Drain @ Crows Landing Rd | Irrigation        | 8/19/2008        | 4.93                       |                         | 956                               | 610                         | 440                      |                                  | 13                     |                       |                                  |                   |                      |                       | 0.024                     |                     | 0.12               |                       |                          |                               |                        |
| <i>Prairie Flower Drain @ Morgan Rd</i> | <i>Irrigation</i> | <i>8/19/2008</i> | 3.63                       |                         | 1300                              |                             |                          |                                  | 20                     |                       |                                  |                   |                      |                       |                           |                     |                    |                       |                          |                               |                        |

| SITE NAME                               | SEASON     | SAMPLE DATE | OXYGEN, DISSOLVED, <7 MG/L | PH, <6.5 AND >8.5 UNITS | SPECIFIC CONDUCTIVITY, >700 µS/CM | DISSOLVED SOLIDS, >450 MG/L | E. COLI, >235 MPN/100 ML | AMMONIA <sup>1</sup> , >1.5 MG/L | NITRATE AS N, >10 MG/L | NITRITE AS N, >1 MG/L | NITRATE + NITRITE AS N, >10 MG/L | ARSENIC, >10 µG/L | MOLYBDENUM, >10 µG/L | CARBARYL, > 2.53 µG/L | CHLORPYRIFOS, >0.015 µG/L | DIMETHOATE, >1µ G/L | MALATHION, >0 µG/L | C. DUBIA, (% CONTROL) | P. PROMELAS, (% CONTROL) | S. CAPRICORNUTUM, (% CONTROL) | H. AZTECA, (% CONTROL) |
|-----------------------------------------|------------|-------------|----------------------------|-------------------------|-----------------------------------|-----------------------------|--------------------------|----------------------------------|------------------------|-----------------------|----------------------------------|-------------------|----------------------|-----------------------|---------------------------|---------------------|--------------------|-----------------------|--------------------------|-------------------------------|------------------------|
| Prairie Flower Drain @ Crows Landing Rd | Sediment   | 8/28/2008   |                            |                         | 1114                              |                             |                          |                                  |                        |                       |                                  |                   |                      |                       |                           |                     |                    |                       |                          |                               | 90                     |
| Prairie Flower Drain @ Crows Landing Rd | Irrigation | 9/23/2008   |                            |                         | 2525                              | 1800                        |                          |                                  | 33                     |                       |                                  |                   |                      |                       |                           |                     |                    |                       |                          |                               |                        |
| Prairie Flower Drain @ Morgan Rd        | Irrigation | 9/23/2008   | 3.3                        |                         | 2675                              |                             |                          |                                  | 29                     |                       |                                  |                   |                      |                       |                           |                     |                    |                       |                          |                               |                        |
| Prairie Flower Drain @ Crows Landing Rd | Sediment   | 10/2/2008   |                            |                         | 2449                              |                             |                          |                                  |                        |                       |                                  |                   |                      |                       |                           |                     |                    |                       |                          |                               | 86                     |
| Prairie Flower Drain @ Crows Landing Rd | Fall       | 10/21/2008  |                            |                         | 1742                              | 1100                        | 370                      |                                  |                        |                       | 27                               |                   |                      |                       |                           |                     |                    |                       |                          |                               |                        |
| Prairie Flower Drain @ Crows Landing Rd | Fall       | 11/11/2008  |                            |                         | 2151                              | 1500                        |                          |                                  |                        |                       | 39                               |                   |                      |                       |                           |                     |                    |                       |                          |                               |                        |
| Prairie Flower Drain @ Crows Landing Rd | Fall       | 12/16/2008  |                            |                         | 2298                              | 2900                        | 1300                     |                                  |                        |                       | 40                               |                   |                      |                       |                           |                     |                    |                       |                          |                               |                        |
| Prairie Flower Drain @ Crows Landing Rd | Winter     | 1/20/2009   |                            |                         | 2414                              | 1500                        |                          |                                  |                        |                       | 43                               |                   |                      |                       |                           |                     |                    |                       |                          |                               |                        |
| Prairie Flower Drain @ Crows Landing Rd | Storm      | 2/7/2009    |                            |                         | 2255                              | 1300                        |                          |                                  |                        |                       | 31                               |                   |                      |                       |                           |                     |                    |                       |                          |                               |                        |
| Prairie Flower Drain @ Crows Landing Rd | Winter     | 3/17/2009   |                            | 8.74                    | 2394                              | 1400                        |                          |                                  |                        |                       | 34                               |                   |                      |                       |                           |                     |                    |                       |                          |                               |                        |
| Prairie Flower Drain @ Crows Landing Rd | Irrigation | 4/21/2009   |                            |                         | 2223                              | 1400                        | 410                      |                                  |                        |                       | 24                               |                   |                      |                       |                           |                     |                    |                       |                          |                               |                        |
| Prairie Flower Drain @ Crows Landing Rd | Irrigation | 5/19/2009   | 4.78                       |                         | 2066                              | 1200                        | >2400                    | 3.2                              |                        |                       | 20                               |                   |                      |                       |                           |                     |                    |                       |                          | 30                            |                        |
| Prairie Flower Drain @ Crows Landing Rd | Irrigation | 6/16/2009   |                            |                         | 2417                              | 1400                        |                          | 1.3                              |                        |                       | 22                               |                   |                      |                       |                           |                     |                    |                       |                          |                               |                        |
| Prairie Flower Drain @ Crows Landing Rd | Irrigation | 7/21/2009   |                            |                         | 1366                              | 820                         |                          | 1.8                              |                        |                       | 14                               |                   |                      |                       |                           |                     |                    |                       |                          |                               |                        |
| Prairie Flower Drain @ Crows Landing Rd | Irrigation | 8/18/2009   |                            |                         | 1984                              | 1200                        |                          |                                  |                        |                       | 22                               |                   |                      |                       |                           |                     |                    |                       |                          |                               |                        |
| Prairie Flower Drain @ Crows Landing Rd | Irrigation | 9/22/2009   |                            |                         | 2171                              | 1400                        | 1300                     |                                  |                        |                       | 35                               |                   |                      |                       |                           |                     |                    |                       |                          |                               |                        |

| SITE NAME                               | SEASON     | SAMPLE DATE | OXYGEN, DISSOLVED, <7 MG/L | PH, <6.5 AND >8.5 UNITS | SPECIFIC CONDUCTIVITY, >700 µS/CM | DISSOLVED SOLIDS, >450 MG/L | E. COLI, >235 MPN/100 ML | AMMONIA <sup>1</sup> , >1.5 MG/L | NITRATE AS N, >10 MG/L | NITRITE AS N, >1 MG/L | NITRATE + NITRITE AS N, >10 MG/L | ARSENIC, >10 µG/L | MOLYBDENUM, >10 µG/L | CARBARYL, > 2.53 µG/L | CHLORPYRIFOS, >0.015 µG/L | DIMETHOATE, >1µ G/L | MALATHION, >0 µG/L | C. DUBIA, (% CONTROL) | P. PROMELAS, (% CONTROL) | S. CAPRICORNUTUM, (% CONTROL) | H. AZTECA, (% CONTROL) |
|-----------------------------------------|------------|-------------|----------------------------|-------------------------|-----------------------------------|-----------------------------|--------------------------|----------------------------------|------------------------|-----------------------|----------------------------------|-------------------|----------------------|-----------------------|---------------------------|---------------------|--------------------|-----------------------|--------------------------|-------------------------------|------------------------|
| Prairie Flower Drain @ Crows Landing Rd | Fall       | 10/20/2009  |                            |                         | 2459                              | 1400                        | 1300                     |                                  |                        |                       | 25                               |                   |                      |                       |                           |                     |                    |                       |                          |                               |                        |
| Prairie Flower Drain @ Crows Landing Rd | Fall       | 11/17/2009  |                            |                         | 2415                              | 1500                        | >2400                    | 8.8                              |                        |                       | 36                               |                   |                      |                       |                           |                     |                    |                       |                          |                               |                        |
| Prairie Flower Drain @ Crows Landing Rd | Storm      | 12/15/2009  |                            |                         | 2695                              | 1600                        | 2000                     |                                  |                        |                       | 36                               |                   |                      |                       |                           |                     |                    |                       |                          |                               |                        |
| Prairie Flower Drain @ Crows Landing Rd | Storm      | 1/19/2010   |                            |                         | 1837                              | 1300                        | 2400                     |                                  |                        |                       | 43                               |                   |                      |                       |                           |                     |                    |                       |                          | 56                            |                        |
| Prairie Flower Drain @ Crows Landing Rd | Storm      | 2/23/2010   |                            |                         | 2833                              | 1700                        | 440                      |                                  |                        |                       | 32                               |                   |                      |                       |                           |                     |                    |                       |                          |                               |                        |
| Prairie Flower Drain @ Crows Landing Rd | Winter     | 3/23/2010   |                            |                         | 2833                              | 1700                        | 1400                     |                                  |                        |                       | 31                               |                   |                      |                       |                           |                     |                    |                       |                          |                               |                        |
| Prairie Flower Drain @ Crows Landing Rd | Storm      | 4/20/2010   |                            |                         | 2399                              | 1500                        | 1300                     |                                  |                        |                       | 33                               |                   |                      |                       |                           |                     |                    |                       |                          |                               |                        |
| Prairie Flower Drain @ Crows Landing Rd | Irrigation | 5/18/2010   |                            |                         | 2428                              | 1500                        | 460                      |                                  |                        |                       | 35                               |                   |                      |                       |                           |                     |                    |                       |                          |                               |                        |
| Prairie Flower Drain @ Crows Landing Rd | Irrigation | 6/15/2010   | 4.25                       |                         | 2703                              | 1600                        | 820                      |                                  |                        |                       | 29                               |                   |                      |                       |                           |                     |                    |                       |                          |                               |                        |
| Prairie Flower Drain @ Crows Landing Rd | Irrigation | 7/20/2010   |                            |                         | 2556                              | 1500                        | 260                      |                                  |                        |                       | 26                               |                   |                      |                       |                           |                     |                    |                       |                          |                               |                        |
| Prairie Flower Drain @ Crows Landing Rd | Irrigation | 8/17/2010   |                            |                         | 2776                              | 1700                        | 870                      |                                  |                        |                       | 24                               |                   |                      |                       |                           |                     |                    |                       |                          |                               |                        |
| Prairie Flower Drain @ Crows Landing Rd | Irrigation | 9/14/2010   |                            |                         |                                   |                             |                          |                                  |                        |                       | 12                               |                   |                      |                       |                           |                     |                    |                       |                          |                               |                        |
| Prairie Flower Drain @ Crows Landing Rd | Fall       | 10/19/2010  |                            |                         | 1795                              | 1100                        | 580                      |                                  |                        |                       | 20                               |                   |                      |                       |                           |                     |                    |                       |                          |                               |                        |
| Prairie Flower Drain @ Crows Landing Rd | Fall       | 11/16/2010  |                            |                         | 2710                              | 1700                        | 460                      |                                  |                        |                       | 42                               |                   |                      |                       |                           |                     |                    |                       |                          |                               |                        |
| Prairie Flower Drain @ Crows Landing Rd | Fall       | 12/14/2010  |                            |                         | 2688                              | 1700                        | >2400                    |                                  |                        |                       | 40                               |                   |                      |                       |                           |                     |                    |                       |                          |                               |                        |
| Prairie Flower Drain @ Crows Landing Rd | Winter     | 1/18/2011   | 5.35                       |                         | 2951                              | 1800                        | 870                      | 1.90                             |                        |                       | 29                               |                   | 25                   |                       |                           |                     |                    |                       |                          |                               |                        |

| SITE NAME                               | SEASON     | SAMPLE DATE | OXYGEN, DISSOLVED, <7 MG/L | PH, <6.5 AND >8.5 UNITS | SPECIFIC CONDUCTIVITY, >700 µS/CM | DISSOLVED SOLIDS, >450 MG/L | E. COLI, >235 MPN/100 ML | AMMONIA <sup>1</sup> , >1.5 MG/L | NITRATE AS N, >10 MG/L | NITRITE AS N, >1 MG/L | NITRATE + NITRITE AS N, >10 MG/L | ARSENIC, >10 µG/L | MOLYBDENUM, >10 µG/L | CARBARYL, > 2.53 µG/L | CHLORPYRIFOS, >0.015 µG/L | DIMETHOATE, >1µ G/L | MALATHION, >0 µG/L | C. DUBIA, (% CONTROL) | P. PROMELAS, (% CONTROL) | S. CAPRICORNUTUM, (% CONTROL) | H. AZTECA, (% CONTROL) |
|-----------------------------------------|------------|-------------|----------------------------|-------------------------|-----------------------------------|-----------------------------|--------------------------|----------------------------------|------------------------|-----------------------|----------------------------------|-------------------|----------------------|-----------------------|---------------------------|---------------------|--------------------|-----------------------|--------------------------|-------------------------------|------------------------|
| Prairie Flower Drain @ Crows Landing Rd | Storm      | 2/17/2011   |                            |                         | 2647                              | 1600                        |                          |                                  |                        |                       | 33                               | 21                |                      |                       |                           |                     |                    |                       |                          | 82                            |                        |
| Prairie Flower Drain @ Crows Landing Rd | Winter     | 3/15/2011   |                            |                         | 2685                              | 1700                        |                          |                                  |                        |                       | 31                               | 19                |                      |                       |                           |                     |                    |                       |                          |                               |                        |
| Prairie Flower Drain @ Crows Landing Rd | Winter     | 3/17/2011   |                            |                         | 2643                              |                             |                          |                                  |                        |                       |                                  |                   |                      |                       |                           |                     |                    |                       |                          |                               |                        |
| Prairie Flower Drain @ Crows Landing Rd | Irrigation | 4/19/2011   | 2.14                       |                         | 1471                              | 800                         | >2400                    | 12.00                            |                        |                       |                                  |                   |                      |                       |                           |                     |                    |                       | 80                       |                               |                        |
| Prairie Flower Drain @ Crows Landing Rd | Irrigation | 5/10/2011   |                            |                         | 1775                              | 1000                        | 370                      | 1.80                             |                        |                       | 17                               |                   | 11                   |                       |                           |                     |                    |                       |                          |                               |                        |
| Prairie Flower Drain @ Crows Landing Rd | Irrigation | 6/14/2011   |                            |                         | 2035                              | 1200                        |                          |                                  |                        |                       | 24                               |                   | 13                   |                       |                           |                     |                    |                       |                          |                               |                        |
| Prairie Flower Drain @ Crows Landing Rd | Irrigation | 6/15/2011   |                            |                         | 2423                              |                             |                          |                                  |                        |                       |                                  |                   |                      |                       |                           |                     |                    |                       |                          |                               |                        |
| Prairie Flower Drain @ Crows Landing Rd | Irrigation | 7/12/2011   |                            |                         | 1083                              | 770                         | >2400                    | 1.8                              |                        |                       | 16                               |                   |                      |                       |                           |                     |                    |                       |                          |                               |                        |
| Prairie Flower Drain @ Crows Landing Rd | Irrigation | 8/9/2011    |                            |                         | 1141                              | 680                         | 1000                     | 4.1                              |                        |                       |                                  |                   |                      | 13                    |                           | 10                  |                    | 0                     |                          |                               |                        |
| Prairie Flower Drain @ Crows Landing Rd | Irrigation | 9/6/2011    |                            |                         |                                   |                             | 370                      |                                  |                        |                       | 11                               |                   |                      |                       |                           | 1.1                 |                    |                       |                          |                               |                        |
| Prairie Flower Drain @ Crows Landing Rd | Fall       | 10/11/2011  | 6.59                       |                         | 2447                              | 1600                        | 290                      |                                  |                        |                       | 28                               |                   |                      |                       |                           |                     |                    |                       |                          | 35                            |                        |
| Prairie Flower Drain @ Crows Landing Rd | Fall       | 11/8/2011   |                            |                         | 2206                              | 1500                        | 520                      |                                  |                        |                       | 33                               |                   |                      |                       |                           |                     |                    |                       |                          |                               |                        |
| Prairie Flower Drain @ Crows Landing Rd | Fall       | 12/6/2011   |                            |                         | 2095                              | 1400                        | 460                      |                                  |                        |                       | 41                               |                   |                      |                       |                           |                     |                    |                       |                          | 8                             |                        |
| Constituent Priority                    |            |             | E                          | E                       | E                                 | E                           | E                        | E                                | C                      | NP                    | C                                | NP                | E                    | NP                    | A/B                       | C                   | NP                 | D                     | D                        | E                             | D                      |

<sup>1</sup>Ammonia WQTL variable based on pH and temperature.

NP – Not Prioritized; less than two exceedances within three consecutive monitoring years and currently no TMDL.

NP<sup>T</sup> – Not prioritized; both toxic samples were from the same sampling event (sample and resample to test for persistence).

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## 2007-2011 Management Plan Monitoring Results

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All monitoring results for high priority management plan constituents in the Prairie Flower Drain subwatershed are listed in Table III-6. These constituents include chlorpyrifos, dimethoate, nitrate, and toxicity to *C. dubia*, *P. promelas*, *S. capricornutum* and *H. azteca*.

Chlorpyrifos exceeded the WQTL four times in samples collected from the Prairie Flower Drain @ Crows Landing Rd subwatershed (Table III-6). No exceedances of chlorpyrifos occurred during upstream monitoring in 2008 at Prairie Flower Drain @ Morgan Rd. All exceedances occurred during the irrigation season, twice during 2005 (August and September), once each in 2007 and 2008 (August). Since the most recent exceedance in August 2008, the Coalition completed Normal Monitoring in 2008 (September) and conducted MPM for chlorpyrifos in 2009 (August) and in 2010 and 2011 (August and September). Assessment Monitoring occurred at the site during 2011 from January through December and no exceedances of the chlorpyrifos WQTL occurred. Zero exceedances of the chlorpyrifos WQTL have occurred since August 2009. In 2012, MPM for chlorpyrifos is scheduled in August, and September.

Dimethoate exceeded the WQTL twice at Prairie Flower Drain @ Crows Landing Rd during 2011 Assessment Monitoring (August and September). In 2012, MPM for dimethoate is scheduled to occur during months of past exceedances (August and September).

Nitrate exceedances occurred at Prairie Flower Drain @ Crows Landing Rd consistently since 2006 monitoring (Table III-5). During 2007, Normal Monitoring exceedances of nitrate occurred in samples collected from February through August (Table III-6). Nitrate MPM during 2008 (April-September) at the upstream location at Prairie Flower @ Morgan Rd resulted in exceedances of the nitrate WQTL during every month except July. In addition, 2008 Normal Monitoring resulted in exceedances of the nitrate WQTL during January, February and April through September. The Coalition replaced separate analysis of nitrate and nitrite with the combined analysis of nitrate + nitrite starting in October 2008. Exceedances of the nitrate WQTL (either of separately measured nitrate or of combined nitrate + nitrite analysis) occurred during every month of the year from 2007 through 2011. Since the Coalition does not possess the capabilities to track fertilizer applications or understand dairy contributions and therefore cannot determine the exact source of the nitrate exceedances, MPM for nitrate is no longer scheduled at Prairie Flower Drain. However, in the current 2008 MRPP, nitrate is a Core Monitoring constituent and since Prairie Flower Drain @ Crows Landing Rd is a Core Monitoring location nitrate is monitored on a monthly basis, therefore scheduling MPM for nitrate is not necessary. Nitrate is still a priority constituent at Prairie Flower Drain @ Crows Landing Rd and in 2012 nitrate will be monitored monthly as part of Core Monitoring at the site.

Toxicity to *C. dubia* occurred three times at Prairie Flower Drain since monitoring began in 2005 (May 2006, September 2007 and August 2011). The site was monitored monthly for toxicity to *C. dubia* during the storm and irrigation seasons of 2007 and 2008. Toxicity to *C. dubia* occurred during the 2007 (September) Normal Monitoring event, but no toxicity occurred in samples collected during 2008 during Normal Monitoring or upstream MPM at Prairie Flower Drain @ Morgan Rd (Table III-6). The TIE for the

toxic samples from September 2007 indicated that organophosphates were responsible for toxicity (3.2 TUa). *C. dubia* toxicity was analyzed monthly during 2011 Assessment Monitoring and toxicity occurred in August (Table III-6). Toxicity was not persistent. A TIE was conducted on the samples from the August 2011 toxicity and it was concluded that pyrethroid insecticides were the cause of toxicity. In 2012, MPM is scheduled for *C. dubia* toxicity (March, August and September).

Toxicity to *P. promelas* occurred in July 2006. In 2007, MPM was implemented at Prairie Flower Drain @ Crows Landing Rd for *P. promelas* toxicity and did not result in toxicity (Table III-6). Normal Monitoring and upstream MPM for *P. promelas* occurred during the 2008 irrigation season at Prairie Flower Drain @ Morgan Road and no samples were toxic to *P. promelas*. In 2009 and 2010, MPM for *P. promelas* was not scheduled. In 2012, Prairie Flower Drain @ Crows Landing Rd rotated into Assessment Monitoring and *P. promelas* was monitored monthly for toxicity. Samples collected during the April 2011 monitoring event were toxic to *P. promelas* (80% survival compared to the control). Survival was greater than 50% compared to the control and therefore a TIE was not initiated. Samples from this April event also exceeded the WQTL for ammonia with a concentration of 12 mg/L. It is likely that the high ammonia was the cause of the 20% reduction in *P. promelas* survival. In 2012, MPM for *P. promelas* is scheduled to occur (April and July).

Toxicity to *S. capricornutum* occurred nine times at Prairie Flower Drain @ Crows Landing Rd in 2007 (May), 2008 (January, February, April and May), in 2009 (May), in 2010 (January) and in 2011 (February, October and December). A TIE was initiated on the February 2008 toxic samples; however, the sample lost all toxicity and the analysis was inconclusive. The results for the April 2008 TIE indicated that the toxicity was caused by cationic chemicals and non-polar organics. The TIE for the toxic May 2009 samples indicated that cationic chemicals and ammonia were the cause of toxicity. Due to the updated monitoring schedule from the 2008 MRPP, MPM for *S. capricornutum* toxicity did not begin until 2009 at Prairie Flower Drain @ Crows Landing Rd. The Coalition's original management plan strategy did not address storm exceedances due to the difficulty in sourcing those exceedances, and at the time of the management plan strategy's development the Coalition was not monitoring monthly (only storms and irrigation months). Starting in 2010, the Coalition updated its management plan strategy to monitor management plan constituents during the storm month that they occurred regardless of a rain event. In response to the updated management plan strategy, *S. capricornutum* toxicity MPM at Prairie Flower Drain @ Crows Landing Rd began in January and February of 2010 and continued through May. In 2011, Assessment Monitoring occurred at the site and resulted in toxicity three times (February, October and December). In 2012, MPM is scheduled for *S. capricornutum* toxicity (January, February, April, May, October and December).

Toxicity to *H. azteca* occurred six times (Table III-6) at Prairie Flower Drain @ Crows Landing Rd, in 2005 (September), 2006 (May), 2007 (August and September) and in 2008 (August and October). Sediment toxicity was added to the MPM schedule in September of 2010, so MPM for *H. azteca* only occurred once in 2010 (September). Starting in 2011, *H. azteca* MPM occurred in both winter and irrigation



monitoring (March and September). Samples collected for sediment monitoring in 2010 and 2011 were not toxic to *H. azteca*. In 2012, MPM is scheduled to continue during March and September.

**Table III-6. Prairie Flower Drain site subwatershed monitoring results for high priority constituents (2007-2011).**

Exceedance values are in bold. Resampling (RS) due to toxicity not included in table.

| MONTH:                                |                                                 | JAN       | FEB       | MAR     | APR       | MAY       | JUN       | JUL       | AUG          | SEP       | OCT | NOV | DEC |
|---------------------------------------|-------------------------------------------------|-----------|-----------|---------|-----------|-----------|-----------|-----------|--------------|-----------|-----|-----|-----|
| 2007 NM<br>(@ Crows<br>Landing Rd)    | Date                                            | NA        | 2/11/07   | 3/01/07 | 4/17/07   | 5/15/07   | 6/19/07   | 7/17/07   | 8/14/07      | 9/11/07   | NA  | NA  | NA  |
|                                       | Nitrate (mg/L)                                  | NA        | 24        | 42      | <b>25</b> | <b>41</b> | <b>32</b> | <b>13</b> | <b>16</b>    | 9.8       | NA  | NA  | NA  |
|                                       | Chlorpyrifos (µg/L)                             | NA        | <0.003    | <0.003  | <0.003    | <0.003    | <0.003    | 0.009     | <0.003       | <0.003    | NA  | NA  | NA  |
|                                       | <i>C. dubia</i> toxicity<br>(% Control)         | NA        | 90        | 105     | 105       | 90        | 95        | 100       | 100          | <b>0</b>  | NA  | NA  | NA  |
|                                       | <i>P. promelas</i> toxicity<br>(% Control)      | NA        | 103       | 100     | 98        | 100       | 100       | 98        | 100          | 100       | NA  | NA  | NA  |
| 2007 MPM A<br>(@ Crows<br>Landing Rd) | Date                                            | NA        | NA        | NA      | NA        | NA        | NA        | 7/31/07   | 8/28/07      | 9/25/07   | NA  | NA  | NA  |
|                                       | Chlorpyrifos (µg/L)                             | NA        | NA        | NA      | NA        | NA        | NA        | NA        | <b>0.094</b> | <0.003    | NA  | NA  | NA  |
|                                       | <i>P. promelas</i> toxicity<br>(% Control)      | NA        | NA        | NA      | NA        | NA        | NA        | 100       | NA           | NA        | NA  | NA  | NA  |
| 2008 NM<br>(@ Crows<br>Landing Rd)    | Date                                            | 1/24/08   | 2/26/08   | NA      | 4/22/08   | 5/20/08   | 6/17/08   | 7/22/08   | 8/19/08      | 9/23/08   | NA  | NA  | NA  |
|                                       | Nitrate (mg/L)                                  | <b>23</b> | <b>28</b> | NA      | <b>23</b> | <b>26</b> | <b>19</b> | <b>11</b> | <b>13</b>    | <b>33</b> | NA  | NA  | NA  |
|                                       | Chlorpyrifos (µg/L)                             | <0.003    | <0.003    | NA      | <0.003    | <0.003    | <0.003    | <0.003    | <b>0.024</b> | <0.003    | NA  | NA  | NA  |
|                                       | <i>C. dubia</i> toxicity<br>(% Control)         | 100       | 95        | NA      | 100       | 95        | 100       | 95        | 100          | 95        | NA  | NA  | NA  |
|                                       | <i>P. promelas</i> toxicity<br>(% Control)      | 103       | 98        | NA      | 100       | 100       | 103       | 100       | 100          | 100       | NA  | NA  | NA  |
| 2008 MPM US<br>(@ Morgan Rd)          | Date                                            | NA        | NA        | NA      | 4/22/08   | 5/20/08   | 6/17/08   | 7/22/08   | 8/19/08      | 9/23/08   | NA  | NA  | NA  |
|                                       | Nitrate (mg/L)                                  | NA        | NA        | NA      | <b>35</b> | <b>22</b> | <b>30</b> | <0.1      | <b>20</b>    | <b>29</b> | NA  | NA  | NA  |
|                                       | Chlorpyrifos (µg/L)                             | NA        | NA        | NA      | NA        | NA        | NA        | NA        | <0.003       | <0.003    | NA  | NA  | NA  |
|                                       | <i>C. dubia</i> toxicity<br>(% Control)         | NA        | NA        | NA      | NA        | NA        | NA        | NA        | NA           | 100       | NA  | NA  | NA  |
|                                       | <i>P. promelas</i> toxicity<br>(% Control)      | NA        | NA        | NA      | NA        | NA        | NA        | 100       | NA           | NA        | NA  | NA  | NA  |
| 2009 MPM<br>(@ Crows<br>Landing Rd)   | Date                                            | NA        | NA        | NA      | 4/21/09   | 5/19/09   | NA        | NA        | 8/18/09      | NA        | NA  | NA  | NA  |
|                                       | Chlorpyrifos (µg/L)                             | NA        | NA        | NA      | NA        | NA        | NA        | NA        | <0.003       | NA        | NA  | NA  | NA  |
|                                       | <i>S. capricornutum</i> toxicity<br>(% Control) | NA        | NA        | NA      | 248       | <b>30</b> | NA        | NA        | NA           | NA        | NA  | NA  | NA  |
| 2010 MPM<br>(@ Crows<br>Landing Rd)   | Date                                            | 1/19/10   | 2/23/10   | NA      | 4/20/10   | 5/18/10   | NA        | NA        | 8/17/10      | 9/14/10   | NA  | NA  | NA  |
|                                       | Chlorpyrifos (µg/L)                             | NA        | NA        | NA      | NA        | NA        | NA        | NA        | 0.014        | <0.003    | NA  | NA  | NA  |
|                                       | <i>C. dubia</i> toxicity<br>(% Control)         | NA        | NA        | NA      | NA        | NA        | NA        | NA        | NA           | 100       | NA  | NA  | NA  |
|                                       | <i>S. capricornutum</i> toxicity<br>(% Control) | <b>56</b> | 340       | NA      | 281       | 96        | NA        | NA        | NA           | NA        | NA  | NA  | NA  |
|                                       | <i>H. azteca</i> toxicity<br>(% Control)        | NA        | NA        | NA      | NA        | NA        | NA        | NA        | NA           | 114       | NA  | NA  | NA  |

| MONTH:                                |                                              | JAN     | FEB        | MAR     | APR     | MAY     | JUN     | JUL     | AUG       | SEP        | OCT       | NOV     | DEC      |
|---------------------------------------|----------------------------------------------|---------|------------|---------|---------|---------|---------|---------|-----------|------------|-----------|---------|----------|
| 2011 NM & MPM<br>(@ Crows Landing Rd) | Date                                         | 1/18/11 | 2/17/11    | 3/15/11 | 4/19/11 | 5/10/11 | 6/14/11 | 7/12/11 | 8/9/11    | 9/6/11     | 10/11/11  | 11/8/11 | 12/6/11  |
|                                       | Chlorpyrifos (µg/L)                          | <0.003  | <0.003     | <0.003  | <0.003  | <0.003  | <0.003  | <0.003  | <0.003*   | <0.003*    | <0.003    | <0.003  | <0.003   |
|                                       | Dimethoate (µg/L)                            | <0.008  | <0.008     | <0.008  | <0.008  | <0.008  | <0.008  | <0.008  | <b>10</b> | <b>1.1</b> | <0.008    | <0.008  | <0.008   |
|                                       | <i>C. dubia</i> toxicity (% Control)         | 100     | 100        | 100*    | 90      | 100     | 100     | 100     | <b>0</b>  | 100*       | 95        | 100     | 100      |
|                                       | <i>S. capricornutum</i> toxicity (% Control) | 617*    | <b>82*</b> | 316     | 119*    | 269*    | 251     | 305     | 647       | 715        | <b>35</b> | 1543    | <b>8</b> |
|                                       | <i>H. azteca</i> toxicity (% Control)        | NA      | NA         | 100*    | NA      | NA      | NA      | NA      | NA        | 106*       | NA        | NA      | NA       |

A – Additional MPM conducted in 2007 only.

MPM – Management Plan Monitoring (see Table 4 for MPM schedule)

NA – Not applicable. No monitoring occurred on this date for this constituent.

NM – Normal Monitoring

US – Upstream MPM conducted in 2008 only.

\*NM & MPM occurred during this date for this constituent.

## Load Calculations

Loads have been calculated for all chlorpyrifos, dimethoate, and nitrate + nitrite detections in the site subwatershed (Table III-7) based on the following formula:

$$\text{Load} = \text{Discharge (cfs)} \times 28.317\text{L/ft}^3 \times \text{Concentration (mg/L} \times 1000 \text{ or } \mu\text{g/L)}.$$

The load values for constituents in this report represent instantaneous loads only. These values should not be used to extrapolate loading over any period of time (e.g. weekly, monthly, seasonal or annual).

The primary purpose for reporting instantaneous loads is to provide a normalization of the concentrations by flow for various constituents at the time the samples were collected.

**Table III-7. Prairie Flower Drain @ Crows Landing Rd site subwatershed instantaneous load calculations for chlorpyrifos, dimethoate, and nitrate + nitrite.**

Sorted by analyte and date.

| SITE NAME                                | ANALYTE NAME           | SAMPLE DATE | DISCHARGE CFS | CONCENTRATION $\mu\text{G/L}$ | LOADING RATE $\mu\text{G/SEC}$ |
|------------------------------------------|------------------------|-------------|---------------|-------------------------------|--------------------------------|
| Prairie Flower Drain @ Crows Landing Rd  | Chlorpyrifos           | 08/17/05    | 0             | 0.029                         | 0                              |
| Prairie Flower Drain @ Crows Landing Rd  | Chlorpyrifos           | 09/21/05    | 0             | 0.018                         | 0                              |
| Prairie Flower Drain @ Crows Landing Rd* | Chlorpyrifos           | 09/21/05    | 0             | 0.018                         | 0                              |
| Prairie Flower Drain @ Crows Landing Rd  | Chlorpyrifos           | 07/13/06    | 0             | 0.014                         | 0                              |
| Prairie Flower Drain @ Crows Landing Rd  | Chlorpyrifos           | 07/17/07    | 2.32          | 0.009                         | 0.59                           |
| Prairie Flower Drain @ Crows Landing Rd  | Chlorpyrifos           | 08/19/08    | 4.67          | 0.024                         | 3.17                           |
| Prairie Flower Drain @ Crows Landing Rd  | Chlorpyrifos           | 08/17/10    | 1.34          | 0.014                         | 0.53                           |
| Prairie Flower Drain @ Crows Landing Rd  | Dimethoate             | 08/09/11    | 5.61          | 10                            | 1588.58                        |
| Prairie Flower Drain @ Crows Landing Rd  | Dimethoate             | 09/06/11    | 0             | 1.1                           | 0                              |
| Prairie Flower Drain @ Crows Landing Rd  | Nitrate + Nitrite as N | 10/21/08    | 0.93          | 27                            | 711.04                         |
| Prairie Flower Drain @ Crows Landing Rd  | Nitrate + Nitrite as N | 11/11/08    | 0.09          | 39                            | 99.39                          |
| Prairie Flower Drain @ Crows Landing Rd  | Nitrate + Nitrite as N | 12/16/08    | 0.19          | 40                            | 215.21                         |
| Prairie Flower Drain @ Crows Landing Rd  | Nitrate + Nitrite as N | 02/07/09    | 0.097         | 31                            | 85.15                          |
| Prairie Flower Drain @ Crows Landing Rd  | Nitrate + Nitrite as N | 03/17/09    | 0.12          | 34                            | 115.53                         |
| Prairie Flower Drain @ Crows Landing Rd  | Nitrate + Nitrite as N | 04/21/09    | 0.3           | 24                            | 203.88                         |
| Prairie Flower Drain @ Crows Landing Rd  | Nitrate + Nitrite as N | 05/19/09    | 0.5           | 20                            | 283.17                         |
| Prairie Flower Drain @ Crows Landing Rd  | Nitrate + Nitrite as N | 06/16/09    | 0.61          | 22                            | 380.01                         |
| Prairie Flower Drain @ Crows Landing Rd  | Nitrate + Nitrite as N | 07/21/09    | 4.15          | 14                            | 1645.22                        |
| Prairie Flower Drain @ Crows Landing Rd  | Nitrate + Nitrite as N | 08/18/09    | 2.85          | 22                            | 1775.48                        |
| Prairie Flower Drain @ Crows Landing Rd  | Nitrate + Nitrite as N | 09/22/09    | 2.08          | 35                            | 2061.48                        |
| Prairie Flower Drain @ Crows Landing Rd  | Nitrate + Nitrite as N | 10/20/09    | 0.72          | 25                            | 509.71                         |
| Prairie Flower Drain @ Crows Landing Rd  | Nitrate + Nitrite as N | 11/17/09    | 0             | 36                            | 0                              |
| Prairie Flower Drain @ Crows Landing Rd  | Nitrate + Nitrite as N | 12/15/09    | 0.31          | 36                            | 316.02                         |
| Prairie Flower Drain @ Crows Landing Rd  | Nitrate + Nitrite as N | 01/19/10    | 0             | 43                            | 0                              |
| Prairie Flower Drain @ Crows Landing Rd  | Nitrate + Nitrite as N | 02/23/10    | 1.5           | 32                            | 1359.22                        |
| Prairie Flower Drain @ Crows Landing Rd  | Nitrate + Nitrite as N | 03/23/10    | 1.33          | 31                            | 1167.51                        |
| Prairie Flower Drain @ Crows Landing Rd  | Nitrate + Nitrite as N | 04/20/10    | 0.49          | 33                            | 457.89                         |
| Prairie Flower Drain @ Crows Landing Rd  | Nitrate + Nitrite as N | 05/18/10    | 0.36          | 35                            | 356.79                         |
| Prairie Flower Drain @ Crows Landing Rd  | Nitrate + Nitrite as N | 06/15/10    | 0             | 29                            | 0                              |
| Prairie Flower Drain @ Crows Landing Rd  | Nitrate + Nitrite as N | 07/20/10    | 0             | 26                            | 0                              |
| Prairie Flower Drain @ Crows Landing Rd  | Nitrate + Nitrite as N | 08/17/10    | 1.34          | 24                            | 910.67                         |
| Prairie Flower Drain @ Crows Landing Rd  | Nitrate + Nitrite as N | 09/14/10    | 0             | 12                            | 0                              |
| Prairie Flower Drain @ Crows Landing Rd  | Nitrate + Nitrite as N | 10/19/10    | 0.83          | 20                            | 470.06                         |

| SITE NAME                               | ANALYTE NAME           | SAMPLE DATE | DISCHARGE CFS | CONCENTRATION µG/L | LOADING RATE µG/SEC |
|-----------------------------------------|------------------------|-------------|---------------|--------------------|---------------------|
| Prairie Flower Drain @ Crows Landing Rd | Nitrate + Nitrite as N | 11/16/10    | 0.39          | 42                 | 463.83              |
| Prairie Flower Drain @ Crows Landing Rd | Nitrate + Nitrite as N | 12/14/10    | 0.59          | 40                 | 668.28              |
| Prairie Flower Drain @ Crows Landing Rd | Nitrate + Nitrite as N | 01/18/11    | 1.61          | 29                 | 1322.12             |
| Prairie Flower Drain @ Crows Landing Rd | Nitrate + Nitrite as N | 02/17/11    | 0.41          | 33                 | 383.13              |
| Prairie Flower Drain @ Crows Landing Rd | Nitrate + Nitrite as N | 03/15/11    | 0.71          | 31                 | 623.26              |
| Prairie Flower Drain @ Crows Landing Rd | Nitrate + Nitrite as N | 04/19/11    | 2.95          | 7                  | 584.75              |
| Prairie Flower Drain @ Crows Landing Rd | Nitrate + Nitrite as N | 05/10/11    | 1.6           | 17                 | 770.22              |
| Prairie Flower Drain @ Crows Landing Rd | Nitrate + Nitrite as N | 06/14/11    | 0.65          | 24                 | 441.75              |
| Prairie Flower Drain @ Crows Landing Rd | Nitrate + Nitrite as N | 07/12/11    | 2.68          | 16                 | 1214.23             |
| Prairie Flower Drain @ Crows Landing Rd | Nitrate + Nitrite as N | 08/09/11    | 5.61          | 8.2                | 1302.64             |
| Prairie Flower Drain @ Crows Landing Rd | Nitrate + Nitrite as N | 09/06/11    | 0             | 11                 | 0                   |
| Prairie Flower Drain @ Crows Landing Rd | Nitrate + Nitrite as N | 10/11/11    | 0.47          | 28                 | 372.65              |
| Prairie Flower Drain @ Crows Landing Rd | Nitrate + Nitrite as N | 11/08/11    | 0.27          | 33                 | 252.30              |
| Prairie Flower Drain @ Crows Landing Rd | Nitrate + Nitrite as N | 12/06/11    | 0.13          | 41                 | 150.93              |

\*Field Duplicate

### Source Identification and Outreach

The Coalition addressed source identification in the 2011 MPUR and, in the following sections, considers 2011 monitoring results and PUR data as it expands upon that discussion. The Coalition focuses its efforts on applied pesticides. During 2007 and 2008, the Coalition conducted additional and upstream MPM during those months when exceedances historically occurred to better characterize water quality in the subwatershed. From 2009 through 2011, MPM continued at the Prairie Flower Drain @ Crows Landing Rd to assess water quality in the subwatershed as outreach in the area progressed. Assessment Monitoring took place at the site during 2011. The PUR data are reviewed to determine the most frequent crop type and timing associated with applications. Prairie Flower @ Crows Landing Rd subwatershed PUR data are available through November 2011.

Focused outreach to document current management practices and track implementation of additional management practices in the Prairie Flower Drain @ Crows Landing Rd subwatershed began in 2009 and has continued through 2011. The Coalition organized grower meetings and mailings to educate growers about management practices and their importance in achieving acceptable water quality objectives. The Coalition contacted 100% of targeted growers (11) representing 865 acres within the Prairie Flower Drain @ Crows Landing Rd subwatershed. Ten growers participated in follow up contacts to determine if additional management practices were implemented and if any are planned to be implemented, excluding one grower who no longer claimed their parcel(s). Management Plan Monitoring will continue in the Prairie Flower Drain @ Crows Landing Rd subwatershed during 2012 in order to demonstrate two consecutive years of monitoring with no exceedances of high priority constituents.

### Priority A/B Constituents

Chlorpyrifos is the only priority A/B constituent in the Prairie Flower Drain @ Crows Landing Rd subwatershed.

### Chlorpyrifos

Four exceedances of the chlorpyrifos WQTL occurred at this site, once during the month of September (2005) and three times during the month of August (2005, 2007, 2008; Table III-5). There were no exceedances during the 2009 through 2011 MPM, as well as during monthly Assessment Monitoring in 2011. The Coalition evaluates monitoring and PUR data to identify possible sources of exceedances of constituents of concern.

In every high priority subwatershed, PUR data are reviewed for the number of monthly applications and pounds of active ingredient applied of the constituent of concern, and the acres treated by the constituent of concern (Table III-8, Figure III-2). The greatest use of chlorpyrifos occurred in 2005 (1,066 lbs AI) with the lowest use in 2007 (150 lbs AI), see Table III-8. The greatest chlorpyrifos use occurred consistently during the month of July. Exceedances occurred in the late summer, but have not always occurred in the months with the highest applications (Figure III-2).

The Coalition also uses PUR data from each subwatershed to determine which crops receive the most applications. Only two crops receive applications of chlorpyrifos in the subwatershed, alfalfa and corn, with corn receiving the largest amount (2,858 lbs AI, alfalfa - 768 lbs AI), (Table III-9). The most common product containing chlorpyrifos used within this subwatershed was Lorsban, while the product with the most pounds AI applied within the subwatershed was Nufos (Table III-9).

**Table III-8. Prairie Flower Drain @ Crows Landing Rd site subwatershed chlorpyrifos applications, lbs AI applied, and acres treated by month (2005-2011).**

PUR data available through November 2011 for Stanislaus County. If month is not included in table, no applications were made.

| MONTH/YEAR               | NUMBER OF CHLORPYRIFOS APPLICATIONS | POUNDS OF AI APPLIED | ACRES TREATED |
|--------------------------|-------------------------------------|----------------------|---------------|
| March, 2005              | 2                                   | 122.0                | 240.0         |
| July, 2005               | 7                                   | 362.7                | 476.0         |
| August, 2005             | 11                                  | 581.7                | 666.0         |
| July, 2006               | 6                                   | 248.9                | 265.0         |
| August, 2006             | 3                                   | 147.4                | 207.0         |
| July, 2007               | 1                                   | 75.1                 | 150.0         |
| August, 2007             | 1                                   | 75.1                 | 150.0         |
| May, 2008                | 2                                   | 212.1                | 140.0         |
| July, 2008               | 9                                   | 746.9                | 865.0         |
| August, 2008             | 4                                   | 90.5                 | 89.0          |
| March, 2009              | 1                                   | 76.3                 | 150.0         |
| July, 2009               | 3                                   | 274.5                | 270.0         |
| August, 2009             | 2                                   | 40.7                 | 40.0          |
| March, 2010              | 3                                   | 24.5                 | 96.0          |
| June, 2010               | 2                                   | 141.4                | 140.0         |
| July, 2010               | 2                                   | 18.8                 | 36.0          |
| August, 2010             | 2                                   | 112.7                | 120.0         |
| July, 2011               | 3                                   | 79.9                 | 157.0         |
| August, 2011             | 4                                   | 195.4                | 194.0         |
| <b>Summaries by Year</b> |                                     |                      |               |
| 2005 Total               | 20                                  | 1066.4               | 1382.0        |
| 2006 Total               | 9                                   | 396.3                | 472.0         |
| 2007 Total               | 2                                   | 150.2                | 300.0         |
| 2008 Total               | 15                                  | 1049.5               | 1094.0        |
| 2009 Total               | 6                                   | 391.5                | 460.0         |
| 2010 Total               | 9                                   | 297.3                | 392.0         |
| 2011 Total               | 7                                   | 275.3                | 351.0         |
| <b>Total</b>             | <b>68</b>                           | <b>3626.5</b>        | <b>4451.0</b> |

**Figure III-2. Prairie Flower Drain @ Crows Landing Rd site subwatershed lbs chlorpyrifos applied by month (2005-2011).**

Asterisk (\*) denotes months with exceedances. PUR data available through November 2011 for Stanislaus County.

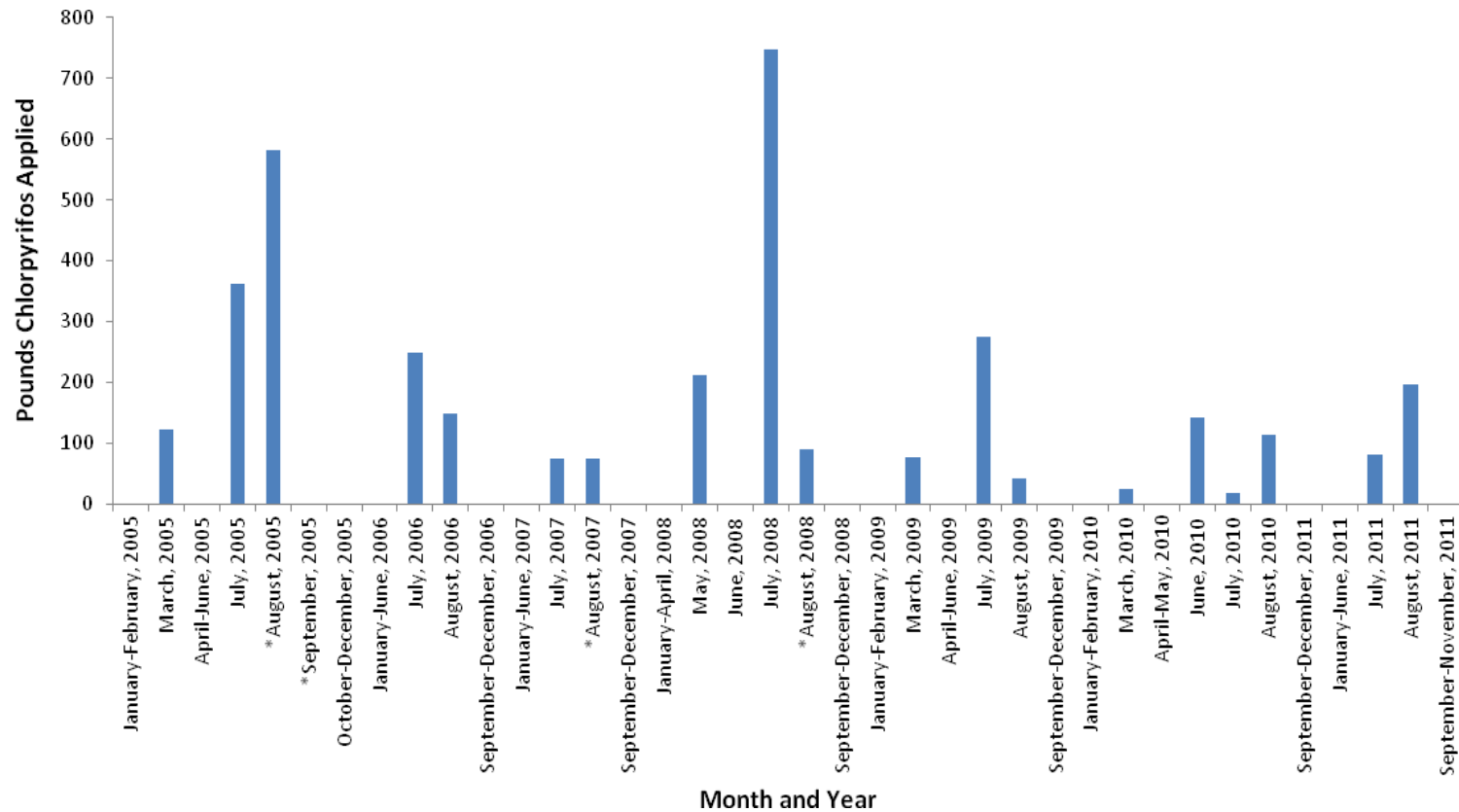




**Table III-9. Prairie Flower Drain @ Crows Landing Rd site subwatershed chlorpyrifos PUR data (2005-2011).**

PUR data available through November 2011 for Stanislaus County.

| CHEMICAL NAME                                   | COMMODITY                               | PRODUCT NAME          | LBS AI APPLIED |
|-------------------------------------------------|-----------------------------------------|-----------------------|----------------|
| CHLORPYRIFOS                                    | ALFALFA (FORAGE - FODDER) (ALFALFA HAY) | LOCK-ON INSECTICIDE   | 545.3          |
|                                                 |                                         | NUFOS 4E              | 198.3          |
|                                                 |                                         | WARHAWK               | 24.5           |
|                                                 | CORN (FORAGE - FODDER)                  | CHLORPYRIFOS 4E AG    | 93.8           |
|                                                 |                                         | GOVERN 4E INSECTICIDE | 212.1          |
|                                                 |                                         | LORSBAN ADVANCED      | 131.5          |
|                                                 |                                         | LORSBAN-4E            | 223.2          |
|                                                 |                                         | NUFOS 4E              | 2056.5         |
|                                                 |                                         | WARHAWK               | 141.4          |
|                                                 |                                         |                       |                |
| ALFALFA - Total Pounds Chlorpyrifos Applied     |                                         |                       | 768.1          |
| CORN - Total Pounds Chlorpyrifos Applied        |                                         |                       | 2858.4         |
| Total Pounds Chlorpyrifos Applied (2005 - 2011) |                                         |                       | 3626.5         |

The Coalition determined the most probable source of chlorpyrifos in the Prairie Flower Drain was runoff from row crops recently receiving chlorpyrifos applications. Unfortunately, of the areas associated with exceedances in 2008, Coalition members own only a small portion of the acreage (2009 MPUR). A large amount of the acreage is owned and farmed by dairies and it is assumed that the land not covered by the Coalition is part of the dairy program. This pattern of ownership suggests that it may be difficult to improve water quality in this site subwatershed. It is difficult to receive cooperation and track implementation of management practices with nonmembers.

The results from the general surveys administered to all members in the subwatershed are summarized in the ESJWQC General Survey Summary Report submitted January 30, 2009. The results were used as a starting point to evaluate management practice implementation within the subwatershed. The survey assessed practices used in the period from May 17, 2007 to December 2009. The Coalition noted that irrigation water is actively managed by Coalition members in this subwatershed. The Coalition designed outreach to increase relevant and effective management practice implementation in member parcels. Growers of row crops were targeted for outreach prior to the irrigation season and heavy application periods and were advised of methods to better manage their irrigation tailwater and storm water runoff.

Coalition outreach since 2007 has included grower meetings and the mailing/distribution of information, such as available funding for management practice implementation. A complete list of coalition outreach during 2011 is provided in the Actions Taken to Address Water Quality Exceedances section of the 2012 AMR (Table 46, page 142).

In accordance with the Coalition's Management Plan strategy, individual contacts with targeted growers began June, 2009 and continued through September, 2009. Targeted growers were selected based on pesticide usage, and the potential for discharge to the creek. Of the 3,611 irrigated acres in Prairie Flower Drain subwatershed with the potential to drain directly to the creek, the Coalition compiled a list

of 11 target members representing 865 acres of irrigated direct drainage. Coalition representatives met with growers to discuss management practices and recommendations specific to the land owner. This also gave the Coalition a chance to better assess currently implemented management practices as well as future planned management practice implementation. Individual contacts with growers focused mainly on chlorpyrifos exceedances however all water quality results were reviewed and discussed including nitrate/nitrate + nitrite, ammonia, *E. coli*, molybdenum, DO, SC, TDS, and pH exceedances and toxicity to *C. dubia*, *S. capricornutum*, and *H. azteca*.

The Coalition contacted all 11 targeted members. In February 2010, the Coalition hosted a follow up meeting to the 2009 Individual Contacts Grower Meeting. Members who attended the meeting provided information as to which recommended management practices were implemented. Members unable to attend the meeting were asked to report their newly implemented management practices via a phone call with a Coalition representative between March 1 and August 4, 2010. All 11 targeted growers completed their follow ups and the Coalition Assessment of implemented management practices is included in the Summary of Implemented Management Practices section of this report. Of the 11 targeted members (except for one member), all required a follow up meeting. Of the 10 members requiring a follow up meeting, the following management practices were implemented to acreages in the Prairie Flower Drain subwatershed: install device to control discharge (43%), reduce amount of water used in surface irrigation (27%), use of polyacrylamide (15%), and drainage basin/sediment pond installation (15%).

The Coalition will continue to assess water quality at Prairie Flower Drain @ Crows Landing Rd through MPM during months of past exceedances. Prairie Flower Drain is scheduled for Assessment Monitoring during 2013-2014 when every constituent will be analyzed during each month of the year. If exceedances of high priority constituents occur, the Coalition will discuss with the Regional Board supplementary actions for outreach that may include contacting other chlorpyrifos sources such as dairy operations and/or contacting new members to the Coalition.

There were no exceedances of the chlorpyrifos WQTL for two or more consecutive years of monitoring in months of past exceedances. A letter was submitted to the Regional Board on January 6, 2012, petitioning to remove chlorpyrifos from the Prairie Flower Drain management plan. Until the approval from the Regional Board, the Coalition will continue to assess water quality at Prairie Flower Drain @ Crows Landing Rd through MPM during those months of past chlorpyrifos exceedances.

### *Priority C Constituents*

Dimethoate and nitrate + nitrite/nitrate are listed as priority C constituents for the Prairie Flower Drain @ Crows Landing Rd subwatershed. The Coalition replaced separate analysis of nitrate and nitrite with the combined analysis of nitrate + nitrite starting in October 2008. Exceedances of the nitrate WQTL, either of separately measured nitrate or of combined nitrate + nitrite analysis, occurred during almost every sample event (excluding a few in 2011).

## Dimethoate

Exceedances of the dimethoate WQTL (1 µg/L) occurred three times in this subwatershed, once in 2008 (July) and two in 2011 (August and September). Subsequently, dimethoate was added to the 2012 Prairie Flower Drain MPM schedule. PUR data are reviewed for the number of monthly dimethoate applications, pounds AI applied, and acres treated (Table III-10, Figure III-3).

PUR data for the Prairie Flower Drain subwatershed are available through November 2011. The greatest amount of dimethoate was applied in 2005 (843 lbs) and the lowest amount applied in 2011 (345 lbs). Between 2005 and 2011, the greatest amount of dimethoate use occurred in the month of July. Dimethoate use over time is a slight trend toward decreasing use. Not all exceedances occurred at Prairie Flower Drain during a month in which dimethoate was applied (Figure III-3).

The Coalition also uses PUR data to assess which crops received the most applications of dimethoate from 2005 through 2011 (Table III-11). The largest amount of dimethoate applied was associated with corn, (3,689 lbs; Table III-11). The most common products containing dimethoate used within this subwatershed were Dimethoate and Drexel™ Dimethoate (Table III-11).

**Table III-10. Prairie Flower Drain @ Crows Landing Rd site subwatershed dimethoate applications, lbs AI applied, and acres treated by month (2005-2011).**

PUR data available through November 2011 for Stanislaus County. If month is not included in table, no applications were made.

| MONTH/YEAR        | NUMBER OF DIMETHOATE APPLICATIONS | POUNDS OF AI APPLIED | ACRES TREATED |
|-------------------|-----------------------------------|----------------------|---------------|
| June, 2005        | 4                                 | 99.0                 | 129.0         |
| July, 2005        | 15                                | 517.7                | 1104.5        |
| August, 2005      | 7                                 | 158.0                | 348.0         |
| June, 2006        | 5                                 | 100.7                | 197.0         |
| July, 2006        | 23                                | 469.9                | 1076.0        |
| August, 2006      | 7                                 | 96.6                 | 206.0         |
| July, 2007        | 29                                | 487.9                | 1163.6        |
| August, 2007      | 10                                | 216.5                | 415.0         |
| July, 2008        | 40                                | 795.6                | 1697.0        |
| August, 2008      | 2                                 | 47.0                 | 95.0          |
| June, 2009        | 5                                 | 55.1                 | 111.0         |
| July, 2009        | 13                                | 391.9                | 779.6         |
| August, 2009      | 2                                 | 69.2                 | 140.0         |
| July, 2010        | 18                                | 493.4                | 955.0         |
| August, 2010      | 2                                 | 39.4                 | 79.0          |
| June, 2011        | 2                                 | 31.2                 | 84.0          |
| July, 2011        | 12                                | 220.2                | 442.0         |
| August, 2011      | 3                                 | 94.0                 | 188.6         |
| Summaries by Year |                                   |                      |               |
| 2005 Total        | 26                                | 774.7                | 1581.5        |
| 2006 Total        | 35                                | 667.2                | 1479.0        |
| 2007 Total        | 39                                | 704.4                | 1578.6        |
| 2008 Total        | 42                                | 842.6                | 1792.0        |
| 2009 Total        | 20                                | 516.2                | 1030.6        |
| 2010 Total        | 20                                | 532.7                | 1034.0        |
| 2011 Total        | 17                                | 345.4                | 714.6         |
| Total             | 199                               | 4383.1               | 9210.3        |

**Figure III-3. Prairie Flower Drain @ Crows Landing Rd site subwatershed lbs dimethoate applied by month (2005-2011).**

Asterisk (\*) denotes months with exceedances. PUR data available through November 2011 for Stanislaus County.

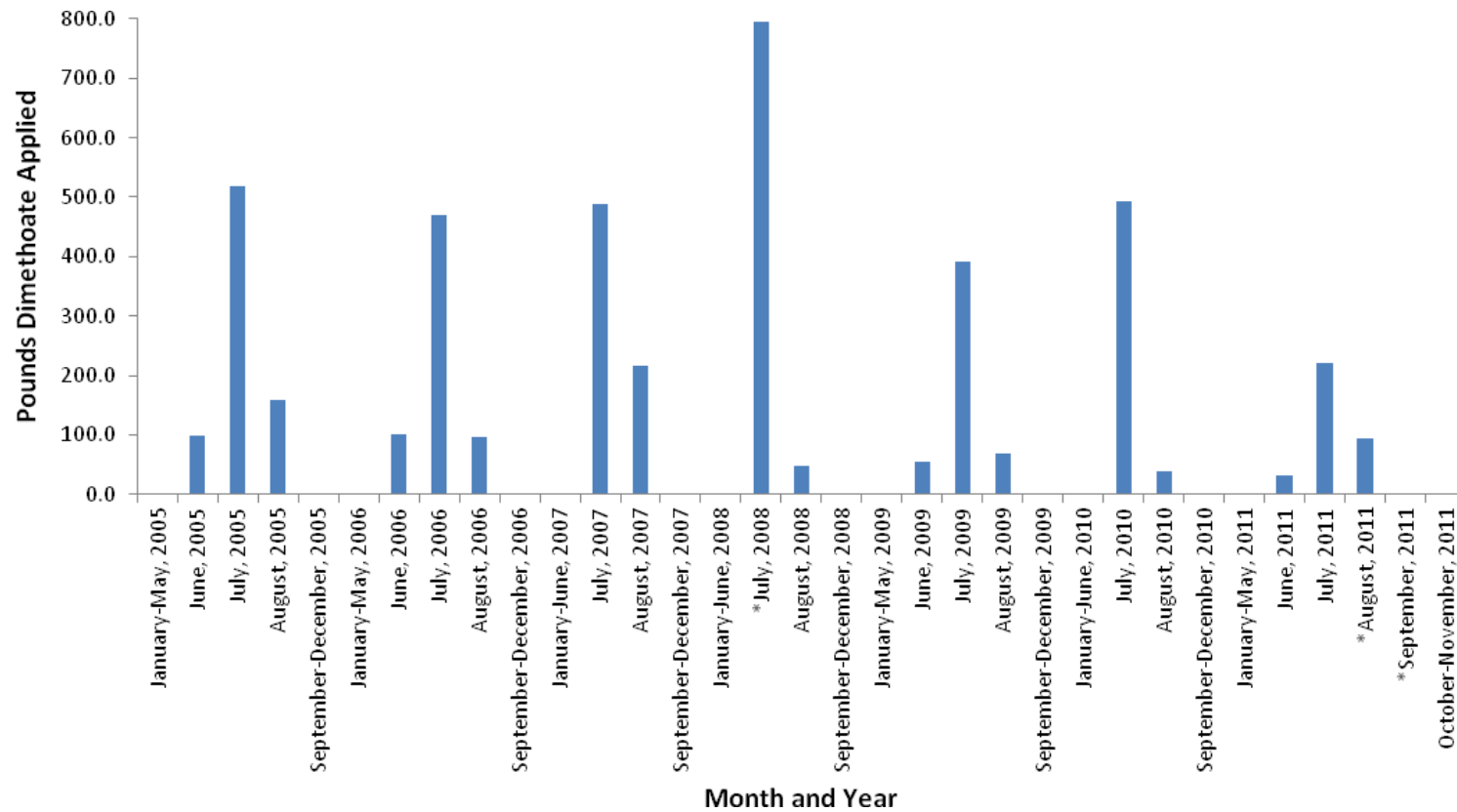


**Table III-11. Prairie Flower Drain @ Crows Landing Rd site subwatershed dimethoate PUR data (2005-2011).**

PUR data available through November 2011 for Stanislaus County.

| CHEMICAL NAME                                 | COMMODITY                        | PRODUCT NAME                          | LBS AI APPLIED |
|-----------------------------------------------|----------------------------------|---------------------------------------|----------------|
| DIMETHOATE                                    | BEAN DRIED                       | DREXEL DIMETHOATE 4EC                 | 37.4           |
|                                               | CORN (FORAGE - FODDER)           | 5 LB. DIMETHOATE SYSTEMIC INSECTICIDE | 22.4           |
|                                               |                                  | CHEMINOVA DIMETHOATE 4E               | 29.7           |
|                                               |                                  | CLEAN CROP DIMETHOATE 400             | 79.0           |
|                                               |                                  | CYMATE 267                            | 205.4          |
|                                               |                                  | DIMETHOATE 267                        | 129.9          |
|                                               |                                  | DIMETHOATE 400                        | 39.5           |
|                                               |                                  | DIMETHOATE 4E                         | 1293.6         |
|                                               |                                  | DIMETHOATE 4E (WITHDRAWN)             | 95.8           |
|                                               |                                  | DREXEL DIMETHOATE 4EC                 | 1707.2         |
|                                               |                                  | PROKIL DIMETHOATE E-267               | 86.2           |
|                                               | TOMATOES, FOR PROCESSING/CANNING | DIMETHOATE 400                        | 487.3          |
|                                               |                                  | DIMETHOATE 4E                         | 93.4           |
|                                               |                                  | DREXEL DIMETHOATE 4EC                 | 76.2           |
| BEAN - Total Pounds Dimethoate Applied        |                                  |                                       | 37.4           |
| CORN - Total Pounds Dimethoate Applied        |                                  |                                       | 3688.8         |
| TOMATOES - Total Pounds Dimethoate Applied    |                                  |                                       | 656.9          |
| Total Pounds Dimethoate Applied (2005 - 2011) |                                  |                                       | 4383.1         |

In 2012, dimethoate MPM is scheduled at Prairie Flower Drain @ Crows Landing Rd for months of past exceedances (July-September). The Coalition's Management Plan strategy for addressing dimethoate exceedances is to include dimethoate in future discussions with individual growers. Improved and additional water management practices should reduce or eliminate dimethoate exceedances. If exceedances of dimethoate continue, the Coalition will discuss with the Regional Board supplementary actions for outreach that may include contacting other possible sources and/or contacting new members to the Coalition.

#### Nitrate + Nitrite / nitrate

There were 10 exceedances of the nitrate WQTL in the Prairie Flower Drain site subwatershed in 2011. Sources of nitrate are discussed in the introduction of the ESJWQC 2008 Management Plan and include fertilizer applications and dairy manure (solid and liquid) waste. Prairie Flower Drain subwatershed contains approximately 443 acres of confined animal operations most of which are dairies. In addition, nitrate contamination of ground water is common in the region, and Prairie Flower Drain intercepts shallow ground water. It is not clear if the nitrates are originating from recent applications of dairy waste that may be reaching surface waters, or from past contamination of ground water which is being intercepted by the drain. The Coalition does not have the capabilities to track fertilizer applications and therefore cannot determine the exact source of the nitrate exceedances. However, in the current 2008 MRPP, nitrate is a Core Monitoring constituent and since Prairie Flower Drain @ Crows Landing Rd is a Core Monitoring location nitrate is monitored on a monthly basis, therefore scheduling MPM for nitrate is not necessary. Nitrate is still a priority constituent at Prairie Flower Drain @ Crows Landing Rd and in 2012 nitrate will be monitored monthly as part of Core Monitoring at the site. In 2008, exceedances

occurred during every sampling event and during upstream sampling at Morgan Rd in all months except July. Exceedances during 2011 occurred every month of the year except April, June and August. It is unlikely that applications of manure would occur in every month, indicating that ground water and/or dairy discharge are the more likely sources.

### *Priority D Constituents*

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The priority D constituents in the Prairie Flower Drain @ Crows Landing Rd subwatershed are water column toxicity to *C. dubia* and *P. promelas*, and sediment toxicity to *H. azteca*.

#### ***C. dubia* toxicity**

*C. dubia* toxicity occurred three times in the Prairie Flower Drain subwatershed in 2006 (March), 2007 (September), and 2011 (August). Toxicity to *C. dubia* was not monitored during 2009, but was monitored in September 2010 and monthly in 2011 during Assessment Monitoring. The 2007 toxicity was associated with an exceedance of chlorpyrifos in August, and a TIE performed on the 2011 toxic sample indicated pyrethroids were the likely cause of toxicity. Consequently, the Coalition's strategy for eliminating *C. dubia* toxicity is to focus on chlorpyrifos. If chlorpyrifos is prevented from entering waterways throughout the irrigation season, the Coalition believes that *C. dubia* toxicity can also be eliminated. The Coalition will conduct MPM in 2012 for *C. dubia* toxicity during months of past exceedances.

#### ***P. promelas* toxicity**

Toxicity to *P. promelas* occurred in July 2006 to both the original sample and resample, and again in April 2011. The TIE associated with the 2006 toxicities indicated ammonia was the cause. A TIE was not required on the April 2011 toxic samples as the survival was greater than 50% compared to the control. Fertilizers applied to agricultural fields can contain ammonium. However, the ammonium is rapidly converted to nitrate in the natural environment, and it is unlikely that the source of ammonia would be agricultural applications of fertilizer. The Coalition believes that dairies in the subwatershed are responsible for the ammonia exceedances, so re-prioritizing *P. promelas* as a higher priority will not occur. The Coalition continues to emphasize the importance of irrigation tailwater and storm water management, which is consistent with the strategy for the subwatershed.

#### ***H. azteca* toxicity**

Sediment toxicity to *H. azteca* occurred during the September 2005 and May 2006 sampling events, and most recently on August 28, 2008 (sample and resample collected on October 2, 2008). Both of the 2008 samples had survival greater than 80% compared to the control. As of 2009, the Coalition tests for total organic carbon and grain size in all sediments. Additional chemistry analysis is run for pyrethroids and chlorpyrifos in sediment that exhibits toxicity of 80% or less compared to the control. Toxicity to *H. azteca* was not monitored during 2009. However, in 2010 sediment toxicity was monitored as part of MPM in September, and in 2011 as part of Assessment Monitoring/MPM in March and September. No toxicity to *H. azteca* occurred in 2010 or 2011. The Coalition will continue to monitor for sediment toxicity to *H. azteca* during 2012 MPM (March and September).

### *Priority E Constituents*

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The priority E constituents listed under the Prairie Flower Drain subwatershed management plan are ammonia, DO, pH, SC, TDS, *E. coli*, molybdenum and water column toxicity to *S. capricornutum*.

Exceedances of ammonia, DO, SC, TDS, and *E. coli* continued to occur during 2011. Molybdenum was added as a priority E constituent as a result of five exceedances during 2011 Assessment Monitoring. Toxicity to *S. capricornutum* occurred several times at the site, usually in the winter or early irrigation months, but was not associated with an herbicide or metal exceedance, except for once in February 2011 when toxicity coincided with a molybdenum exceedance. Toxicity to *S. capricornutum* occurred three times during 2011 Assessment Monitoring/MPM (February, October and December), and again only the February sample was associated with a metal exceedance.

The Coalition will continue to collect priority E constituent monitoring data for DO, pH and SC during each monitoring event, *E.coli* and ammonia are monitored during Assessment and Core Monitoring events and molybdenum and *S. capricornutum* are monitored during Assessment Monitoring only; Assessment Monitoring will resume at this site in 2014. These constituents remain low priority but will be discussed during individual contacts with growers and at annual grower meetings. The Coalition also plans to participate in a focus group along with other Coalitions and Regional Board staff to develop a joint Work Plan to address *E. coli* exceedances by determining the potential agricultural sources of *E. coli* and identifying management practices to prevent discharges to surface waters.

In addition to chlorpyrifos, there were no exceedances of the pH WQTL for two or more consecutive years of monitoring, and it was included in the letter submitted to the Regional Board on January 6, 2012, petitioning to also have it removed from the active Prairie Flower Drain management plan.

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### *Evaluation*

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The Prairie Flower Drain subwatershed is one of the first three priority site subwatersheds within the ESJWQC. Therefore, the Coalition focused its resources on identifying sources of agricultural discharge within this subwatershed that could result in water quality impairments by extending outreach to individual Coalition members, and setting evaluation goals based on the effectiveness of management practices (by considering changes in water quality over time).

The Coalition's strategy for the Prairie Flower Drain subwatershed is to target growers with the potential to discharge into the drain. Outreach includes grower notification, management practice education, tracking of the implementation of management practices, and providing information on special studies of management practice efficacy.

Individual grower surveys documenting current management practices and follow up contacts assessing planned implementation strategies were completed and returned representing 100% of the targeted growers. The Summary of Implemented Management Practices section of this report summarizes the results of these surveys.

Both the overall acres treated and pounds of chlorpyrifos applied decreased since 2005. A decrease between 2008 and 2011 use is evident, which may further demonstrate that recent Coalition outreach is resulting in a positive impact. Additionally, usage of chlorpyrifos decreased in the months of July and August, when the most exceedances occurred historically. Also encouraging was the absence of chlorpyrifos exceedances during 2011 monthly Assessment Monitoring.

During 2012, Prairie Flower Drain @ Crows Landing Rd is scheduled for Core Monitoring and MPM will continue to take place during months of past exceedances. The Coalition believes continued MPM will provide more data needed to assess if additional funding and additional implemented management practices are improving water quality, or if further outreach to dairies and new member contacts is needed.

There were no exceedances of chlorpyrifos and pH WQTLs for two or more consecutive years of monitoring. Both constituents have been included in the letter submitted to the Regional Board on January 6, 2012, petitioning to have these constituents removed from the Prairie Flower Drain management plan. Until the letter is approved, the constituents will continue to be monitored as scheduled.



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## HIGH PRIORITY SITE SUBWATERSHEDS (2010-2012)

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## IV. BEAR CREEK @ KIBBY RD

### Management Plan Constituents

#### Priority A/B

- Chlorpyrifos

#### Priority C

- Copper

#### Priority D

- *Ceriodaphnia dubia* water column toxicity

#### Priority E

- Dissolved Oxygen
- pH
- *E. coli*

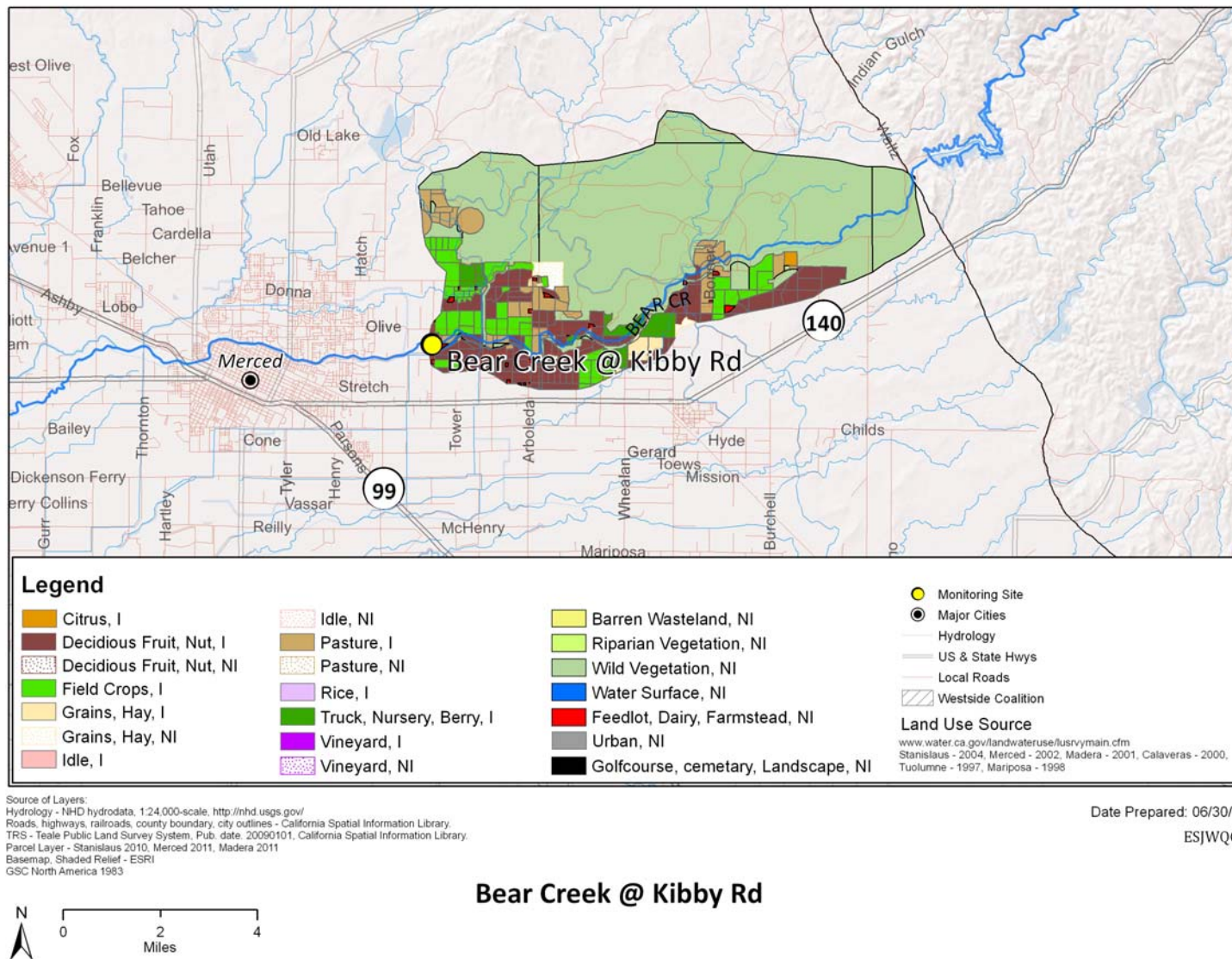
### Description of Bear Creek @ Kibby Rd Site Subwatershed

Bear Creek @ Kibby Rd (7,784 irrigated acres) – This site subwatershed drains an eastern portion of the Coalition region in Merced County. Bear Creek originates in the foothills of the Sierras with Burn's Creek as one of the major tributaries. Bear Creek drains to the east just north of the towns of Planada, through Merced and eventually to the San Joaquin River. Table IV-1 includes the station name (sample site), station code and target latitude/longitudes for the site sampled within this subwatershed. The primary irrigated agriculture in the site subwatershed includes deciduous nuts, field crops, truck crops, and irrigated pasture (Figure IV-1).

**Table IV-1. Bear Creek @ Kibby Rd site subwatershed sampling location coordinates.**

| SITE NAME             | STATION CODE | TARGET LATITUDE | TARGET LONGITUDE |
|-----------------------|--------------|-----------------|------------------|
| Bear Creek @ Kibby Rd | 535XBCAKR    | 37.3128         | -120.4138        |

Figure IV-1. Bear Creek @ Kibby Rd site subwatershed land use map.



Date Prepared: 06/30/11

ESJWQC

## Subwatershed Monitoring History

Sampling was initiated at Bear Creek @ Kibby Rd during the storm season of 2005 and continued through irrigation season of 2008 (Table IV-2). Under the current 2008 MRPP, the Bear Creek @ Kibby Rd site subwatershed is a rotating Assessment Monitoring location within the Merced River @ Santa Fe Zone (Zone 4). Bear Creek @ Kibby Rd is not scheduled for Assessment Monitoring until 2023 through 2024. The constituents monitored at this location from 2005 through 2011 are listed in Table IV-3.

Management Plan Monitoring for the Coalition at Bear Creek @ Kibby Rd occurred in 2008 (May and July) and included additional sampling for chlorpyrifos and *C. dubia* toxicity (Table IV-4). There were no samples collected at this site during 2009; however, the Coalition began high priority MPM (chlorpyrifos, copper and *C. dubia* toxicity) in May 2010 and continued through 2011 during months of past exceedances (Table IV-4).

Bear Creek is currently on California's 2008-2010 303d List of Impaired Waterbodies for *E. coli* and unknown water column toxicity.

**Table IV-2. Bear Creek @ Kibby Rd site subwatershed sampling events per season and year (including MPM).**

| YEAR | SEASON     | EVENTS SAMPLED | EVENTS NOT SAMPLED <sup>1</sup> | TOTAL |
|------|------------|----------------|---------------------------------|-------|
| 2004 | Irrigation | NA             | NA                              | NA    |
| 2005 | Storm      | 1              | 1                               | 2     |
|      | Irrigation | 5              | 0                               | 5     |
| 2006 | Storm      | 2              | 0                               | 2     |
|      | Irrigation | 5              | 0                               | 5     |
| 2007 | Storm      | 2              | 0                               | 2     |
|      | Irrigation | 6              | 0                               | 6     |
| 2008 | Storm      | 2              | 0                               | 2     |
|      | Irrigation | 8              | 0                               | 8     |
|      | Fall       | NA             | NA                              | NA    |
| 2009 | Winter     | NA             | NA                              | NA    |
|      | Storm      | NA             | NA                              | NA    |
|      | Irrigation | NA             | NA                              | NA    |
|      | Fall       | NA             | NA                              | NA    |
| 2010 | Winter     | NA             | NA                              | NA    |
|      | Storm      | NA             | NA                              | NA    |
|      | Irrigation | 3              | 0                               | 3     |
|      | Fall       | NA             | NA                              | NA    |
| 2011 | Winter     | 1              | 0                               | 1     |
|      | Storm      | 1              | 0                               | 1     |
|      | Irrigation | 3              | 0                               | 3     |
|      | Fall       | NA             | NA                              | NA    |

<sup>1</sup>If an event was not sampled during scheduled monitoring, the site was dry.

NA - Not applicable. This site was not scheduled for sampling during this season/year.

**Table IV-3. Bear Creek @ Kibby Rd site subwatershed analyses per sampling season and year.**

Only environmental samples with a sample replicate and lab replicate number of one are shown.

| METHOD                        | ANALYTE               | 2005  |            | 2006  |            | 2007  |            | 2008  |            |        | 2009          | 2010     |         |            |        | 2011   |       |            |        |
|-------------------------------|-----------------------|-------|------------|-------|------------|-------|------------|-------|------------|--------|---------------|----------|---------|------------|--------|--------|-------|------------|--------|
|                               |                       | STORM | IRRIGATION | STORM | IRRIGATION | STORM | IRRIGATION | STORM | IRRIGATION | FALL * | WINTER-FALL * | WINTER * | STORM * | IRRIGATION | FALL * | WINTER | STORM | IRRIGATION | FALL * |
| Field and Physical Parameters |                       |       |            |       |            |       |            |       |            |        |               |          |         |            |        |        |       |            |        |
| EPA 110.2                     | Color                 | 1     | 5          | 2     | 5          | 2     | 6          | 2     | 6          |        |               |          |         |            |        |        |       |            |        |
| EPA 160.1                     | Dissolved Solids      | 1     | 5          | 2     | 5          | 2     | 6          | 2     | 6          |        |               |          |         |            |        |        |       |            |        |
| EPA 180.1                     | Turbidity             | 1     | 5          | 2     | 5          | 2     | 6          | 2     | 6          |        |               |          |         |            |        |        |       |            |        |
| EPA 405.1                     | BOD                   |       |            |       | 1          | 2     | 2          |       |            |        |               |          |         |            |        |        |       |            |        |
| EPA 415.1                     | Total Organic Carbon  | 1     | 5          | 2     | 5          | 2     | 6          | 2     | 6          |        |               |          |         |            |        |        |       |            |        |
| SM 9223                       | <i>E. coli</i>        | 1     | 5          | 2     | 5          | 2     | 6          | 2     | 6          |        |               |          |         |            |        |        |       |            |        |
| NA                            | Dissolved Oxygen      | 1     | 6          | 3     | 6          | 3     | 7          | 3     | 10         |        |               |          |         | 3          |        | 1      | 1     | 3          |        |
| NA                            | Specific Conductivity | 1     | 6          | 3     | 6          | 3     | 7          | 3     | 10         |        |               |          |         | 3          |        | 1      | 1     | 3          |        |
| NA                            | pH                    | 1     | 6          | 3     | 6          | 3     | 7          | 3     | 10         |        |               |          |         | 3          |        | 1      | 1     | 3          |        |
| Carbamates                    |                       |       |            |       |            |       |            |       |            |        |               |          |         |            |        |        |       |            |        |
| EPA 8321A                     | Aldicarb              |       |            |       | 5          | 2     | 6          | 2     | 6          |        |               |          |         |            |        |        |       |            |        |
| EPA 8321A                     | Carbaryl              |       |            |       | 5          | 2     | 6          | 2     | 6          |        |               |          |         |            |        |        |       |            |        |
| EPA 8321A                     | Carbofuran            |       |            |       | 5          | 2     | 6          | 2     | 6          |        |               |          |         |            |        |        |       |            |        |
| EPA 8321A                     | Diuron                |       |            |       | 5          | 2     | 6          | 2     | 6          |        |               |          |         |            |        |        |       |            |        |
| EPA 8321A                     | Linuron               |       |            |       | 5          | 2     | 6          | 2     | 6          |        |               |          |         |            |        |        |       |            |        |
| EPA 8321A                     | Methiocarb            |       |            |       | 5          | 2     | 6          | 2     | 6          |        |               |          |         |            |        |        |       |            |        |
| EPA 8321A                     | Methomyl              |       |            |       | 5          | 2     | 6          | 2     | 6          |        |               |          |         |            |        |        |       |            |        |
| EPA 8321A                     | Oxamyl                |       |            |       | 5          | 2     | 6          | 2     | 6          |        |               |          |         |            |        |        |       |            |        |
| Organochlorines               |                       |       |            |       |            |       |            |       |            |        |               |          |         |            |        |        |       |            |        |
| EPA 8081A                     | DDD (p,p')            |       |            |       | 5          | 2     | 6          | 2     | 6          |        |               |          |         |            |        |        |       |            |        |
| EPA 8081A                     | DDE (p,p')            |       |            |       | 5          | 2     | 6          | 2     | 6          |        |               |          |         |            |        |        |       |            |        |
| EPA 8081A                     | DDT (p,p')            |       |            |       | 5          | 2     | 6          | 2     | 6          |        |               |          |         |            |        |        |       |            |        |
| EPA 8081A                     | Dicofol               |       |            |       | 5          | 2     | 6          | 2     | 6          |        |               |          |         |            |        |        |       |            |        |
| EPA 8081A                     | Dieldrin              |       |            |       | 5          | 2     | 6          | 2     | 6          |        |               |          |         |            |        |        |       |            |        |
| EPA 8081A                     | Endrin                |       |            |       | 5          | 2     | 6          | 2     | 6          |        |               |          |         |            |        |        |       |            |        |
| EPA 8081A                     | Methoxychlor          |       |            |       | 5          | 2     | 6          | 2     | 6          |        |               |          |         |            |        |        |       |            |        |
| Organophosphates              |                       |       |            |       |            |       |            |       |            |        |               |          |         |            |        |        |       |            |        |
| EPA 8141A                     | Azinphos methyl       |       |            |       | 5          | 2     | 6          | 2     | 6          |        |               |          |         |            |        |        |       |            |        |

| METHOD         | ANALYTE                           | 2005  |            | 2006  |            | 2007  |            | 2008  |            |        | 2009          | 2010     |         |            |        |        | 2011  |            |        |  |
|----------------|-----------------------------------|-------|------------|-------|------------|-------|------------|-------|------------|--------|---------------|----------|---------|------------|--------|--------|-------|------------|--------|--|
|                |                                   | STORM | IRRIGATION | STORM | IRRIGATION | STORM | IRRIGATION | STORM | IRRIGATION | FALL * | WINTER-FALL * | WINTER * | STORM * | IRRIGATION | FALL * | WINTER | STORM | IRRIGATION | FALL * |  |
| EPA 8141A      | Chlorpyrifos                      | 1     | 5          | 2     | 5          | 2     | 6          | 2     | 8          |        |               |          |         | 2          |        |        |       | 2          |        |  |
| EPA 8141A      | Diazinon                          |       |            |       | 5          | 2     | 6          | 2     | 6          |        |               |          |         |            |        |        |       |            |        |  |
| EPA 8141A      | Dimethoate                        |       |            |       | 5          | 2     | 6          | 2     | 6          |        |               |          |         |            |        |        |       |            |        |  |
| EPA 8141A      | Disulfoton                        |       |            |       | 5          | 2     | 6          | 2     | 6          |        |               |          |         |            |        |        |       |            |        |  |
| EPA 8141A      | Malathion                         |       |            |       | 5          | 2     | 6          | 2     | 6          |        |               |          |         |            |        |        |       |            |        |  |
| EPA 8141A      | Methamidophos                     |       |            |       | 5          | 2     | 6          | 2     | 6          |        |               |          |         |            |        |        |       |            |        |  |
| EPA 8141A      | Methidathion                      |       |            |       | 5          | 2     | 6          | 2     | 6          |        |               |          |         |            |        |        |       |            |        |  |
| EPA 8141A      | Molinate                          |       |            |       | 5          | 2     | 6          | 2     | 6          |        |               |          |         |            |        |        |       |            |        |  |
| EPA 8141A      | Parathion, Methyl                 |       |            |       | 5          | 2     | 6          | 2     | 6          |        |               |          |         |            |        |        |       |            |        |  |
| EPA 8141A      | Phorate                           |       |            |       | 5          | 2     | 6          | 2     | 6          |        |               |          |         |            |        |        |       |            |        |  |
| EPA 8141A      | Phosmet                           |       |            |       | 5          | 2     | 6          | 2     | 6          |        |               |          |         |            |        |        |       |            |        |  |
| EPA 8141A      | Thiobencarb                       |       |            |       | 5          | 2     | 6          | 2     | 6          |        |               |          |         |            |        |        |       |            |        |  |
| Pyrethroids    |                                   |       |            |       |            |       |            |       |            |        |               |          |         |            |        |        |       |            |        |  |
| EPA 8081A      | Bifenthrin                        |       | 1          | 2     | 5          | 2     | 6          |       |            |        |               |          |         |            |        |        |       |            |        |  |
| EPA 8081A      | Cyfluthrin, total                 |       | 1          | 2     | 5          | 2     | 6          |       |            |        |               |          |         |            |        |        |       |            |        |  |
| EPA 8081A      | Cyhalothrin, lambda, total        | 1     | 5          | 2     | 5          | 2     | 6          |       |            |        |               |          |         |            |        |        |       |            |        |  |
| EPA 8081A      | Cypermethrin, total               | 1     | 5          | 2     | 5          | 2     | 6          |       |            |        |               |          |         |            |        |        |       |            |        |  |
| EPA 8081A      | Esfenvalerate/ Fenvalerate, total | 1     | 5          | 2     | 5          | 2     | 6          |       |            |        |               |          |         |            |        |        |       |            |        |  |
| EPA 8081A      | Permethrin, total                 | 1     | 5          | 2     | 5          | 2     | 6          |       |            |        |               |          |         |            |        |        |       |            |        |  |
| Triazines      |                                   |       |            |       |            |       |            |       |            |        |               |          |         |            |        |        |       |            |        |  |
| EPA 547M       | Glyphosate                        |       |            |       | 5          | 2     | 6          | 2     | 6          |        |               |          |         |            |        |        |       |            |        |  |
| EPA 549.2M     | Paraquat dichloride               |       |            |       | 5          | 2     | 6          | 2     | 6          |        |               |          |         |            |        |        |       |            |        |  |
| EPA 619        | Atrazine                          |       |            |       | 5          | 2     | 6          | 2     | 6          |        |               |          |         |            |        |        |       |            |        |  |
| EPA 619        | Cyanazine                         |       |            |       | 5          | 2     | 6          | 2     | 6          |        |               |          |         |            |        |        |       |            |        |  |
| EPA 619        | Simazine                          |       |            |       | 5          | 2     | 6          | 2     | 6          |        |               |          |         |            |        |        |       |            |        |  |
| Metals (Total) |                                   |       |            |       |            |       |            |       |            |        |               |          |         |            |        |        |       |            |        |  |
| EPA 200.8      | Arsenic                           |       |            |       | 5          | 2     | 6          | 2     | 6          |        |               |          |         |            |        |        |       |            |        |  |
| EPA 200.8      | Boron                             |       |            |       | 5          | 2     | 6          | 2     | 6          |        |               |          |         |            |        |        |       |            |        |  |
| EPA 200.8      | Cadmium                           |       |            |       | 5          | 2     | 6          | 2     | 6          |        |               |          |         |            |        |        |       |            |        |  |
| EPA 200.8      | Copper                            |       |            |       | 5          | 2     | 6          | 2     | 6          |        |               |          |         | 1          |        | 1      | 1     | 1          |        |  |
| EPA 200.8      | Lead                              |       |            |       | 5          | 2     | 6          | 2     | 6          |        |               |          |         |            |        |        |       |            |        |  |

| METHOD             | ANALYTE                          | 2005  |            | 2006  |            | 2007  |            | 2008  |            |        | 2009          | 2010    |        |            |        |        | 2011  |            |        |  |
|--------------------|----------------------------------|-------|------------|-------|------------|-------|------------|-------|------------|--------|---------------|---------|--------|------------|--------|--------|-------|------------|--------|--|
|                    |                                  | STORM | IRRIGATION | STORM | IRRIGATION | STORM | IRRIGATION | STORM | IRRIGATION | FALL * | WINTER-FALL * | WINTER* | STORM* | IRRIGATION | FALL * | WINTER | STORM | IRRIGATION | FALL * |  |
| EPA 200.8          | Molybdenum                       |       |            |       |            |       |            |       |            |        |               |         |        |            |        |        |       |            |        |  |
| EPA 200.8          | Nickel                           |       |            |       | 5          | 2     | 6          | 2     | 6          |        |               |         |        |            |        |        |       |            |        |  |
| EPA 200.8          | Selenium                         |       |            |       | 5          | 2     | 2          | 2     | 6          |        |               |         |        |            |        |        |       |            |        |  |
| EPA 200.8          | Zinc                             |       |            |       | 5          | 2     | 6          | 2     | 6          |        |               |         |        |            |        |        |       |            |        |  |
| Metals (Dissolved) |                                  |       |            |       |            |       |            |       |            |        |               |         |        |            |        |        |       |            |        |  |
| EPA 200.8          | Cadmium                          |       |            |       |            |       |            |       |            |        |               |         |        |            |        |        |       |            |        |  |
| EPA 200.8          | Copper                           |       |            |       |            |       |            |       |            |        |               |         |        | 1          |        | 1      | 1     | 1          |        |  |
| EPA 200.8          | Lead                             |       |            |       |            |       |            |       |            |        |               |         |        |            |        |        |       |            |        |  |
| EPA 200.8          | Nickel                           |       |            |       |            |       |            |       |            |        |               |         |        |            |        |        |       |            |        |  |
| EPA 200.8          | Zinc                             |       |            |       |            |       |            |       |            |        |               |         |        |            |        |        |       |            |        |  |
| Nutrients          |                                  |       |            |       |            |       |            |       |            |        |               |         |        |            |        |        |       |            |        |  |
| SM 2340 C          | Hardness as CaCO3                |       |            |       | 5          | 2     | 6          | 2     | 6          |        |               |         |        | 1          |        | 1      | 1     | 1          |        |  |
| EPA 300.0          | Nitrate as N                     |       |            |       | 5          | 2     | 6          | 2     | 6          |        |               |         |        |            |        |        |       |            |        |  |
| EPA 350.2          | Ammonia as N                     |       |            |       | 5          | 2     | 6          | 2     | 6          |        |               |         |        |            |        |        |       |            |        |  |
| EPA 351.3          | Nitrogen, Total Kjeldahl         |       |            |       | 5          | 2     | 6          | 2     | 6          |        |               |         |        |            |        |        |       |            |        |  |
| EPA 354.1          | Nitrite as N                     |       |            |       | 5          | 2     | 6          | 2     | 6          |        |               |         |        |            |        |        |       |            |        |  |
| EPA 353.2          | Nitrate + Nitrite as N           |       |            |       |            |       |            |       |            |        |               |         |        |            |        |        |       |            |        |  |
| EPA 365.2          | OrthoPhosphate as P              |       |            |       | 5          | 2     | 6          | 2     | 6          |        |               |         |        |            |        |        |       |            |        |  |
| EPA 365.2          | Phosphate as P                   |       |            |       | 5          | 2     | 6          | 2     | 6          |        |               |         |        |            |        |        |       |            |        |  |
| Toxicity           |                                  |       |            |       |            |       |            |       |            |        |               |         |        |            |        |        |       |            |        |  |
| EPA 821/R-02-012   | <i>Ceriodaphnia dubia</i>        | 1     | 6          | 2     | 6          | 2     | 8          | 2     | 8          |        |               |         |        | 2          |        |        |       | 2          |        |  |
| EPA 821/R-02-012   | <i>Pimephales promelas</i>       | 1     | 6          | 2     | 5          | 2     | 7          | 2     | 6          |        |               |         |        |            |        |        |       |            |        |  |
| EPA 821/R-02-013   | <i>Selenastrum capricornutum</i> | 1     | 6          | 2     | 5          | 2     | 7          |       | 7          |        |               |         |        |            |        |        |       |            |        |  |
| EPA 600/R-99-064   | <i>Hyalella azteca</i>           |       | 5          | 1     | 1          | 1     | 1          | 1     | 2          |        |               |         |        |            |        |        |       |            |        |  |

\*Site not sampled during the 2008 fall season, 2009 sampling year, 2010 winter, storm and fall seasons, and 2011 fall season.

**Table IV-4. Bear Creek @ Kibby Rd site subwatershed Management Plan Monitoring schedule (2008-2011).**

| SITE NAME             | SAMPLE DATE | MONITORING TYPE | COPPER | CHLORPYRIFOS | C. DUBIA |
|-----------------------|-------------|-----------------|--------|--------------|----------|
| Bear Creek @ Kibby Rd | 7-May-08    | A               |        | X            | X        |
| Bear Creek @ Kibby Rd | 8-Jul-08    | A               |        | X            | X        |
| Bear Creek @ Kibby Rd | 18-May-10   | MPM             |        | X            | X        |
| Bear Creek @ Kibby Rd | 20-Jul-10   | MPM             |        | X            | X        |
| Bear Creek @ Kibby Rd | 17-Aug-10   | MPM             | X      |              |          |
| Bear Creek @ Kibby Rd | 18-Jan-11   | MPM             | X      |              |          |
| Bear Creek @ Kibby Rd | 17-Feb-11   | MPM             | X      |              |          |
| Bear Creek @ Kibby Rd | 17-May-11   | MPM             |        | X            | X        |
| Bear Creek @ Kibby Rd | 19-Jul-11   | MPM             |        | X            | X        |
| Bear Creek @ Kibby Rd | 16-Aug-11   | MPM             | X      |              |          |

A – Additional sampling

U – Upstream sampling

X – Constituent sampled for Management Plan Monitoring (MPM)



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### Exceedance History

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Samples collected from the Bear Creek @ Kibby Rd subwatershed from 2005 through 2011 have resulted in exceedances of the WQTLs for field and physical parameters, *E. coli*, nutrients, metals, pesticides, and water column and sediment toxicity occurred within the Bear Creek site subwatershed (Table IV-5). During ambient water monitoring several exceedances occurred, including DO (2), pH (3), *E. coli* (7), arsenic (1), copper (4), chlorpyrifos (2), and DDT (1). Toxicity to *C. dubia* (3), and *S. capricornutum* (2), including a resample of initial toxicity. Toxicity to *H. azteca* sediment (2) occurred (Table IV-5).

No exceedances occurred at Bear Creek @ Kibby Rd during MPM sampling in 2011.

All exceedances are listed in Table IV-5 by season and date and are based on WQTLs listed in the introduction to the ESJWQC Management Plan. The highest priority constituents in the Bear Creek subwatershed are chlorpyrifos (A), copper (C), and toxicity to *C. dubia* (D).

**Table IV-5. Bear Creek @ Kibby Rd site subwatershed exceedances (2005-2011).**

The WQTL used to evaluate the data are listed in the header after the analyte.

| SITE NAME             | SEASON     | SAMPLE DATE | OXYGEN, DISSOLVED, <7 MG/L | PH, <6.5 AND >8.5 UNITS | E. COLI, >235 MPN/100 ML | ARSENIC, >10 µG/L | COPPER, TOTAL <sup>1</sup> , >1,300 µG/L | CHLORPYRIFOS, >0.015 µG/L | DDT, (p,p'), >0.00059 µG/L | C. DUBIA, (% CONTROL) | S. CAPRICORNUTUM, (% CONTROL) | H. AZTECA, (% CONTROL) |
|-----------------------|------------|-------------|----------------------------|-------------------------|--------------------------|-------------------|------------------------------------------|---------------------------|----------------------------|-----------------------|-------------------------------|------------------------|
| Bear Creek @ Kibby Rd | Storm      | 3/21/2005   | 4.4                        |                         | 1600                     |                   |                                          |                           |                            |                       |                               |                        |
| Bear Creek @ Kibby Rd | Irrigation | 5/10/2005   |                            |                         | 280                      |                   |                                          |                           |                            | 5                     |                               |                        |
| Bear Creek @ Kibby Rd | Storm      | 3/15/2006   |                            |                         | 1600                     |                   |                                          |                           |                            |                       |                               |                        |
| Bear Creek @ Kibby Rd | Irrigation | 5/17/2006   |                            |                         |                          |                   |                                          | 0.52                      |                            | 0                     |                               |                        |
| Bear Creek @ Kibby Rd | Irrigation | 6/13/2006   | 6.99                       | 8.69                    |                          |                   |                                          |                           |                            |                       |                               |                        |
| Bear Creek @ Kibby Rd | Storm      | 2/12/2007   |                            |                         | 2400                     |                   | 12 (9.3)                                 |                           | 0.0091                     |                       |                               |                        |
| Bear Creek @ Kibby Rd | Storm      | 3/1/2007    |                            |                         | 1300                     |                   |                                          |                           |                            |                       |                               |                        |
| Bear Creek @ Kibby Rd | Irrigation | 7/24/2007   |                            |                         |                          |                   |                                          | 0.049                     |                            | 0                     |                               |                        |
| Bear Creek @ Kibby Rd | Irrigation | 8/21/2007   |                            | 8.69                    |                          |                   |                                          |                           |                            |                       |                               |                        |
| Bear Creek @ Kibby Rd | Storm      | 1/24/2008   |                            |                         | 2400                     |                   | 8.6 (7.7)                                |                           |                            |                       |                               |                        |
| Bear Creek @ Kibby Rd | Storm      | 2/25/2008   |                            |                         | >2400                    |                   | 7.2 (6.4)                                |                           |                            |                       |                               |                        |
| Bear Creek @ Kibby Rd | Sediment   | 3/4/2008    |                            | 8.72                    |                          |                   |                                          |                           |                            |                       |                               |                        |
| Bear Creek @ Kibby Rd | Irrigation | 4/29/2008   |                            |                         |                          |                   |                                          |                           |                            |                       | 4                             |                        |
| Bear Creek @ Kibby Rd | Irrigation | 5/7/2008    |                            |                         |                          |                   |                                          |                           |                            |                       | 21                            |                        |
| Bear Creek @ Kibby Rd | Irrigation | 6/24/2008   |                            |                         |                          | 17                |                                          |                           |                            |                       |                               |                        |
| Bear Creek @ Kibby Rd | Irrigation | 7/29/2008   |                            |                         |                          |                   |                                          |                           |                            |                       |                               |                        |
| Bear Creek @ Kibby Rd | Irrigation | 8/26/2008   |                            |                         |                          |                   | 7.1 (2.4)                                |                           |                            |                       |                               |                        |
| Bear Creek @ Kibby Rd | Sediment   | 8/28/2008   |                            |                         |                          |                   |                                          |                           |                            |                       |                               | 91                     |

| SITE NAME             | SEASON   | SAMPLE DATE | OXYGEN, DISSOLVED, <7 MG/L | PH, <6.5 AND > 8.5 UNITS | E. COLI, >235 MPN/100 ML | ARSENIC, >10 µG/L | COPPER, TOTAL <sup>1</sup> , >1,300 µG/L | CHLORPYRIFOS, >0.015 µG/L | DDT, (P,P'), >0.00059 µG/L | C. DUBIA, (% CONTROL) | S. CAPRICORNUTUM, (% CONTROL) | H. AZTECA, (% CONTROL) |
|-----------------------|----------|-------------|----------------------------|--------------------------|--------------------------|-------------------|------------------------------------------|---------------------------|----------------------------|-----------------------|-------------------------------|------------------------|
| Bear Creek @ Kibby Rd | Sediment | 10/2/2008   |                            |                          |                          |                   |                                          |                           |                            |                       |                               | 91                     |
| Constituent Priority  |          |             | E                          | E                        | E                        | NP                | C                                        | A/B                       | NP                         | D                     | NP <sup>T</sup>               | NP <sup>T</sup>        |

<sup>1</sup>Total metal WQTL variable based on hardness.

NP – Not Prioritized; less than two exceedances within three consecutive monitoring years and currently no TMDL.

NP<sup>T</sup> – Not prioritized; both toxic samples were from the same sampling event (sample and resample to test for persistence).

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## 2008-2011 Management Plan Monitoring Results

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All monitoring results for high priority management plan constituents in the Bear Creek @ Kibby Rd subwatershed are listed in Table IV-6. These constituents include chlorpyrifos, copper and *C. dubia* toxicity.

There were two exceedances of the chlorpyrifos WQTL at Bear Creek @ Kibby Rd (Table IV-5). Both exceedances occurred during irrigation season sampling events in 2006 (May) and 2007 (July). Since the most recent chlorpyrifos WQTL exceedance in July 2007, the Bear Creek @ Kibby Rd was monitored for chlorpyrifos during 2008 Normal Monitoring (January-February and April-September), 2008 additional MPM (May and July) and during MPM in 2010 and 2011 (May and July). There were no exceedances of the chlorpyrifos WQTL during normal or MPM in 2008, 2010, or 2011 (Table IV-6). Since the July 2007 exceedance, there was one detection of chlorpyrifos (during storm sampling in February 2008) in samples collected from Bear Creek @ Kibby Rd; however, there were no detections of chlorpyrifos in any of the samples collected during irrigation months (months of past exceedances). In 2012, chlorpyrifos MPM is scheduled to continue in May and July.

Copper concentrations exceeded the hardness based WQTL three times during 2008 Normal Monitoring (January, February, and August) and copper was therefore added to the Bear Creek management plan. Management Plan Monitoring for copper was conducted during the 2010 irrigation season in August and resulted in no exceedances (Table IV-6). In 2011, MPM occurred for copper (January, February and August) and there were no exceedances (Table IV-6). In 2012, copper MPM is scheduled to continue in January, February and August.

There were three instances of *C. dubia* toxicity in the Bear Creek @ Kibby Rd site subwatershed (Table IV-6). Toxicity to *C. dubia* occurred in 2005 (May), 2006 (May) and 2007 (July). No toxicity occurred during the 2006 and 2007 resampling events. The TIE that was initiated for the May 2005 toxicity indicated that toxicity in the sample was no longer present. Non-polar organics were determined to be the cause of the May 2006 toxicity and the cause of toxicity for July 2007 samples could not be identified. Toxicity was not persistent in either resampling event for May 2006 and July 2007 samples. Both the 2006 and 2007 toxicities coincided with the only two chlorpyrifos exceedances to have occurred at Bear Creek @ Kibby Rd. Normal Monitoring occurred during the storm and irrigation seasons in 2007 and 2008, and the Coalition also conducted MPM for *C. dubia* toxicity in May and July of 2010 and 2011 and there have been no instances of *C. dubia* toxicity since July 2007 (Table IV-6). In 2012, *C. dubia* toxicity MPM is scheduled to continue in May and July.

**Table IV-6. Bear Creek @ Kibby Rd site subwatershed monitoring results for high priority constituents (2008-2011).**

Exceedance values are in bold. Resampling (RS) due to toxicity not included in table.

| MONTH:                           |                                      | JAN     | FEB     | APR     | MAY     | JUN     | JUL     | AUG     | SEP     |
|----------------------------------|--------------------------------------|---------|---------|---------|---------|---------|---------|---------|---------|
| <b>2008 NM<br/>(@ Kibby Rd)</b>  | Date                                 | 1/24/08 | 2/25/08 | 4/29/08 | 5/27/08 | 6/24/08 | 7/29/08 | 8/26/08 | 9/30/08 |
|                                  | Chlorpyrifos (µg/L)                  | <0.003  | 0.008   | <0.003  | <0.003  | <0.003  | <0.003  | <0.003  | <0.003  |
|                                  | <i>C. dubia</i> toxicity (% Control) | 90      | 100     | 100     | 100     | 100     | 100     | 100     | 100     |
| <b>2008 MPM<br/>(@ Kibby Rd)</b> | Date                                 | NA      | NA      | NA      | 5/07/08 | NA      | 7/08/08 | NA      | NA      |
|                                  | Chlorpyrifos (µg/L)                  | NA      | NA      | NA      | <0.003  | NA      | <0.003  | NA      | NA      |
|                                  | <i>C. dubia</i> toxicity (% Control) | NA      | NA      | NA      | 100     | NA      | 95      | NA      | NA      |
| <b>2010 MPM<br/>(@ Kibby Rd)</b> | Date                                 | NA      | NA      | NA      | 5/18/10 | NA      | 7/20/10 | 8/17/10 | NA      |
|                                  | Copper, dissolved (µg/L)             | NA      | NA      | NA      | NA      | NA      | NA      | 0.46    | NA      |
|                                  | Copper, total (µg/L)                 | NA      | NA      | NA      | NA      | NA      | NA      | 1.2     | NA      |
|                                  | Chlorpyrifos (µg/L)                  | NA      | NA      | NA      | <0.003  | NA      | <0.003  | NA      | NA      |
|                                  | <i>C. dubia</i> toxicity (% Control) | NA      | NA      | NA      | 100     | NA      | 100     | NA      | NA      |
| <b>2011 MPM<br/>(@ Kibby Rd)</b> | Date                                 | 1/18/11 | 2/17/11 | NA      | 5/17/11 | NA      | 7/19/11 | 8/16/11 | NA      |
|                                  | Copper, dissolved (µg/L)             | 1.5     | 1.2     | NA      | NA      | NA      | NA      | 0.38    | NA      |
|                                  | Copper, total (µg/L)                 | 2.4     | 2.3     | NA      | NA      | NA      | NA      | 0.86    | NA      |
|                                  | Chlorpyrifos (µg/L)                  | NA      | NA      | NA      | <0.003  | NA      | <0.003  | NA      | NA      |
|                                  | <i>C. dubia</i> toxicity (% Control) | NA      | NA      | NA      | 100     | NA      | 100     | NA      | NA      |

MPM – Management Plan Monitoring (see Table 4 for MPM schedule)

NA – Not applicable. No monitoring occurred on this date for this constituent.

NM – Normal Monitoring

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## Load Calculations

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Loads have been calculated for all chlorpyrifos and copper detections in the site subwatershed (Table IV-7) based on the following formula:

$$\text{Load} = \text{Discharge (cfs)} \times 28.317\text{L/ft}^3 \times \text{Concentration (mg/L} \times 1000 \text{ or } \mu\text{g/L)}.$$

The load values for constituents in this report represent instantaneous loads only. These values should not be used to extrapolate loading over any period of time (e.g. weekly, monthly, seasonal or annual). The primary purpose for reporting instantaneous loads is to provide a normalization of the concentrations by flow for various constituents at the time the samples were collected.

**Table IV-7. Bear Creek @ Kibby Rd site subwatershed instantaneous load calculations for copper.**

Sorted by analyte and date.

| SITE NAME              | ANALYTE NAME | SAMPLE DATE | DISCHARGE CFS | CONCENTRATION $\mu\text{G/L}$ | LOADING RATE $\mu\text{G/SEC}$ |
|------------------------|--------------|-------------|---------------|-------------------------------|--------------------------------|
| Bear Creek @ Kibby Rd* | Copper       | 04/17/07    | 29.13         | 2                             | 1649.75                        |
| Bear Creek @ Kibby Rd  | Copper       | 04/17/07    | 29.13         | 2.1                           | 1732.24                        |
| Bear Creek @ Kibby Rd  | Copper       | 08/21/07    | 56.1          | 1.6                           | 2541.73                        |
| Bear Creek @ Kibby Rd  | Copper       | 09/18/07    | 51.02         | 1.7                           | 2456.05                        |
| Bear Creek @ Kibby Rd  | Copper       | 04/29/08    | 113.34        | 1.1                           | 3530.39                        |
| Bear Creek @ Kibby Rd  | Copper       | 05/27/08    | 147.77        | 1.4                           | 5858.16                        |
| Bear Creek @ Kibby Rd  | Copper       | 08/26/08    | 94.9          | 7.1                           | 19079.71                       |
| Bear Creek @ Kibby Rd  | Copper       | 09/30/08    | 33.1          | 1.3                           | 1218.48                        |

\*Field Duplicate

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## Source Identification and Outreach

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To address source identification and determine an outreach strategy, the Coalition focuses its efforts on applied pesticides by considering past monitoring results and associated PUR data. In 2008, the Coalition conducted additional MPM during the months when exceedances historically occurred to better characterize water quality in the subwatershed. Management Plan Monitoring resumed at Bear Creek in 2010 and continued in 2011 to assess water quality in the subwatershed as outreach in the area progressed. The Coalition also reviews PUR data to determine the most frequent crop type and timing associated with high priority constituent applications. Bear Creek @ Kibby Rd subwatershed PUR data are available through October 2011.

Focused outreach to document current management practices and track implementation of additional management practices in the Bear Creek @ Kibby Rd subwatershed began in 2010 and continued through 2011. The Coalition organized grower meetings and mailings to educate growers about management practices and their importance in achieving acceptable water quality. The Coalition contacted 100% of targeted growers (14) representing 1,292 acres within the Bear Creek @ Kibby subwatershed. All 14 growers participated in follow up contacts to determine if additional management practices were implemented and if any are planned to be implemented. Management Plan Monitoring will continue in the Bear Creek @ Kibby Rd subwatershed in 2012 as necessary to assess the effect of outreach on water quality.

### *Priority A/B Constituents*

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Chlorpyrifos is the only priority A/B constituent in the Bear Creek @ Kibby Rd subwatershed management plan.

#### **Chlorpyrifos**

Two water samples contained chlorpyrifos above the WQTL of 0.015 µg/L from 2006 through 2011 (May 2006 and July 2007). Chlorpyrifos was omitted from the monitoring schedule in October 2008 when the Coalition began monitoring under the current 2008 MRPP. In 2009, no MPM took place at this site. Starting in May 2010 through 2011, MPM continued and chlorpyrifos was monitored during months of past exceedances, no exceedances of the chlorpyrifos WQTL occurred. The Coalition evaluates monitoring and PUR data to identify possible sources of past exceedances.

In every high priority subwatershed, PUR data are reviewed for the number of monthly applications, pounds of active ingredient applied of the constituent of concern, and the acres treated by the constituent of concern (Table IV-8, Figure IV-2). The largest amount of chlorpyrifos was applied in 2008 (1,430 lbs AI, see Table IV-8, Figure IV-2). The months with the greatest amount of chlorpyrifos use from 2005 through 2011 were May, June and July (Table IV-8, Figure IV-2). Both past exceedances occurred during months with historically the greatest amount of use (May and July), but not all of the largest pounds of AI applied months have coincided with exceedances (Figure IV-2).

The Coalition also uses PUR data from each subwatershed to determine which crops receive the most applications of the constituent of concern. The highest application rates of chlorpyrifos in the Bear Creek subwatershed from 2005 through 2011 were to almonds (2,371 lbs AI), walnuts (1,836 lbs AI), and corn (1,674 lbs AI) (Table IV-9). The most common product containing chlorpyrifos used within this subwatershed was Lorsban (Table IV-9).

**Table IV-8. Bear Creek @ Kibby Rd site subwatershed chlorpyrifos applications, lbs AI applied, and acres treated by month (2005-2011).**

PUR data available through October 2011 for Merced County. If month is not included in table, no applications were made.

| MONTH/YEAR               | NUMBER OF CHLORPYRIFOS APPLICATIONS | POUNDS OF AI APPLIED | ACRES TREATED |
|--------------------------|-------------------------------------|----------------------|---------------|
| March, 2005              | 1                                   | 39.6                 | 99.0          |
| May, 2005                | 5                                   | 347.0                | 178.0         |
| June, 2005               | 2                                   | 49.9                 | 25.0          |
| July, 2005               | 3                                   | 109.9                | 55.0          |
| August, 2005             | 2                                   | 95.6                 | 50.0          |
| September, 2005          | 1                                   | 18.0                 | 10.0          |
| May, 2006                | 11                                  | 980.6                | 520.0         |
| June, 2006               | 4                                   | 154.9                | 78.0          |
| July, 2006               | 3                                   | 403.6                | 200.0         |
| August, 2006             | 2                                   | 131.4                | 81.0          |
| May, 2007                | 10                                  | 403.2                | 216.0         |
| June, 2007               | 1                                   | 29.9                 | 15.0          |
| July, 2007               | 5                                   | 518.7                | 264.0         |
| August, 2007             | 3                                   | 215.7                | 110.0         |
| September, 2007          | 1                                   | 76.3                 | 75.0          |
| February, 2008           | 2                                   | 325.2                | 175.0         |
| May, 2008                | 1                                   | 20.0                 | 10.0          |
| June, 2008               | 13                                  | 529.0                | 385.0         |
| July, 2008               | 6                                   | 458.4                | 352.0         |
| August, 2008             | 2                                   | 97.4                 | 106.0         |
| May, 2009                | 7                                   | 356.1                | 436.0         |
| March, 2010              | 1                                   | 28.7                 | 22.0          |
| June, 2010               | 8                                   | 590.3                | 451.7         |
| July, 2010               | 1                                   | 45.1                 | 90.0          |
| April, 2011              | 2                                   | 24.2                 | 103.0         |
| <b>Summaries by Year</b> |                                     |                      |               |
| 2005 Total               | 14                                  | 660.0                | 417.0         |
| 2006 Total               | 20                                  | 1670.6               | 879.0         |
| 2007 Total               | 20                                  | 1243.8               | 680.0         |
| 2008 Total               | 24                                  | 1430.0               | 1028.0        |
| 2009 Total               | 7                                   | 356.1                | 436.0         |
| 2010 Total               | 10                                  | 664.1                | 563.7         |
| 2011 Total               | 2                                   | 24.2                 | 103.0         |
| <b>Total</b>             | <b>97</b>                           | <b>6048.8</b>        | <b>4106.7</b> |



**Figure IV-2. Bear Creek @ Kibby Rd site subwatershed lbs chlorpyrifos applied by month (2005-2011).**

Asterisk (\*) denotes months with exceedances. PUR data available through October 2011 for Merced County.

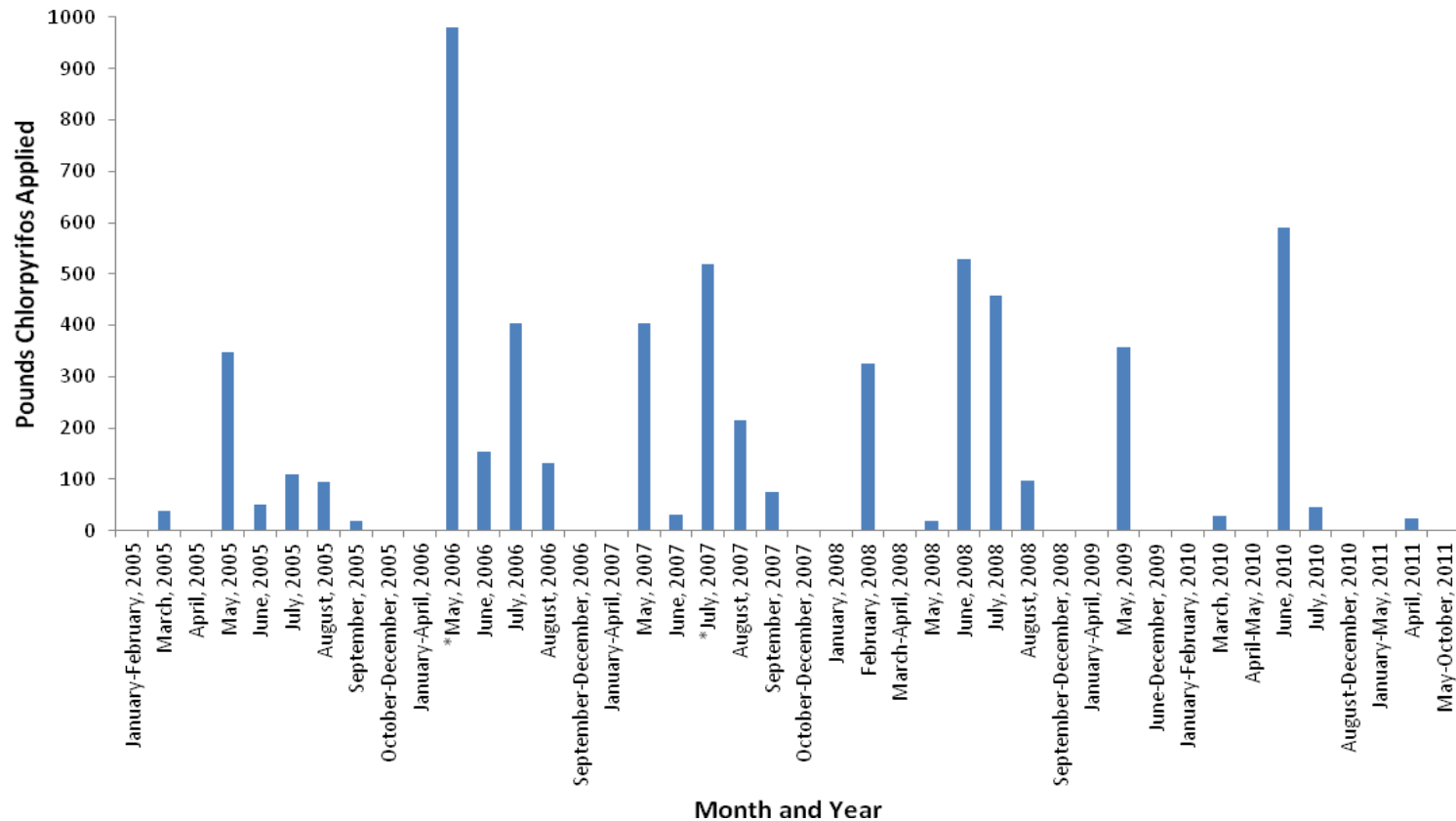


**Table IV-9. Bear Creek @ Kibby Rd site subwatershed chlorpyrifos PUR data (2005-2011).**

PUR data available through October 2011 for Merced County.

| CHEMICAL NAME                                   | COMMODITY                               | PRODUCT NAME           | LBS AI APPLIED |
|-------------------------------------------------|-----------------------------------------|------------------------|----------------|
| CHLORPYRIFOS                                    | ALFALFA (FORAGE - FODDER) (ALFALFA HAY) | CHLORPYRIFOS 4E AG     | 39.6           |
|                                                 |                                         | LOCK-ON INSECTICIDE    | 45.1           |
|                                                 | ALMOND                                  | GOVERN 4E INSECTICIDE  | 997.9          |
|                                                 |                                         | LORSBAN 4E INSECTICIDE | 80.1           |
|                                                 |                                         | LORSBAN 4E-HF          | 517.4          |
|                                                 |                                         | LORSBAN-4E             | 675.8          |
|                                                 |                                         | WHIRLWIND              | 100.0          |
|                                                 | CORN (FORAGE - FODDER)                  | NUFOS 4E               | 699.4          |
|                                                 |                                         | SAURUS                 | 975.1          |
|                                                 | PEACH                                   | LORSBAN-4E             | 158.0          |
|                                                 | WALNUT                                  | CHLORPYRIFOS 4E AG     | 57.4           |
|                                                 |                                         | LORSBAN 4E INSECTICIDE | 60.1           |
|                                                 |                                         | LORSBAN 4E-HF          | 665.9          |
|                                                 |                                         | LORSBAN-4E             | 1052.8         |
|                                                 | WHEAT                                   | LORSBAN ADVANCED       | 24.2           |
| ALFALFA - Total Pounds Chlorpyrifos Applied     |                                         |                        | 84.7           |
| ALMOND - Total Pounds Chlorpyrifos Applied      |                                         |                        | 2371.2         |
| CORN - Total Pounds Chlorpyrifos Applied        |                                         |                        | 1674.5         |
| PEACH - Total Pounds Chlorpyrifos Applied       |                                         |                        | 158.0          |
| WALNUT - Total Pounds Chlorpyrifos Applied      |                                         |                        | 1836.2         |
| WHEAT - Total Pounds Chlorpyrifos Applied       |                                         |                        | 24.2           |
| Total Pounds Chlorpyrifos Applied (2005 - 2011) |                                         |                        | 6148.7         |

Based on chlorpyrifos exceedances occurring in the months with some of the highest application rates, the Coalition suspected the most probably source of chlorpyrifos in Bear Creek was a combination of spray drift and irrigation tailwater discharge. Growers were encouraged to review their operation to determine if irrigation return flows were managed properly. Owners with orchards were requested to evaluate their applications to minimize spray drift. Row crop farmers were advised of methods to better manage their irrigation tailwater and storm water runoff, whereas outreach efforts to orchard growers focused on encouraging management practices to reduce spray drift and improve orchard and vineyard water management.

Coalition outreach since 2007 has included grower meetings and the mailing/distribution of information such as funding available for management practice implementation. A complete list of coalition outreach during 2011 is provided in the Actions Taken to Address Water Quality Exceedances section of the 2012 AMR (Table 46, page 142).

In accordance with the Coalition's Management Plan strategy, individual contacts with targeted growers began in June 2010. The Coalition focused outreach efforts on growers owning parcels with the potential to drain to the creek and those applying chlorpyrifos with the potential for spray drift. The Coalition developed a list of 14 targeted members that represented 1,292 of the 4,179 acres with the potential to discharge to the creek. Coalition representatives met with growers on their property to

discuss the Bear Creek Management Plan and offer management practice recommendations specific to the parcel and land owner/operator. Current management practices were assessed by Coalition representatives and additional management practices were discussed and encouraged. Individual contacts focused mainly on chlorpyrifos exceedances; however, all water quality results were reviewed and discussed including exceedances of copper, DO, *E. coli*, pH and toxicity to *C. dubia*.

To date, the Coalition contacted all 14 targeted members, representing 1,292 acres or 31% of the total direct drainage acreage of the subwatershed. Of the 14 targeted members, recommended management practices to acreages in the Bear Creek subwatershed include: recirculation/tailwater return system (62%), and drainage basin/sediment pond (38%). Based on the exact timing of each individual meeting and/or the grower's resources, some owners would not be able to implement recommended management practices until during or after the 2011 irrigation season. In addition, long term structural Best Management Practices (BMPs; e.g. sediment ponds) will most likely take longer than two years to implement and will require additional tracking to document their implementation.

In April 2011, the Coalition followed up with growers to determine if the management practices recommended by Coalition representatives were implemented in 2010 and if any additional practices were planned for 2011. One grower, farming 45 acres with irrigation drainage, indicated in 2010 he planned to install a recirculation/tailwater return system by the 2011 irrigation season, but at the time of the follow up survey was still waiting for equipment. Another grower did not implement the recommended management practice because it was no longer applicable to his property. All of the remaining growers in the Bear Creek subwatershed indicated they would like to install the recirculation/tailwater return systems and/or drainage basins/sediment ponds that were recommended, but did not have the resources to do so. Two of the remaining growers who could not afford the recommended practices opted for alternative management practices; microirrigation system installation and decreasing the amount of water used during surface irrigation. The Coalition will continue its strategy of notifying members about available funding opportunities and encourage them to take advantage of the application process.

To evaluate the management practice process, the Coalition monitored for high priority constituents at Bear Creek @ Kibby Rd during months of past exceedances in 2011, and no exceedances occurred. Bear Creek @ Kibby Rd is scheduled to continue MPM in 2012. Since there no chlorpyrifos WQTL exceedances for two or more consecutive years of monitoring during months of past exceedances, a letter was submitted to the Regional Board on January 6, 2012, petitioning to remove chlorpyrifos from the active Bear Creek @ Kibby Rd management plan.

### Priority C Constituents

Copper is listed as the only priority C constituent for the Bear Creek @ Kibby Rd subwatershed.

#### Copper

Copper exceeded the hardness based WQTL four times in this subwatershed from 2005 through 2011. Copper exceedances occurred once during the 2007 storm season, twice during the 2008 storm season and once in the 2008 irrigation season in July. The Coalition began monitoring for both the total and dissolved copper fractions in October 2008 to better characterize copper contamination. Bear Creek was not scheduled for monitoring in 2009; however, MPM samples were collected in 2010 and 2011 for copper analysis and did not exceed the WQTL.

PUR data are reviewed for the number of monthly applications, pounds of active ingredient applied, and acres treated (Table IV-10, Figure IV-3). The amount of copper applied within the subwatershed decreased annually from 2005 through 2009, subsequently the amount of copper applied then increased in 2010 and 2011 (Table IV-10, Figure IV-3). Between 2005 through 2011, the greatest amount of copper applied was in the months of January, February, March, April and May (Table IV-10, Figure IV-3). Not all exceedances occurred during months of the greatest amount of use (Figure IV-3).

The Coalition uses PUR data to assess which crops receive the most applications of copper. The largest amount of copper applied from 2005 through 2011 was associated with walnut and peach orchards (Table IV-11). Walnut orchards received the greatest overall amount (lbs applied) of copper (13,808 lbs AI). The most common product containing copper used within this subwatershed was Kocide (Table IV-11).

**Table IV-10. Bear Creek @ Kibby Rd site subwatershed copper applications, lbs AI applied and acres treated by month (2005-2011).**

PUR data available through October 2011 for Merced County. If month is not included in table, no applications were made.

| MONTH/YEAR     | NUMBER OF COPPER APPLICATIONS | POUNDS OF AI APPLIED | ACRES TREATED |
|----------------|-------------------------------|----------------------|---------------|
| January, 2005  | 2                             | 1178.9               | 175.0         |
| February, 2005 | 3                             | 307.2                | 121.0         |
| March, 2005    | 4                             | 818.6                | 174.0         |
| April, 2005    | 9                             | 1834.1               | 345.5         |
| May, 2005      | 8                             | 1762.6               | 603.0         |
| November, 2005 | 1                             | 26.9                 | 40.0          |
| January, 2006  | 6                             | 2290.7               | 493.0         |
| February, 2006 | 4                             | 1212.1               | 244.0         |
| March, 2006    | 2                             | 51.9                 | 95.0          |
| April, 2006    | 11                            | 1614.5               | 499.0         |
| May, 2006      | 3                             | 323.8                | 186.0         |
| June, 2006     | 2                             | 142.0                | 88.0          |
| October, 2006  | 2                             | 150.6                | 140.0         |
| January, 2007  | 3                             | 1111.0               | 275.0         |
| February, 2007 | 1                             | 729.9                | 116.9         |
| March, 2007    | 7                             | 965.3                | 242.0         |

| MONTH/YEAR               | NUMBER OF COPPER APPLICATIONS | POUNDS OF AI APPLIED | ACRES TREATED |
|--------------------------|-------------------------------|----------------------|---------------|
| April, 2007              | 17                            | 2025.8               | 595.0         |
| February, 2008           | 3                             | 2752.6               | 291.9         |
| March, 2008              | 8                             | 711.0                | 310.0         |
| April, 2008              | 7                             | 667.7                | 235.0         |
| October, 2008            | 1                             | 67.5                 | 80.0          |
| January, 2009            | 2                             | 945.1                | 201.9         |
| February, 2009           | 1                             | 62.9                 | 15.0          |
| March, 2009              | 1                             | 122.7                | 38.0          |
| April, 2009              | 2                             | 1562.2               | 128.0         |
| May, 2009                | 2                             | 156.0                | 54.0          |
| September, 2009          | 6                             | 249.3                | 333.8         |
| January, 2010            | 3                             | 2710.2               | 311.8         |
| February, 2010           | 2                             | 493.3                | 175.5         |
| March, 2010              | 5                             | 1072.5               | 335.1         |
| April, 2010              | 9                             | 989.9                | 347.9         |
| May, 2010                | 4                             | 323.1                | 205.0         |
| January, 2011            | 3                             | 2635.0               | 250.0         |
| February, 2011           | 1                             | 273.0                | 48.0          |
| March, 2011              | 2                             | 43.3                 | 57.7          |
| April, 2011              | 9                             | 821.2                | 223.0         |
| May, 2011                | 16                            | 1143.1               | 454.0         |
| June, 2011               | 5                             | 350.2                | 228.0         |
| <b>Summaries by Year</b> |                               |                      |               |
| 2005 Total               | 27                            | 5928.3               | 1458.5        |
| 2006 Total               | 30                            | 5785.7               | 1745.0        |
| 2007 Total               | 28                            | 4831.9               | 1228.9        |
| 2008 Total               | 19                            | 4198.8               | 916.9         |
| 2009 Total               | 14                            | 3098.2               | 770.7         |
| 2010 Total               | 23                            | 5589.0               | 1375.3        |
| 2011 Total               | 36                            | 5265.8               | 1260.7        |
| <b>Total</b>             | <b>177</b>                    | <b>34697.6</b>       | <b>8756.0</b> |

**Figure IV-3. Bear Creek @ Kibby Rd site subwatershed lbs copper applied by month (2005-2011).**

Asterisk (\*) denotes months with exceedances. PUR data available through October 2011 for Merced County.

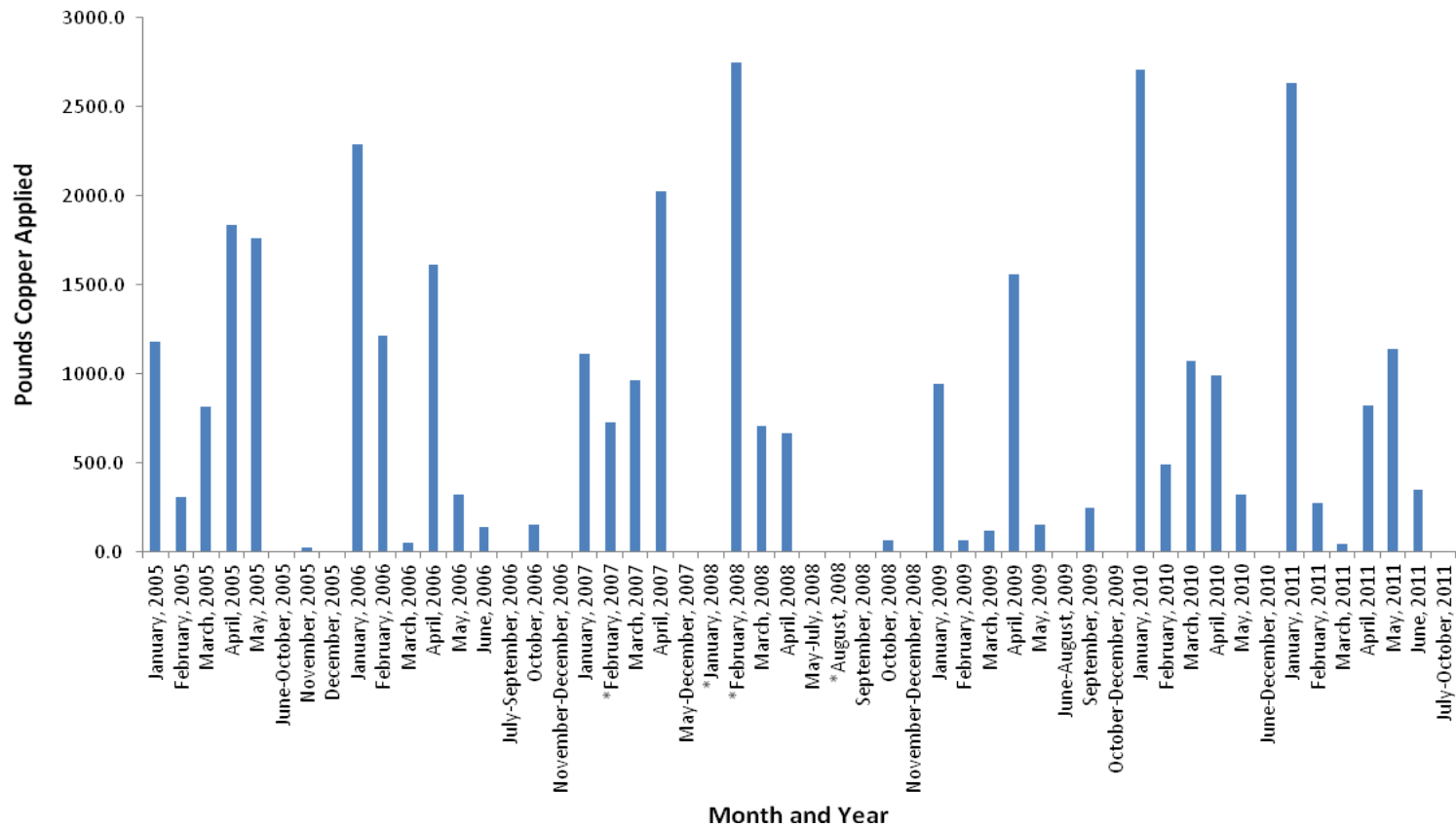


**Table IV-11. Bear Creek @ Kibby Rd site subwatershed copper PUR data (2005-2011).**

PUR data available through October 2011 for Merced County.

| CHEMICAL NAME                             | COMMODITY                               | PRODUCT NAME                             | LBS AI APPLIED |
|-------------------------------------------|-----------------------------------------|------------------------------------------|----------------|
| COPPER                                    | ALFALFA (FORAGE - FODDER) (ALFALFA HAY) | KOCIDE 2000                              | 48.4           |
|                                           | ALMOND                                  | CUPROFIX ULTRA 40 DISPERSS               | 1993.5         |
|                                           |                                         | DUPONT KOCIDE 2000 FUNGICIDE/BACTERICIDE | 1533.3         |
|                                           |                                         | KOCIDE 101                               | 61.6           |
|                                           |                                         | KOCIDE 2000                              | 798.9          |
|                                           |                                         | KOCIDE DF                                | 337.7          |
|                                           |                                         | NORDOX 75 WG                             | 62.9           |
|                                           |                                         | NU-COP HB                                | 77.0           |
|                                           | PEACH                                   | BASIC COPPER 53                          | 5292.0         |
|                                           |                                         | CUPROFIX ULTRA 40 DISPERSS               | 877.4          |
|                                           |                                         | DUPONT KOCIDE 2000 FUNGICIDE/BACTERICIDE | 895.8          |
|                                           |                                         | DUPONT KOCIDE 3000 FUNGICIDE/BACTERICIDE | 1010.5         |
|                                           |                                         | KOCIDE DF                                | 2410.0         |
|                                           |                                         | NORDOX                                   | 395.9          |
|                                           |                                         | NORDOX 75 WG                             | 2146.3         |
|                                           | PRUNE                                   | NORDOX 75 WG                             | 1141.0         |
|                                           | TOMATO                                  | CHAMP FLOWABLE                           | 3.5            |
|                                           |                                         | CHAMP FORMULA 2 FLOWABLE                 | 189.5          |
|                                           |                                         | DUPONT KOCIDE 2000 FUNGICIDE/BACTERICIDE | 236.5          |
|                                           |                                         | DUPONT KOCIDE 3000 FUNGICIDE/BACTERICIDE | 344.1          |
|                                           |                                         | KOCIDE 2000                              | 915.1          |
|                                           |                                         | NU-COP HB                                | 117.8          |
|                                           | WALNUT                                  | DUPONT KOCIDE 2000 FUNGICIDE/BACTERICIDE | 1273.7         |
|                                           |                                         | DUPONT KOCIDE 3000 FUNGICIDE/BACTERICIDE | 785.5          |
|                                           |                                         | KENTAN DF                                | 576.2          |
|                                           |                                         | KOCIDE 101                               | 323.4          |
|                                           |                                         | KOCIDE 2000                              | 1954.3         |
|                                           |                                         | KOCIDE DF                                | 1061.0         |
|                                           |                                         | NORDOX                                   | 21.2           |
|                                           |                                         | NORDOX 75 WG                             | 42.0           |
|                                           |                                         | NU-COP 50DF                              | 7694.6         |
|                                           | NU-COP HB                               | 77.0                                     |                |
| ALFALFA - Total Pounds Copper Applied     |                                         |                                          | 48.4           |
| ALMOND - Total Pounds Copper Applied      |                                         |                                          | 4865.0         |
| PEACH - Total Pounds Copper Applied       |                                         |                                          | 13027.8        |
| PRUNE - Total Pounds Copper Applied       |                                         |                                          | 1141.0         |
| TOMATO - Total Pounds Copper Applied      |                                         |                                          | 1806.5         |
| WALNUT - Total Pounds Copper Applied      |                                         |                                          | 13808.8        |
| Total Pounds Copper Applied (2005 - 2011) |                                         |                                          | 34697.6        |

The Coalition determined that outreach should focus on providing information to specific growers located adjacent to Bear Creek to encourage the retention of water and sediment on the fields, especially during the dormant season. This coincides with the Coalition's Management Plan strategy outlined in the chlorpyrifos Source Identification and Outreach section above. Orchard operators were

advised to consider water retention and management to prevent copper from entering the waterway during irrigation and winter runoff events.

### *Priority D Constituents*

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The priority D constituent in the Bear Creek @ Kibby Rd subwatershed is water column toxicity to *C. dubia*.

#### ***C. dubia* toxicity**

Toxicity to *C. dubia* occurred in May of 2005 and 2006, and in July of 2007. Toxicity Identification Evaluations were conducted for all three toxicities. The May 2005 and July 2007 cause of toxicity could not be determined since the toxicity did not persist through the TIE, and the May 2006 cause of toxicity was determined to be non-polar organics. The 2006 and 2007 toxicities both coincided with an exceedance of chlorpyrifos. Consequently, the Coalition's strategy for eliminating *C. dubia* toxicity involves focusing on chlorpyrifos. If chlorpyrifos is prevented from entering waterways throughout the irrigation season, the Coalition believes that *C. dubia* toxicity can be eliminated. The Coalition discussed toxicity to *C. dubia* and pesticide applications during individual grower meetings, and conducted outreach regarding the retention of irrigation and storm water runoff on the grower's property. Since there were no instances of toxicity to *C. dubia* for two or more consecutive years of monitoring during months of past exceedances, a letter was submitted to the Regional Board on January 6, 2012, petitioning to remove *C. dubia* from the active Bear Creek @ Kibby Rd management plan. The Coalition will conduct MPM in 2012 for *C. dubia* toxicity during months of past exceedances (May and July).

### *Priority E Constituents*

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The following priority E constituents listed in the Bear Creek @ Kibby Rd subwatershed management plan are DO, *E. coli*, and pH.

There were no exceedances for any priority E constituents during 2011 monitoring. However, *E. coli* was not sampled in 2011 due to MPM only. Although DO and pH remain low priority, the Coalition will continue to collect monitoring data for these parameters during each monitoring event. Since there were no instances of DO WQTL exceedances for two or more consecutive years of monitoring during months of past exceedances, a letter was submitted to the Regional Board on January 6, 2012, petitioning to remove DO from the active Bear Creek @ Kibby Rd management plan. *E. coli* monitoring will resume during Assessment Monitoring at this site in 2023-2024. The priority E constituents are discussed during individual contacts with growers and at annual grower meetings. In addition, the Coalition plans to participate in a focus group along with other Coalitions and Regional Board staff to develop a joint Work Plan to address *E. coli* exceedances by determining the potential agricultural sources of *E. coli* and identifying management practices to prevent discharges to surface waters.

### *Evaluation*

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Bear Creek @ Kibby Rd is one of the four second priority site subwatersheds within the ESJWQC and just completed its second year of focused outreach (2010-2012). Therefore, the Coalition focused its



resources on identifying sources of agricultural discharge within this subwatershed that could result in water quality impairments by extending outreach to individual Coalition members, and setting evaluation goals based on the effectiveness of management practices (by considering changes in water quality over time).

The Coalition's strategy for the Bear Creek subwatershed is to target growers adjacent to the waterway that have the potential to discharge into the creek. Focus is on water retention and minimizing spray drift. Outreach includes grower notification, management practice outreach and education, tracking of management practices implementation, and providing information on special studies of management practice efficacy.

Individual surveys documenting current management practice implementations and follow up contacts assessing future planned implementations were completed and returned for 100% of targeted growers. The Second Priority Subwatersheds Summary of Implemented Management Practices section of this report summarizes the results of these contacts.

During 2012, MPM will continue during months of past exceedances in the Bear Creek @ Kibby subwatershed. In addition to chlorpyrifos, monitoring for DO and toxicity to *C. dubia* resulted in no exceedances for two or more consecutive years of monitoring during months of past exceedances. A letter was submitted to the Regional Board on January 6, 2012 petitioning to remove these constituents from the Bear Creek management plan.

## V. COTTONWOOD CREEK @ RD 20

### Management Plan Constituents

#### Priority A/B

- Chlorpyrifos
- Diazinon

#### Priority C

- Copper
- Diuron

#### Priority E

- Dissolved Oxygen
- Lead
- *E. coli*

### Description of Cottonwood Creek @ Rd 20 Site Subwatershed

Cottonwood Creek @ Rd 20 (36,906 irrigated acres) – This site subwatershed is at the very southern edge of the Coalition region in Madera County and drains into the Eastside Bypass 9 (Table V-1). This site subwatershed includes an upstream location (Cottonwood Creek @ Hwy 145) which was sampled in 2008. The immediate upstream agriculture is vineyards, with deciduous nut orchards farther to the east. There are also a few dairies in the Cottonwood Creek site subwatershed (Figure V-1).

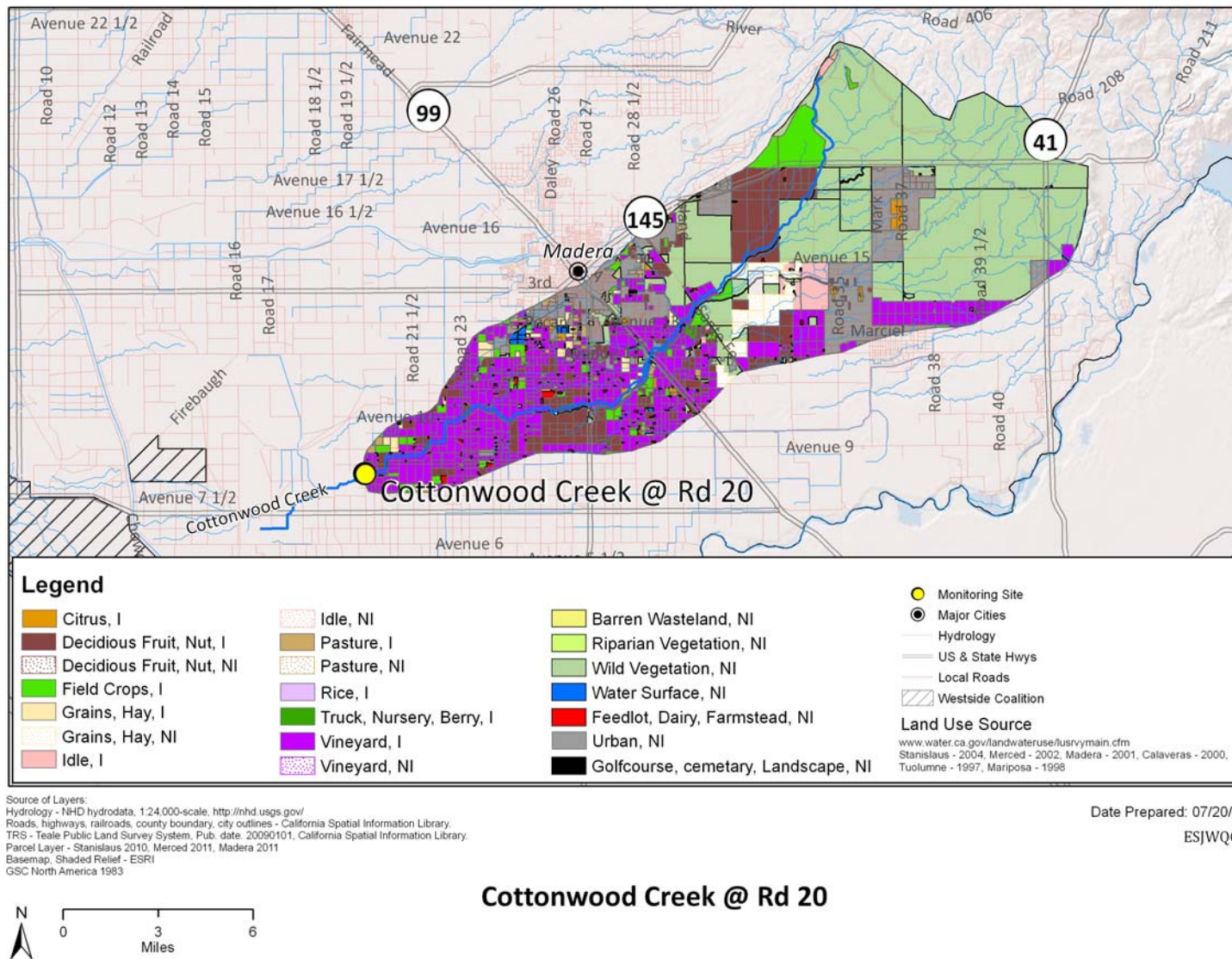
**Table V-1. Cottonwood Creek site subwatershed sampling locations coordinates.**

| SITE NAME                               | STATION CODE | TARGET LATITUDE | TARGET LONGITUDE |
|-----------------------------------------|--------------|-----------------|------------------|
| Cottonwood Creek @ Rd 20*               | 545XCCART    | 36.8686         | -120.1818        |
| Cottonwood Creek @ Hwy 145 <sup>U</sup> | 545XCCAHO    | 36.9002         | -120.0555        |

<sup>U</sup>Upstream sites

\*Original ESJWQC sampling site

Figure V-1. Cottonwood Creek @ Rd 20 site subwatershed land use map.



## Subwatershed Monitoring History

Monitoring at Cottonwood Creek @ Rd 20 began during the storm season of 2005 and continued through fall 2011 (Table V-2). Under the current 2008 MRPP, Cottonwood Creek @ Rd 20 is the Core Monitoring location in Zone 6. In 2006, 2007 and 2008, Normal Monitoring occurred. Core constituents were monitored at Cottonwood Creek @ Rd 20 beginning in the fall of 2008 through the fall 2010. Assessment Monitoring was initiated in 2011 and is scheduled to occur every third year thereafter (e.g. 2014, 2017). Core Monitoring will resume at this site in 2012.

The constituents sampled at this location from 2005 through 2011 are listed in Table V-3. Due to the single toxic *S. capricornutum* sample in 2008 (April; resample toxic one week later in May 2008), *S. capricornutum* toxicity, simazine and cyanazine were monitored monthly starting in October 2009 through December 2010.

Management Plan Monitoring occurred within the Cottonwood Creek site subwatershed in 2007 and 2008 for copper (Table V-4). The Cottonwood Creek @ Rd 20 subwatershed includes an upstream location (Cottonwood Creek @ Hwy 145) which was sampled during the irrigation seasons of 2007 and 2008. Cottonwood Creek was monitored twice a month in June and September 2007 and at Cottonwood Creek @ Hwy 145 (upstream location) monthly from May through September 2008. During 2011, all constituents were monitored monthly as a part of Assessment Monitoring and the following MPM constituents were analyzed monthly during Assessment Monitoring: copper (April-September), and for chlorpyrifos, diazinon and diuron (January and February) occurred (Table V-4).

Cottonwood Creek is currently on California's 2008-2010 303d List of Impaired Waterbodies for *E. coli* and unknown water column toxicity.

**Table V-2. Cottonwood Creek @ Rd 20 site subwatershed sampling events per season and year (including MPM).**

| YEAR | SEASON     | EVENTS SAMPLED | EVENTS NOT SAMPLED <sup>1</sup> | TOTAL |
|------|------------|----------------|---------------------------------|-------|
| 2004 | Irrigation | NA             | NA                              | NA    |
| 2005 | Storm      | 2              | 0                               | 2     |
|      | Irrigation | 5              | 0                               | 5     |
| 2006 | Storm      | 2              | 0                               | 2     |
|      | Irrigation | 5              | 0                               | 5     |
| 2007 | Storm      | 0              | 2                               | 2     |
|      | Irrigation | 6              | 2                               | 8     |
| 2008 | Storm      | 1              | 2                               | 3     |
|      | Irrigation | 5              | 1                               | 6     |
|      | Fall       | 0              | 2                               | 2     |
| 2009 | Winter     | 0              | 2                               | 2     |
|      | Storm      | 2              | 0                               | 2     |
|      | Irrigation | 3              | 3                               | 6     |
|      | Fall       | 2              | 0                               | 2     |

| YEAR | SEASON     | EVENTS SAMPLED | EVENTS NOT SAMPLED <sup>1</sup> | TOTAL |
|------|------------|----------------|---------------------------------|-------|
| 2010 | Winter     | 0              | 1                               | 1     |
|      | Storm      | 2              | 1                               | 3     |
|      | Irrigation | 5              | 0                               | 5     |
|      | Fall       | 1              | 2                               | 3     |
| 2011 | Winter     | 2              | 0                               | 2     |
|      | Storm      | 1              | 0                               | 1     |
|      | Irrigation | 6              | 0                               | 6     |
|      | Fall       | 1              | 2                               | 3     |

<sup>1</sup>If an event was not sampled during scheduled monitoring, the site was dry.

NA – Not applicable. This site was not scheduled for sampling during this season/year.

**Table V-3. Cottonwood Creek @ Rd 20 site subwatershed analyses per sampling season and year.**

Only environmental samples with a sample replicate and lab replicate number of one are shown.

| METHOD                        | ANALYTE                         | 2005  |            | 2006  |            | 2007  |            | 2008  |            |      | 2009   |       |            |      | 2010   |       |            |      | 2011   |       |            |      |
|-------------------------------|---------------------------------|-------|------------|-------|------------|-------|------------|-------|------------|------|--------|-------|------------|------|--------|-------|------------|------|--------|-------|------------|------|
|                               |                                 | STORM | IRRIGATION | STORM | IRRIGATION | STORM | IRRIGATION | STORM | IRRIGATION | FALL | WINTER | STORM | IRRIGATION | FALL | WINTER | STORM | IRRIGATION | FALL | WINTER | STORM | IRRIGATION | FALL |
| Field and Physical Parameters |                                 |       |            |       |            |       |            |       |            |      |        |       |            |      |        |       |            |      |        |       |            |      |
| EPA 110.2                     | Color                           | 2     | 5          | 2     | 5          |       | 5          | 2     | 5          |      |        |       |            |      |        |       |            |      |        |       |            |      |
| EPA 160.1                     | Dissolved Solids                | 2     | 5          | 2     | 5          |       | 5          | 2     | 5          |      |        | 2     | 3          | 2    |        | 2     | 5          | 1    | 2      | 1     | 6          | 1    |
| EPA 160.2                     | Suspended Solids                |       |            |       |            |       |            |       |            |      |        | 2     | 3          | 2    |        | 2     | 5          | 1    | 2      | 1     | 6          | 1    |
| EPA 180.1                     | Turbidity                       | 2     | 5          | 2     | 5          |       | 5          | 2     | 5          |      |        | 2     | 3          | 2    |        | 2     | 5          | 1    | 2      | 1     | 6          | 1    |
| EPA 405.1                     | BOD                             |       |            |       | 1          |       | 2          |       |            |      |        |       |            |      |        |       |            |      |        |       |            |      |
| EPA 415.1                     | Total Organic Carbon            | 2     | 5          | 2     | 5          |       | 5          | 2     | 5          |      |        | 2     | 3          | 2    |        | 2     | 5          | 1    | 2      | 1     | 6          | 1    |
| Walkley-Black                 | Total Organic Carbon (sediment) |       |            |       |            |       |            |       |            |      |        |       | 1          |      |        |       | 1          |      | 1      |       | 1          |      |
| SM 9223                       | <i>E. coli</i>                  | 2     | 5          | 2     | 6          |       | 5          | 2     | 5          |      |        | 2     | 3          | 2    |        | 2     | 5          | 1    | 2      | 1     | 6          | 1    |
| ASTM D422 or ASTM D4464       | Grain size (sediment)           |       |            |       |            |       |            |       |            |      |        |       | 1          |      |        |       | 1          |      | 1      |       | 1          |      |
| NA                            | Dissolved Oxygen                | 2     | 5          | 3     | 5          |       | 7          | 3     | 6          |      |        | 2     | 3          | 2    |        | 2     | 5          | 1    | 3      | 1     | 6          | 1    |
| NA                            | Specific Conductivity           | 2     | 5          | 3     | 5          |       | 7          | 3     | 6          |      |        | 2     | 3          | 2    |        | 2     | 5          | 1    | 3      | 1     | 6          | 1    |
| NA                            | pH                              | 2     | 5          | 3     | 5          |       | 7          | 3     | 6          |      |        | 2     | 3          | 2    |        | 2     | 5          | 1    | 3      | 1     | 6          | 1    |
| Carbamates                    |                                 |       |            |       |            |       |            |       |            |      |        |       |            |      |        |       |            |      |        |       |            |      |
| EPA 8321A                     | Aldicarb                        |       |            |       | 5          |       | 5          | 2     | 5          |      |        |       |            |      |        |       |            |      | 2      | 1     | 6          | 1    |
| EPA 8321A                     | Carbaryl                        |       |            |       | 5          |       | 5          | 2     | 5          |      |        |       |            |      |        |       |            |      | 2      | 1     | 6          | 1    |
| EPA 8321A                     | Carbofuran                      |       |            |       | 5          |       | 5          | 2     | 5          |      |        |       |            |      |        |       |            |      | 2      | 1     | 6          | 1    |
| EPA 8321A                     | Diuron                          |       |            |       | 5          |       | 5          | 2     | 5          |      |        |       |            |      |        | 1     |            |      | 2      | 1     | 6          | 1    |
| EPA 8321A                     | Linuron                         |       |            |       | 5          |       | 5          | 2     | 5          |      |        |       |            |      |        |       |            |      | 2      | 1     | 6          | 1    |
| EPA 8321A                     | Methiocarb                      |       |            |       | 5          |       | 5          | 2     | 5          |      |        |       |            |      |        |       |            |      | 2      | 1     | 6          | 1    |
| EPA 8321A                     | Methomyl                        |       |            |       | 5          |       | 5          | 2     | 5          |      |        |       |            |      |        |       |            |      | 2      | 1     | 6          | 1    |
| EPA 8321A                     | Oxamyl                          |       |            |       | 5          |       | 5          | 2     | 5          |      |        |       |            |      |        |       |            |      | 2      | 1     | 6          | 1    |
| Organochlorines               |                                 |       |            |       |            |       |            |       |            |      |        |       |            |      |        |       |            |      |        |       |            |      |
| EPA 8081A                     | DDD(p,p')                       |       |            |       | 5          |       | 5          | 2     | 5          |      |        |       |            |      |        |       |            |      | 2      | 1     | 4          |      |
| EPA 8081A                     | DDE(p,p')                       |       |            |       | 5          |       | 5          | 2     | 5          |      |        |       |            |      |        |       |            |      | 2      | 1     | 4          |      |
| EPA 8081A                     | DDT(p,p')                       |       |            |       | 5          |       | 5          | 2     | 5          |      |        |       |            |      |        |       |            |      | 2      | 1     | 4          |      |
| EPA 8081A                     | Dicofol                         |       |            |       | 5          |       | 5          | 2     | 5          |      |        |       |            |      |        |       |            |      | 2      | 1     | 4          |      |
| EPA 8081A                     | Dieldrin                        |       |            |       | 5          |       | 5          | 2     | 5          |      |        |       |            |      |        |       |            |      | 2      | 1     | 4          |      |
| EPA 8081A                     | Endrin                          |       |            |       | 5          |       | 5          | 2     | 5          |      |        |       |            |      |        |       |            |      | 2      | 1     | 4          |      |

| METHOD             | ANALYTE            | 2005  |            | 2006  |            | 2007  |            | 2008  |            |      | 2009   |       |            |      | 2010   |       |            |      | 2011   |       |            |      |
|--------------------|--------------------|-------|------------|-------|------------|-------|------------|-------|------------|------|--------|-------|------------|------|--------|-------|------------|------|--------|-------|------------|------|
|                    |                    | STORM | IRRIGATION | STORM | IRRIGATION | STORM | IRRIGATION | STORM | IRRIGATION | FALL | WINTER | STORM | IRRIGATION | FALL | WINTER | STORM | IRRIGATION | FALL | WINTER | STORM | IRRIGATION | FALL |
| EPA 8081A          | Methoxychlor       |       |            |       | 5          |       | 5          | 2     | 5          |      |        |       |            |      |        |       |            |      | 2      | 1     | 4          |      |
| Group A Pesticides |                    |       |            |       |            |       |            |       |            |      |        |       |            |      |        |       |            |      |        |       |            |      |
| EPA 8081A          | Aldrin             |       |            |       |            |       |            |       |            |      |        |       |            |      |        |       |            |      | 2      | 1     | 4          |      |
| EPA 8081A          | Chlordane          |       |            |       |            |       |            |       |            |      |        |       |            |      |        |       |            |      | 2      | 1     | 4          |      |
| EPA 8081A          | Endosulfan I       |       |            |       |            |       |            |       |            |      |        |       |            |      |        |       |            |      | 2      | 1     | 4          |      |
| EPA 8081A          | Endosulfan II      |       |            |       |            |       |            |       |            |      |        |       |            |      |        |       |            |      | 2      | 1     | 4          |      |
| EPA 8081A          | HCH, alpha         |       |            |       |            |       |            |       |            |      |        |       |            |      |        |       |            |      | 2      | 1     | 4          |      |
| EPA 8081A          | HCH, beta          |       |            |       |            |       |            |       |            |      |        |       |            |      |        |       |            |      | 2      | 1     | 4          |      |
| EPA 8081A          | HCH, delta         |       |            |       |            |       |            |       |            |      |        |       |            |      |        |       |            |      | 2      | 1     | 4          |      |
| EPA 8081A          | HCH, gamma         |       |            |       |            |       |            |       |            |      |        |       |            |      |        |       |            |      | 2      | 1     | 4          |      |
| EPA 8081A          | Heptachlor         |       |            |       |            |       |            |       |            |      |        |       |            |      |        |       |            |      | 2      | 1     | 4          |      |
| EPA 8081A          | Heptachlor epoxide |       |            |       |            |       |            |       |            |      |        |       |            |      |        |       |            |      | 2      | 1     | 4          |      |
| EPA 8081A          | Toxaphene          |       |            |       |            |       |            |       |            |      |        |       |            |      |        |       |            |      | 2      | 1     | 4          |      |
| Organophosphates   |                    |       |            |       |            |       |            |       |            |      |        |       |            |      |        |       |            |      |        |       |            |      |
| EPA 8141A          | Azinphos methyl    |       |            |       | 5          |       | 5          | 2     | 5          |      |        |       |            |      |        |       |            |      | 2      | 1     | 6          | 1    |
| EPA 8141A          | Chlorpyrifos       | 2     | 5          | 2     | 5          |       | 5          | 2     | 5          |      |        |       |            |      |        | 1     |            |      | 2      | 1     | 6          | 1    |
| EPA 8141A          | Demeton-s          |       |            |       |            |       |            |       |            |      |        |       |            |      |        |       |            |      | 2      | 1     | 6          | 1    |
| EPA 8141A          | Diazinon           | 2     | 5          | 2     | 5          |       | 5          | 2     | 5          |      |        |       |            |      |        | 1     |            |      | 2      | 1     | 6          | 1    |
| EPA 8141A          | Dimethoate         |       |            |       | 5          |       | 5          | 2     | 5          |      |        |       |            |      |        |       |            |      | 2      | 1     | 6          | 1    |
| EPA 8141A          | Disulfoton         |       |            |       | 5          |       | 5          | 2     | 5          |      |        |       |            |      |        |       |            |      | 2      | 1     | 6          | 1    |
| EPA 8141A          | Malathion          |       |            |       | 5          |       | 5          | 2     | 5          |      |        |       |            |      |        |       |            |      | 2      | 1     | 6          | 1    |
| EPA 8321A          | Methamidophos      |       |            |       | 5          |       | 5          | 2     | 5          |      |        |       |            |      |        | 1     |            |      | 2      | 1     | 6          | 1    |
| EPA 8141A          | Methidathion       |       |            |       | 5          |       | 5          | 2     | 5          |      |        |       |            |      |        |       |            |      | 2      | 1     | 6          | 1    |
| EPA 8141A          | Molinate           |       |            |       | 5          |       | 5          | 2     | 5          |      |        |       |            |      |        |       |            |      |        |       |            |      |
| EPA 8141A          | Parathion, Methyl  |       |            |       | 5          |       | 5          | 2     | 5          |      |        |       |            |      |        |       |            |      | 2      | 1     | 6          | 1    |
| EPA 8141A          | Phorate            |       |            |       | 5          |       | 5          | 2     | 5          |      |        |       |            |      |        |       |            |      | 2      | 1     | 6          | 1    |
| EPA 8141A          | Phosmet            |       |            |       | 5          |       | 5          | 2     | 5          |      |        |       |            |      |        |       |            |      | 2      | 1     | 6          | 1    |
| EPA 8141A          | Thiobencarb        |       |            |       | 5          |       | 5          | 2     | 5          |      |        |       |            |      |        |       |            |      |        |       |            |      |
| EPA 8141A          | Trifluralin        |       |            |       |            |       |            |       |            |      |        |       |            |      |        |       |            |      | 2      | 1     | 6          | 1    |
| Pyrethroids        |                    |       |            |       |            |       |            |       |            |      |        |       |            |      |        |       |            |      |        |       |            |      |
| EPA 8081A          | Bifenthrin         |       | 1          | 2     | 5          |       | 5          |       |            |      |        |       |            |      |        |       |            |      |        |       |            |      |
| EPA 8081A          | Cyfluthrin, total  |       | 1          | 2     | 5          |       | 5          |       |            |      |        |       |            |      |        |       |            |      |        |       |            |      |

| METHOD             | ANALYTE                           | 2005  |            | 2006  |            | 2007  |            | 2008  |            |      | 2009   |       |            |      | 2010   |       |            |      | 2011   |       |            |      |
|--------------------|-----------------------------------|-------|------------|-------|------------|-------|------------|-------|------------|------|--------|-------|------------|------|--------|-------|------------|------|--------|-------|------------|------|
|                    |                                   | STORM | IRRIGATION | STORM | IRRIGATION | STORM | IRRIGATION | STORM | IRRIGATION | FALL | WINTER | STORM | IRRIGATION | FALL | WINTER | STORM | IRRIGATION | FALL | WINTER | STORM | IRRIGATION | FALL |
| EPA 8081A          | Cyhalothrin, lambda, total        | 2     | 5          | 2     | 5          |       | 5          |       |            |      |        |       |            |      |        |       |            |      |        |       |            |      |
| EPA 8081A          | Cypermethrin, total               | 2     | 5          | 2     | 5          |       | 5          |       |            |      |        |       |            |      |        |       |            |      |        |       |            |      |
| EPA 8081A          | Esfenvalerate/ Fenvalerate, total | 2     | 5          | 2     | 5          |       | 5          |       |            |      |        |       |            |      |        |       |            |      |        |       |            |      |
| EPA 8081A          | Permethrin, total                 | 2     | 5          | 2     | 5          |       | 5          |       |            |      |        |       |            |      |        |       |            |      |        |       |            |      |
| Triazines          |                                   |       |            |       |            |       |            |       |            |      |        |       |            |      |        |       |            |      |        |       |            |      |
| EPA 547M           | Glyphosate                        |       |            |       | 5          |       | 5          | 2     | 5          |      |        |       |            |      |        |       |            |      | 2      |       | 4          |      |
| EPA 549.2M         | Paraquat dichloride               |       |            |       | 5          |       | 5          | 2     | 5          |      |        |       |            |      |        |       |            |      | 2      |       | 4          |      |
| EPA 619            | Atrazine                          |       |            |       | 5          |       | 5          | 2     | 5          |      |        |       |            |      |        |       |            |      | 2      | 1     | 6          | 1    |
| EPA 619            | Cyanazine                         |       |            |       | 5          |       | 5          | 2     | 5          |      |        | 1     | 2          | 2    |        | 2     | 5          | 1    | 2      | 1     | 6          | 1    |
| EPA 619            | Simazine                          |       |            |       | 5          |       | 5          | 2     | 5          |      |        | 1     | 2          | 2    |        | 2     | 5          | 1    | 2      | 1     | 6          | 1    |
| Metals (Total)     |                                   |       |            |       |            |       |            |       |            |      |        |       |            |      |        |       |            |      |        |       |            |      |
| EPA 200.8          | Arsenic                           |       |            |       | 5          |       | 5          | 2     | 5          |      |        |       |            |      |        |       |            |      | 2      | 1     | 5          |      |
| EPA 200.8          | Boron                             |       |            |       | 5          |       | 5          | 2     | 5          |      |        |       |            |      |        |       |            |      | 2      | 1     | 6          | 1    |
| EPA 200.8          | Cadmium                           |       |            |       | 5          |       | 5          | 2     | 5          |      |        |       |            |      |        |       |            |      | 2      | 1     | 5          |      |
| EPA 200.8          | Copper                            |       |            |       | 5          |       | 6          | 2     | 5          |      |        |       |            |      | 1      | 5     |            |      | 2      | 1     | 6          | 1    |
| EPA 200.8          | Lead                              |       |            |       | 5          |       | 5          | 2     | 5          |      |        |       |            |      |        |       |            |      | 2      | 1     | 5          |      |
| EPA 200.8          | Molybdenum                        |       |            |       |            |       |            |       |            |      |        |       |            |      |        |       |            |      | 2      | 1     | 5          |      |
| EPA 200.8          | Nickel                            |       |            |       | 5          |       | 5          | 2     | 5          |      |        |       |            |      |        |       |            |      | 2      | 1     | 6          | 1    |
| EPA 200.8          | Selenium                          |       |            |       | 5          |       | 2          | 2     | 5          |      |        |       |            |      |        |       |            |      | 2      | 1     | 5          | 1    |
| EPA 200.8          | Zinc                              |       |            |       | 5          |       | 5          | 2     | 5          |      |        |       |            |      |        |       |            |      | 2      | 1     | 6          | 1    |
| Metals (Dissolved) |                                   |       |            |       |            |       |            |       |            |      |        |       |            |      |        |       |            |      |        |       |            |      |
| EPA 200.8          | Cadmium                           |       |            |       |            |       |            |       |            |      |        |       |            |      |        |       |            |      | 2      | 1     | 5          |      |
| EPA 200.8          | Copper                            |       |            |       |            |       |            |       |            |      |        |       |            |      |        | 1     | 5          |      | 2      | 1     | 6          | 1    |
| EPA 200.8          | Lead                              |       |            |       |            |       |            |       |            |      |        |       |            |      |        |       |            |      | 2      | 1     | 5          |      |
| EPA 200.8          | Nickel                            |       |            |       |            |       |            |       |            |      |        |       |            |      |        |       |            |      | 2      | 1     | 6          | 1    |
| EPA 200.8          | Zinc                              |       |            |       |            |       |            |       |            |      |        |       |            |      |        |       |            |      | 2      | 1     | 6          | 1    |
| Nutrients          |                                   |       |            |       |            |       |            |       |            |      |        |       |            |      |        |       |            |      |        |       |            |      |
| SM 2340 C          | Hardness as CaCO3                 |       |            |       | 5          |       | 6          | 2     | 5          |      |        |       |            |      |        | 1     | 5          |      | 2      | 1     | 6          | 1    |
| EPA 300.0          | Nitrate as N                      |       |            |       | 5          |       | 5          | 2     | 5          |      |        |       |            |      |        |       |            |      |        |       |            |      |
| EPA 350.2          | Ammonia as N                      |       |            |       | 5          |       | 5          | 2     | 5          |      |        | 2     | 3          | 2    |        | 2     | 5          | 1    | 2      | 1     | 6          | 1    |
| EPA 351.3          | Nitrogen, Total Kjeldahl          |       |            |       | 5          |       | 5          | 2     | 5          |      |        | 1     |            |      |        |       | 3          | 1    | 2      | 1     | 6          | 1    |
| EPA 354.1          | Nitrite as N                      |       |            |       | 5          |       | 5          | 2     | 5          |      |        |       |            |      |        |       |            |      |        |       |            |      |



| METHOD           | ANALYTE                          | 2005  |            | 2006  |            | 2007  |            | 2008  |            |      | 2009   |       |            |      | 2010   |       |            |      | 2011   |       |            |      |
|------------------|----------------------------------|-------|------------|-------|------------|-------|------------|-------|------------|------|--------|-------|------------|------|--------|-------|------------|------|--------|-------|------------|------|
|                  |                                  | STORM | IRRIGATION | STORM | IRRIGATION | STORM | IRRIGATION | STORM | IRRIGATION | FALL | WINTER | STORM | IRRIGATION | FALL | WINTER | STORM | IRRIGATION | FALL | WINTER | STORM | IRRIGATION | FALL |
| EPA 353.2        | Nitrate + Nitrite as N           |       |            |       |            |       |            |       |            |      |        | 2     | 3          | 2    |        | 2     | 5          | 1    | 2      | 1     | 6          | 1    |
| EPA 365.2        | OrthoPhosphate as P              |       |            |       | 5          |       | 5          | 2     | 5          |      |        | 1     |            |      |        |       | 3          | 1    | 2      | 1     | 6          | 1    |
| EPA 365.2        | Phosphate as P                   |       |            |       | 5          |       | 5          | 2     | 5          |      |        | 2     | 3          | 2    |        | 2     | 5          | 1    | 2      | 1     | 6          | 1    |
| Toxicity         |                                  |       |            |       |            |       |            |       |            |      |        |       |            |      |        |       |            |      |        |       |            |      |
| EPA 821/R-02-012 | <i>Ceriodaphnia dubia</i>        | 2     | 5          | 2     | 5          |       | 6          | 2     | 5          |      |        |       |            |      |        |       |            |      | 2      | 1     | 6          | 1    |
| EPA 821/R-02-012 | <i>Pimephales promelas</i>       | 2     | 5          | 2     | 5          |       | 6          | 3     | 5          |      |        | 1     | 3          | 2    |        | 2     | 5          | 1    | 2      | 1     | 6          | 1    |
| EPA 821/R-02-013 | <i>Selenastrum capricornutum</i> | 2     | 5          | 2     | 5          |       | 6          |       | 6          |      |        | 1     | 3          | 2    |        | 2     | 5          | 1    | 2      | 1     | 6          | 1    |
| EPA 600/R-99-064 | <i>Hyalella azteca</i>           |       | 5          | 1     | 1          |       | 1          | 1     | 1          |      |        |       | 1          |      |        |       | 1          |      | 1      |       | 1          |      |

**Table V-4. Cottonwood Creek site subwatershed Management Plan Monitoring schedule (2007-2011).**

| SITE NAME                  | SAMPLE DATE | MONITORING TYPE | COPPER | CHLORPYRIFOS | DIAZINON | DIURON |
|----------------------------|-------------|-----------------|--------|--------------|----------|--------|
| Cottonwood Creek @ Rd 20   | 19-Jun-07   | A               | X      |              |          |        |
| Cottonwood Creek @ Rd 20   | 26-Sep-07   | A               | X      |              |          |        |
| Cottonwood Creek @ Hwy 145 | 27-May-08   | U               | X      |              |          |        |
| Cottonwood Creek @ Hwy 145 | 24-Jun-08   | U               | X      |              |          |        |
| Cottonwood Creek @ Hwy 145 | 29-Jul-08   | U               | X      |              |          |        |
| Cottonwood Creek @ Hwy 145 | 26-Aug-08   | U               | X      |              |          |        |
| Cottonwood Creek @ Hwy 145 | 30-Sep-08   | U               | X      |              |          |        |
| Cottonwood Creek @ Rd 20   | 19-Jan-10   | MPM             |        | X            | X        | X      |
| Cottonwood Creek @ Rd 20   | 23-Feb-10   | MPM             |        | X            | X        | X      |
| Cottonwood Creek @ Rd 20   | 20-Apr-10   | MPM             | X      |              |          |        |
| Cottonwood Creek @ Rd 20   | 18-May-10   | MPM             | X      |              |          |        |
| Cottonwood Creek @ Rd 20   | 15-Jun-10   | MPM             | X      |              |          |        |
| Cottonwood Creek @ Rd 20   | 20-Jul-10   | MPM             | X      |              |          |        |
| Cottonwood Creek @ Rd 20   | 17-Aug-10   | MPM             | X      |              |          |        |
| Cottonwood Creek @ Rd 20   | 14-Sep-10   | MPM             | X      |              |          |        |
| Cottonwood Creek @ Rd 20   | 18-Jan-11   | MPM             | X      | X            |          | X      |
| Cottonwood Creek @ Rd 20   | 17-Feb-11   | MPM             | X      | X            | X        | X      |
| Cottonwood Creek @ Rd 20   | 19-Apr-11   | MPM             | X      |              |          |        |
| Cottonwood Creek @ Rd 20   | 17-May-11   | MPM             | X      |              |          |        |
| Cottonwood Creek @ Rd 20   | 21-Jun-11   | MPM             | X      |              |          |        |
| Cottonwood Creek @ Rd 20   | 19-Jul-11   | MPM             | X      |              |          |        |
| Cottonwood Creek @ Rd 20   | 16-Aug-11   | MPM             | X      |              |          |        |
| Cottonwood Creek @ Rd 20   | 13-Sep-11   | MPM             | X      |              |          |        |

A – Additional sampling

U – Upstream sampling

X – Constituent sampled for Management Plan Monitoring (MPM)

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### Exceedance History

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Samples collected from the Cottonwood Creek subwatershed (Cottonwood Creek @ Rd 20 and Cottonwood Creek @ Hwy 145) from 2005 through 2011 resulted in exceedances of the WQTLs for field and physical parameters, *E. coli*, nutrients, metals, pesticides, and water column and sediment toxicity (Table V-5). Table V-5 includes exceedances in this subwatershed (including the upstream site) for DO (20), pH (1), *E. coli* (19), total copper (13), dissolved copper (8), total lead (3), chlorpyrifos (3), cyanazine (1), diazinon (1), simazine (1), and diuron (2). Toxicity to *P. promelas* (1), *S. capricornutum* (2), and *H. azteca* sediment (1) also occurred.

During 2011, exceedances detected during monitoring included DO (1), *E. coli* (3), and dissolved copper (5).

All exceedances are listed in Table V-5 by season and date and are based on WQTLs listed in the introduction to the ESJWQC Management Plan. The highest priority constituents in the Cottonwood Creek subwatershed are chlorpyrifos and diazinon (A/B) as well as copper and diuron (C).

**Table V-5. Cottonwood Creek site subwatershed exceedances (2005-2011).**

The WQTL used to evaluate the data are listed in the header after the analyte. Upstream site is italicized.

| SITE NAME                | SEASON     | SAMPLE DATE | OXYGEN, DISSOLVED, <7 MG/L | PH, <6.5 AND > 8.5 UNITS | E. COLI, >235 MPN/100 ML | COPPER, DISSOLVED <sup>1</sup> µG/L | COPPER, TOTAL <sup>2</sup> , >1,300 µG/L | LEAD, TOTAL <sup>2</sup> , >15 µG/L | CHLORPYRIFOS, >0.015 µG/L | CYANAZINE, >1 µG/L | DIAZINON, >0.1 µG/L | DIURON, >2 µG/L | SIMAZINE, >4 µG/L | P. PROMELAS, (% CONTROL) | S. CAPRICORNUTUM, (% CONTROL) | H. AZTECA, (% CONTROL) |
|--------------------------|------------|-------------|----------------------------|--------------------------|--------------------------|-------------------------------------|------------------------------------------|-------------------------------------|---------------------------|--------------------|---------------------|-----------------|-------------------|--------------------------|-------------------------------|------------------------|
| Cottonwood Creek @ Rd 20 | Storm      | 2/16/2005   |                            |                          | 1600                     |                                     |                                          |                                     |                           |                    |                     |                 |                   |                          |                               |                        |
| Cottonwood Creek @ Rd 20 | Storm      | 3/21/2005   | 5.6                        |                          | 1600                     |                                     |                                          |                                     |                           |                    |                     |                 |                   |                          |                               |                        |
| Cottonwood Creek @ Rd 20 | Irrigation | 5/10/2005   |                            |                          | 540                      |                                     |                                          |                                     |                           |                    |                     |                 |                   |                          |                               |                        |
| Cottonwood Creek @ Rd 20 | Irrigation | 6/14/2005   | 5.7                        |                          |                          |                                     |                                          |                                     |                           |                    |                     |                 |                   |                          |                               |                        |
| Cottonwood Creek @ Rd 20 | Irrigation | 7/12/2005   | 5.17                       |                          |                          |                                     |                                          |                                     |                           |                    |                     |                 |                   |                          |                               |                        |
| Cottonwood Creek @ Rd 20 | Irrigation | 8/16/2005   |                            |                          | 300                      |                                     |                                          |                                     |                           |                    |                     |                 |                   |                          |                               |                        |
| Cottonwood Creek @ Rd 20 | Irrigation | 9/20/2005   | 6.5                        |                          |                          |                                     |                                          |                                     |                           |                    |                     |                 |                   |                          |                               |                        |
| Cottonwood Creek @ Rd 20 | Storm      | 2/28/2006   |                            |                          | 300                      |                                     |                                          |                                     |                           |                    |                     |                 |                   |                          |                               |                        |
| Cottonwood Creek @ Rd 20 | Storm      | 3/15/2006   |                            |                          | 1600                     |                                     |                                          |                                     |                           |                    |                     |                 |                   |                          |                               |                        |
| Cottonwood Creek @ Rd 20 | Irrigation | 5/16/2006   | 5.71                       |                          |                          |                                     | 4.4 (3.5)                                |                                     |                           |                    |                     |                 |                   |                          |                               |                        |
| Cottonwood Creek @ Rd 20 | Irrigation | 6/13/2006   | 6.9                        |                          |                          |                                     | 8 (6.9)                                  | 0.73 (0.63)                         |                           |                    |                     |                 |                   |                          |                               |                        |
| Cottonwood Creek @ Rd 20 | Irrigation | 7/11/2006   | 6.51                       |                          |                          |                                     |                                          |                                     |                           |                    |                     |                 |                   |                          |                               |                        |
| Cottonwood Creek @ Rd 20 | Irrigation | 8/8/2006    | 6.95                       |                          |                          |                                     |                                          |                                     |                           |                    |                     |                 |                   |                          |                               |                        |
| Cottonwood Creek @ Rd 20 | Irrigation | 9/12/2006   | 6.11                       |                          |                          |                                     | 5.5 (4.4)                                |                                     |                           |                    |                     |                 |                   |                          |                               |                        |
| Cottonwood Creek @ Rd 20 | Irrigation | 5/29/2007   | 6.55                       |                          |                          |                                     | 6.7 (5.5)                                |                                     |                           |                    |                     |                 |                   |                          |                               |                        |
| Cottonwood Creek @ Rd 20 | Irrigation | 6/19/2007   |                            |                          |                          |                                     | 6.7 (4.1)                                |                                     |                           |                    |                     |                 |                   |                          |                               |                        |
| Cottonwood Creek @ Rd 20 | Irrigation | 6/26/2007   |                            |                          |                          |                                     | 4.3 (4.1)                                |                                     |                           |                    |                     |                 |                   |                          |                               |                        |
| Cottonwood Creek @ Rd 20 | Irrigation | 7/24/2007   |                            | 9.04                     |                          |                                     | 5.4 (4.6)                                |                                     |                           |                    |                     |                 |                   |                          |                               |                        |

| SITE NAME                  | SEASON     | SAMPLE DATE | OXYGEN, DISSOLVED, <7 MG/L | pH, <6.5 AND > 8.5 UNITS | E. COLI, >235 MPN/100 ML | COPPER, DISSOLVED <sup>1</sup> µG/L | COPPER, TOTAL <sup>2</sup> , >1,300 µG/L | LEAD, TOTAL <sup>2</sup> , >15 µG/L | CHLORPYRIFOS, >0.015 µG/L | CYANAZINE, >1 µG/L | DIAZINON, >0.1 µG/L | DIURON, >2 µG/L | SIMAZINE, >4 µG/L | P. PROMELAS, (% CONTROL) | S. CAPRICORNUTUM, (% CONTROL) | H. AZTECA, (% CONTROL) |
|----------------------------|------------|-------------|----------------------------|--------------------------|--------------------------|-------------------------------------|------------------------------------------|-------------------------------------|---------------------------|--------------------|---------------------|-----------------|-------------------|--------------------------|-------------------------------|------------------------|
| Cottonwood Creek @ Rd 20   | Irrigation | 8/21/2007   | 6.81                       |                          |                          |                                     | 5.2 (4.6)                                |                                     |                           |                    |                     |                 |                   |                          |                               |                        |
| Cottonwood Creek @ Rd 20   | Irrigation | 8/23/2007   | 3.95                       |                          |                          |                                     |                                          |                                     |                           |                    |                     |                 |                   |                          |                               |                        |
| Cottonwood Creek @ Rd 20   | Storm      | 1/25/2008   |                            |                          | 1200                     |                                     | 24 (3.0)                                 | 5.4 (0.6)                           | 0.02                      |                    |                     | 68              |                   | 45                       |                               |                        |
| Cottonwood Creek @ Rd 20   | Storm      | 2/25/2008   |                            |                          |                          |                                     | 21 (6.5)                                 | 1.9 (1.9)                           | 0.04                      |                    | 0.2                 | 65              | 5                 |                          |                               |                        |
| Cottonwood Creek @ Rd 20   | Sediment   | 3/4/2008    |                            |                          |                          |                                     |                                          |                                     |                           |                    |                     |                 |                   |                          |                               | 96                     |
| Cottonwood Creek @ Rd 20   | Irrigation | 4/29/2008   |                            |                          | 580                      |                                     | 8 (6.9)                                  |                                     |                           |                    |                     |                 |                   |                          | 5                             |                        |
| Cottonwood Creek @ Rd 20   | Irrigation | 5/7/2008    |                            |                          |                          |                                     |                                          |                                     |                           |                    |                     |                 |                   |                          | 4                             |                        |
| Cottonwood Creek @ Rd 20   | Irrigation | 5/27/2008   |                            |                          | 250                      |                                     |                                          |                                     |                           | 1                  |                     |                 |                   |                          |                               |                        |
| Cottonwood Creek @ Hwy 145 | Irrigation | 6/24/2008   |                            |                          |                          |                                     | 39 (5.5)                                 |                                     |                           |                    |                     |                 |                   |                          |                               |                        |
| Cottonwood Creek @ Rd 20   | Irrigation | 6/24/2008   |                            |                          | 1300                     |                                     |                                          |                                     |                           |                    |                     |                 |                   |                          |                               |                        |
| Cottonwood Creek @ Rd 20   | Irrigation | 7/29/2008   |                            |                          | 1000                     |                                     |                                          |                                     |                           |                    |                     |                 |                   |                          |                               |                        |
| Cottonwood Creek @ Hwy 145 | Irrigation | 8/26/2008   | 6.45                       |                          |                          |                                     |                                          |                                     |                           |                    |                     |                 |                   |                          |                               |                        |
| Cottonwood Creek @ Rd 20   | Irrigation | 8/26/2008   | 6.83                       |                          | 390                      |                                     | 4.4 (3.7)                                |                                     |                           |                    |                     |                 |                   |                          |                               |                        |
| Cottonwood Creek @ Rd 20   | Storm      | 2/7/2009    |                            |                          | >2400                    |                                     |                                          |                                     |                           |                    |                     |                 |                   |                          |                               |                        |
| Cottonwood Creek @ Rd 20   | Irrigation | 5/19/2009   | 6.72                       |                          |                          |                                     |                                          |                                     |                           |                    |                     |                 |                   |                          |                               |                        |
| Cottonwood Creek @ Rd 20   | Fall       | 11/17/2009  |                            |                          | 770                      |                                     |                                          |                                     |                           |                    |                     |                 |                   |                          |                               |                        |
| Cottonwood Creek @ Rd 20   | Storm      | 1/19/2010   |                            |                          |                          |                                     |                                          |                                     | 0.21                      |                    |                     |                 |                   |                          |                               |                        |
| Cottonwood Creek @ Rd 20   | Storm      | 4/20/2010   | 6.36                       |                          |                          | 3.1 (2.17)                          |                                          |                                     |                           |                    |                     |                 |                   |                          |                               |                        |
| Cottonwood Creek @ Rd 20   | Irrigation | 5/18/2010   |                            |                          |                          | 3.6 (2.36)                          |                                          |                                     |                           |                    |                     |                 |                   |                          |                               |                        |
| Cottonwood Creek @ Rd 20   | Irrigation | 6/15/2010   |                            |                          | 2000                     |                                     |                                          |                                     |                           |                    |                     |                 |                   |                          |                               |                        |

| SITE NAME                | SEASON     | SAMPLE DATE | OXYGEN, DISSOLVED, <7 MG/L | pH, <6.5 AND > 8.5 UNITS | E. COLI, >235 MPN/100 mL | COPPER, DISSOLVED <sup>1</sup> µG/L | COPPER, TOTAL <sup>2</sup> , >1,300 µG/L | LEAD, TOTAL <sup>2</sup> , >15 µG/L | CHLORPYRIFOS, >0.015 µG/L | CYANAZINE, >1 µG/L | DIAZINON, >0.1 µG/L | DIURON, >2 µG/L | SIMAZINE, >4 µG/L | P. PROMELAS, (% CONTROL) | S. CAPRICORNUTUM, (% CONTROL) | H. AZTECA, (% CONTROL) |
|--------------------------|------------|-------------|----------------------------|--------------------------|--------------------------|-------------------------------------|------------------------------------------|-------------------------------------|---------------------------|--------------------|---------------------|-----------------|-------------------|--------------------------|-------------------------------|------------------------|
| Cottonwood Creek @ Rd 20 | Irrigation | 7/20/2010   | 6.80                       |                          |                          |                                     |                                          |                                     |                           |                    |                     |                 |                   |                          |                               |                        |
| Cottonwood Creek @ Rd 20 | Irrigation | 8/17/2010   | 6.04                       |                          |                          | 5.3 (4.9)                           |                                          |                                     |                           |                    |                     |                 |                   |                          |                               |                        |
| Cottonwood Creek @ Rd 20 | Irrigation | 9/14/2010   | 6.44                       |                          |                          |                                     |                                          |                                     |                           |                    |                     |                 |                   |                          |                               |                        |
| Cottonwood Creek @ Rd 20 | Fall       | 10/19/2010  |                            |                          | 290                      |                                     |                                          |                                     |                           |                    |                     |                 |                   |                          |                               |                        |
| Cottonwood Creek @ Rd 20 | Irrigation | 4/19/2011   | 6.7                        |                          |                          | 4.6 (3.83)                          |                                          |                                     |                           |                    |                     |                 |                   |                          |                               |                        |
| Cottonwood Creek @ Rd 20 | Irrigation | 5/17/2011   |                            |                          |                          | 3.8 (3.02)                          |                                          |                                     |                           |                    |                     |                 |                   |                          |                               |                        |
| Cottonwood Creek @ Rd 20 | Irrigation | 6/21/2011   |                            |                          | 550                      |                                     |                                          |                                     |                           |                    |                     |                 |                   |                          |                               |                        |
| Cottonwood Creek @ Rd 20 | Irrigation | 7/19/2011   |                            |                          |                          | 4.3 (3.56)                          |                                          |                                     |                           |                    |                     |                 |                   |                          |                               |                        |
| Cottonwood Creek @ Rd 20 | Irrigation | 8/16/2011   |                            |                          | 250                      |                                     |                                          |                                     |                           |                    |                     |                 |                   |                          |                               |                        |
| Cottonwood Creek @ Rd 20 | Irrigation | 9/13/2011   |                            |                          |                          | 5.8 (3.20)                          |                                          |                                     |                           |                    |                     |                 |                   |                          |                               |                        |
| Cottonwood Creek @ Rd 20 | Fall       | 10/11/2011  |                            |                          | >2400                    | 4.1 (3.56)                          |                                          |                                     |                           |                    |                     |                 |                   |                          |                               |                        |
| Constituent Priority     |            |             | E                          | NP                       | E                        | C                                   | C                                        | E                                   | A/B                       | NP                 | A/B                 | C               | NP                | NP                       | NP <sup>T</sup>               | NP                     |

<sup>1</sup>Dissolved metals not analyzed until October 2008; WQTL variable based on hardness.

<sup>2</sup>Total metal WQTL variable based on hardness.

NP – Not Prioritized; less than two exceedances within three consecutive monitoring years and currently no TMDL.

NP<sup>T</sup> – Not prioritized; both toxic samples were from the same sampling event (sample and resample to test for persistence).

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## 2007-2011 Management Plan Monitoring Results

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All monitoring results for high priority management plan constituents in the Cottonwood Creek subwatershed are listed in Table V-6. These constituents include chlorpyrifos, copper, diazinon, and diuron.

The Regional Board established a TMDL for diazinon for the ESJWQC region (Lower San Joaquin River Chlorpyrifos and Diazinon TMDL); consequently, diazinon is considered one of the highest priority constituents under the Coalition's Management Plan. There was one exceedance of the diazinon WQTL at Cottonwood Creek @ Rd 20 in February 2008 (Table V-6). Beginning in October 2008, only Core Monitoring constituents were sampled at Cottonwood Creek. In January and February 2010, MPM was initiated for diazinon. Since the single exceedance of the diazinon WQTL in February 2008, MPM occurred during the month of past exceedance in 2010 (February) and Assessment Monitoring occurred monthly in 2011. There were no exceedances of the diazinon WQTL in samples collected from Cottonwood Creek @ Rd 20 in 2010 or 2011. In 2012, MPM for diazinon is scheduled to occur during months of past exceedances (February).

Chlorpyrifos exceeded the WQTL at Cottonwood Creek @ Rd 20 three times, twice during the storm season of 2008 (January and February) and once in 2009 (January). In 2010 and 2011, MPM for chlorpyrifos (January and February) took place and no exceedances occurred (Table V-6). In 2012, Cottonwood Creek @ Rd 20 will return to Core Monitoring and MPM is scheduled to occur for chlorpyrifos during months of past exceedances (January and February).

In 2007, Cottonwood Creek @ Rd 20 was monitored for copper from April through September plus additional copper monitoring was conducted in June and September (Table V-6). Exceedances of copper occurred in all samples analyzed from 2007 (May-August) Normal Monitoring including the additional sample collected in June 2007 (Table V-6). The April sample had detectable amounts of copper; however, the concentration was not an exceedance. Cottonwood Creek was dry in September and therefore there are no results for September 2007 NM or MPM. In accordance with the 2008 upstream MPM schedule, Cottonwood Creek @ Hwy 145 was monitored for copper from May through September 2008 (Table V-6). Copper was detected in all samples collected during the irrigation season except in September when the site was dry. Exceedances of the copper WQTL occurred in samples collected during April and August 2008 at the Normal Monitoring site, but not at the upstream monitoring site. Cottonwood Creek @ Rd 20 was not scheduled for MPM in 2009. Management Plan Monitoring for copper took place during every month of the 2010 irrigation season (April-September). Copper exceedances occurred in April, May and August 2010 (Table V-6). During 2011, Cottonwood Creek @ Rd 20 rotated into Assessment Monitoring where all high priority constituents were monitored monthly and exceedances of copper occurred during April, May, July, September and October. In 2012, MPM is scheduled for copper during months of past exceedances (January-February and April-October).

Samples containing diuron exceeded the WQTL twice at the Cottonwood Creek @ Rd 20 site subwatershed (Table V-5); both exceedances occurred during 2008 storm events (January and

February). Since the most recent diuron exceedance in February 2008, samples were collected for diuron during MPM in months of past exceedances and this site was sampled monthly during normal irrigation and storm monitoring in 2008 as well as monthly Assessment Monitoring in 2011 (Table V-6). The Coalition conducted MPM for diuron in January and February 2010 and 2011. There were no exceedances of the diuron WQTL in any sample collected from Cottonwood Creek @ Rd 20 in 2008, 2010 or 2011. In 2012, MPM for diuron is scheduled to occur during months of past exceedances (January and February).



**Table V-6. Cottonwood Creek site subwatershed monitoring results for high priority constituents (2007-2011).**

Exceedance values are in bold. Resampling (RS) due to toxicity not included in table.

| MONTH:                     |                          | JAN     | FEB     | MAR     | APR     | MAY     | JUN     | JUL     | AUG     | SEP     | OCT      | Nov     | DEC     |
|----------------------------|--------------------------|---------|---------|---------|---------|---------|---------|---------|---------|---------|----------|---------|---------|
| 2007 NM<br>(@ Rd 20)       | Date                     | NA      | NA      | NA      | 4/24/07 | 5/29/07 | 6/26/07 | 7/24/07 | 8/21/07 | 9/18/07 | NA       | NA      | NA      |
|                            | Copper (µg/L)            | NA      | NA      | NA      | 3.9     | 6.7     | 4.3     | 5.4     | 5.2     | Dry     | NA       | NA      | NA      |
| 2007 MPM A<br>(@Rd 20)     | Date                     | NA      | NA      | NA      | NA      | NA      | 6/19/07 | NA      | NA      | 9/25/07 | NA       | NA      | NA      |
|                            | Copper (µg/L)            | NA      | NA      | NA      | NA      | NA      | 6.7     | NA      | NA      | Dry     | NA       | NA      | NA      |
| 2008 NM<br>(@ Rd 20)       | Date                     | 1/25/08 | 2/25/08 | NA      | 4/29/08 | 5/27/08 | 6/24/08 | 7/29/08 | 8/26/08 | 9/30/08 | NA       | NA      | NA      |
|                            | Copper (µg/L)            | 24      | 21      | NA      | 8       | 4.9     | 4.5     | 4.8     | 4.4     | Dry     | NA       | NA      | NA      |
| 2008 MPM US<br>(@ Hwy 145) | Date                     | NA      | NA      | NA      | NA      | 5/27/08 | 6/24/08 | 7/29/08 | 8/26/08 | 9/30/08 | NA       | NA      | NA      |
|                            | Copper (µg/L)            | NA      | NA      | NA      | NA      | 2.4     | 39      | 2.3     | 2.1     | Dry     | NA       | NA      | NA      |
| 2010 MPM<br>(@ Rd 20)      | Date                     | 1/19/10 | 2/23/10 | NA      | 4/20/10 | 5/18/10 | 6/15/10 | 7/20/10 | 8/17/10 | 9/14/10 | NA       | NA      | NA      |
|                            | Copper, dissolved (µg/L) | NA      | NA      | NA      | 3.1     | 3.6     | 3.2     | 2.8     | 5.3     | 3.5     | NA       | NA      | NA      |
|                            | Copper, total (µg/L)     | NA      | NA      | NA      | 4.2     | 5.1     | 10      | 5.6     | 6.6     | 8.5     | NA       | NA      | NA      |
|                            | Chlorpyrifos (µg/L)      | 0.21    | Dry     | NA      | NA      | NA      | NA      | NA      | NA      | NA      | NA       | NA      | NA      |
|                            | Diuron (µg/L)            | <0.20   | Dry     | NA      | NA      | NA      | NA      | NA      | NA      | NA      | NA       | NA      | NA      |
|                            | Diazinon (µg/L)          | <0.004  | Dry     | NA      | NA      | NA      | NA      | NA      | NA      | NA      | NA       | NA      | NA      |
| 2011 NM &<br>MPM (@ Rd 20) | Date                     | 1/18/11 | 2/17/11 | 3/15/11 | 4/19/11 | 5/17/11 | 6/21/11 | 7/19/11 | 8/16/11 | 9/13/11 | 10/11/11 | 11/8/11 | 12/6/11 |
|                            | Copper, dissolved (µg/L) | 2.4*    | 2.3*    | 2.7     | 4.6*    | 3.8*    | 3.7*    | 4.3*    | 3.4*    | 5.8*    | 4.1      | Dry     | Dry     |
|                            | Copper, total (µg/L)     | 4.4*    | 3.8*    | 3.9     | 7.3*    | 5.9*    | 5.9*    | 6.2*    | 6.4*    | 9.8*    | 14       | Dry     | Dry     |
|                            | Chlorpyrifos (µg/L)      | <0.003* | <0.003* | <0.003  | <0.003  | <0.003  | <0.003  | <0.003  | <0.003  | <0.003  | <0.003   | Dry     | Dry     |
|                            | Diuron (µg/L)            | <0.20*  | <0.20*  | 1.1     | <0.20   | <0.20   | <0.20   | <0.20   | <0.20   | <0.20   | <0.20    | Dry     | Dry     |
|                            | Diazinon (µg/L)          | <0.004  | <0.004* | <0.004  | <0.004  | <0.004  | <0.004  | <0.004  | <0.004  | <0.004  | <0.004   | Dry     | Dry     |

A – Additional MPM conducted in 2007 only.

MPM – Management Plan Monitoring (see Table 4 for MPM schedule)

NA – Not applicable. No monitoring occurred on this date for this constituent.

NM – Normal Monitoring

US – Upstream MPM conducted in 2008 only.

\*NM & MPM occurred during this date for this constituent.

## Load Calculations

Loads have been calculated for all chlorpyrifos, diazinon, copper, and diuron detections in the site subwatershed (Table V-7) based on the following formula:

$$\text{Load} = \text{Discharge (cfs)} \times 28.317\text{L/ft}^3 \times \text{Concentration (mg/L} \times 1000 \text{ or } \mu\text{g/L)}.$$

The load values for constituents in this report represent instantaneous loads only. These values should not be used to extrapolate loading over any period of time (e.g. weekly, monthly, seasonal or annual). The primary purpose for reporting instantaneous loads is to provide a normalization of the concentrations by flow for various constituents at the time the samples were collected.

**Table V-7. Cottonwood Creek site subwatershed instantaneous load calculations for chlorpyrifos, copper, diazinon, and diuron.**

Upstream site is italicized. Sorted by analyte and date.

| SITE NAME                              | ANALYTE NAME  | SAMPLE DATE     | DISCHARGE CFS | CONCENTRATION $\mu\text{G/L}$ | LOADING RATE $\mu\text{G/SEC}$ |
|----------------------------------------|---------------|-----------------|---------------|-------------------------------|--------------------------------|
| Cottonwood Creek @ Rd 20               | Chlorpyrifos  | 03/15/06        | 0             | 0.011                         | 0                              |
| Cottonwood Creek @ Rd 20*              | Chlorpyrifos  | 03/15/06        | 0             | 0.012                         | 0                              |
| Cottonwood Creek @ Rd 20               | Chlorpyrifos  | 07/11/06        | 1.96          | 0.014                         | 0.78                           |
| Cottonwood Creek @ Rd 20               | Chlorpyrifos  | 07/24/07        | 0             | 0.007                         | 0                              |
| Cottonwood Creek @ Rd 20               | Chlorpyrifos  | 01/25/08        | 3.05          | 0.019                         | 1.64                           |
| Cottonwood Creek @ Rd 20               | Chlorpyrifos  | 02/25/08        | 0.22          | 0.036                         | 0.22                           |
| Cottonwood Creek @ Rd 20               | Chlorpyrifos  | 01/19/10        | 0             | 0.21                          | 0                              |
| Cottonwood Creek @ Rd 20               | Copper        | 05/16/06        | 2.33          | 4.4                           | 290.31                         |
| Cottonwood Creek @ Rd 20*              | Copper        | 05/16/06        | 2.33          | 4.8                           | 316.70                         |
| Cottonwood Creek @ Rd 20               | Copper        | 06/13/06        | 2.66          | 8                             | 602.59                         |
| Cottonwood Creek @ Rd 20               | Copper        | 07/11/06        | 1.96          | 5.3                           | 294.16                         |
| Cottonwood Creek @ Rd 20               | Copper        | 08/08/06        | 12.92         | 4.1                           | 1500.01                        |
| Cottonwood Creek @ Rd 20               | Copper        | 09/12/06        | 38.2          | 5.5                           | 5949.40                        |
| Cottonwood Creek @ Rd 20               | Copper        | 04/24/07        | 28.24         | 3.9                           | 3118.72                        |
| Cottonwood Creek @ Rd 20               | Copper        | 06/19/07        | 0.59          | 6.7                           | 111.94                         |
| Cottonwood Creek @ Rd 20               | Copper        | 07/24/07        | 0             | 5.4                           | 0                              |
| Cottonwood Creek @ Rd 20*              | Copper        | 07/24/07        | 0             | 5.1                           | 0                              |
| Cottonwood Creek @ Rd 20               | Copper        | 01/25/08        | 3.05          | 24                            | 2072.80                        |
| Cottonwood Creek @ Rd 20               | Copper        | 02/25/08        | 0.22          | 21                            | 130.82                         |
| Cottonwood Creek @ Rd 20               | Copper        | 04/29/08        | 8.26          | 8                             | 1871.19                        |
| Cottonwood Creek @ Rd 20               | Copper        | 05/27/08        | 17.41         | 4.9                           | 2415.69                        |
| <i>Cottonwood Creek at Highway 145</i> | <i>Copper</i> | <i>05/27/08</i> | <i>20.01</i>  | <i>2.4</i>                    | <i>1359.90</i>                 |
| Cottonwood Creek @ Rd 20               | Copper        | 06/24/08        | 0.08          | 4.5                           | 10.19                          |
| <i>Cottonwood Creek at Highway 145</i> | <i>Copper</i> | <i>06/24/08</i> | <i>60.24</i>  | <i>39</i>                     | <i>66526.83</i>                |
| Cottonwood Creek @ Rd 20               | Copper        | 07/29/08        | 0.16          | 4.8                           | 21.75                          |
| <i>Cottonwood Creek at Highway 145</i> | <i>Copper</i> | <i>07/29/08</i> | <i>35.03</i>  | <i>2.3</i>                    | <i>2281.47</i>                 |
| Cottonwood Creek @ Rd 20               | Copper        | 08/26/08        | 0.79          | 4.4                           | 98.43                          |
| <i>Cottonwood Creek at Highway 145</i> | <i>Copper</i> | <i>08/26/08</i> | <i>10.85</i>  | <i>2.1</i>                    | <i>645.20</i>                  |
| Cottonwood Creek @ Rd 20               | Copper        | 04/20/10        | 12.68         | 4.2                           | 1508.05                        |
| Cottonwood Creek @ Rd 20               | Copper        | 05/18/10        | 12.42         | 5.1                           | 1793.66                        |
| Cottonwood Creek @ Rd 20               | Copper        | 06/15/10        | 0             | 10                            | 0                              |
| Cottonwood Creek @ Rd 20               | Copper        | 07/20/10        | 12.97         | 5.6                           | 2056.72                        |

| SITE NAME                 | ANALYTE NAME | SAMPLE DATE | DISCHARGE CFS | CONCENTRATION µG/L | LOADING RATE µG/SEC |
|---------------------------|--------------|-------------|---------------|--------------------|---------------------|
| Cottonwood Creek @ Rd 20  | Copper       | 08/17/10    | 14.29         | 6.6                | 2670.69             |
| Cottonwood Creek @ Rd 20  | Copper       | 09/14/10    | 3.82          | 8.5                | 919.45              |
| Cottonwood Creek @ Rd 20  | Copper       | 01/18/11    | 42.66         | 4.4                | 5315.21             |
| Cottonwood Creek @ Rd 20  | Copper       | 02/17/11    | 27.62         | 3.8                | 2972.04             |
| Cottonwood Creek @ Rd 20  | Copper       | 03/15/11    | 31.48         | 3.9                | 3476.53             |
| Cottonwood Creek @ Rd 20  | Copper       | 04/19/11    | 1.35          | 7.3                | 279.06              |
| Cottonwood Creek @ Rd 20* | Copper       | 04/19/11    | 1.35          | 8                  | 305.82              |
| Cottonwood Creek @ Rd 20  | Copper       | 09/13/11    | 6.25          | 9.8                | 1734.42             |
| Cottonwood Creek @ Rd 20  | Copper       | 10/11/11    | 0.21          | 14                 | 83.25               |
| Cottonwood Creek @ Rd 20* | Copper       | 10/11/11    | 0.21          | 13                 | 77.31               |
| Cottonwood Creek @ Rd 20  | Copper (D)   | 04/20/10    | 12.68         | 3.1                | 1113.08             |
| Cottonwood Creek @ Rd 20  | Copper (D)   | 05/18/10    | 12.42         | 3.6                | 1266.11             |
| Cottonwood Creek @ Rd 20  | Copper (D)   | 06/15/10    | 0             | 3.2                | 0                   |
| Cottonwood Creek @ Rd 20  | Copper (D)   | 07/20/10    | 12.97         | 2.8                | 1028.36             |
| Cottonwood Creek @ Rd 20  | Copper (D)   | 08/17/10    | 14.29         | 5.3                | 2144.64             |
| Cottonwood Creek @ Rd 20  | Copper (D)   | 09/14/10    | 3.82          | 3.5                | 378.60              |
| Cottonwood Creek @ Rd 20  | Copper (D)   | 01/18/11    | 42.66         | 2.4                | 2899.21             |
| Cottonwood Creek @ Rd 20  | Copper (D)   | 02/17/11    | 27.62         | 2.3                | 1798.87             |
| Cottonwood Creek @ Rd 20  | Copper (D)   | 03/15/11    | 31.48         | 2.7                | 2406.83             |
| Cottonwood Creek @ Rd 20  | Copper (D)   | 04/19/11    | 1.35          | 4.6                | 175.85              |
| Cottonwood Creek @ Rd 20* | Copper (D)   | 04/19/11    | 1.35          | 5.2                | 198.79              |
| Cottonwood Creek @ Rd 20  | Copper (D)   | 09/13/11    | 6.25          | 5.8                | 1026.49             |
| Cottonwood Creek @ Rd 20  | Copper (D)   | 10/11/11    | 0.21          | 4.1                | 24.38               |
| Cottonwood Creek @ Rd 20* | Copper (D)   | 10/11/11    | 0.21          | 3.8                | 22.60               |
| Cottonwood Creek @ Rd 20  | Diazinon     | 02/28/06    | 0.26          | 0.02               | 0.15                |
| Cottonwood Creek @ Rd 20* | Diazinon     | 02/28/06    | 0.26          | 0.023              | 0.17                |
| Cottonwood Creek @ Rd 20  | Diazinon     | 01/25/08    | 3.05          | 0.06               | 5.18                |
| Cottonwood Creek @ Rd 20  | Diazinon     | 02/25/08    | 0.22          | 0.24               | 1.50                |
| Cottonwood Creek @ Rd 20  | Diuron       | 04/24/07    | 28.24         | 0.85               | 679.72              |
| Cottonwood Creek @ Rd 20  | Diuron       | 01/25/08    | 3.05          | 68                 | 5872.95             |
| Cottonwood Creek @ Rd 20  | Diuron       | 02/25/08    | 0.22          | 65                 | 404.93              |
| Cottonwood Creek @ Rd 20  | Diuron       | 04/29/08    | 8.26          | 0.63               | 147.36              |
| Cottonwood Creek @ Rd 20  | Diuron       | 05/27/08    | 17.41         | 0.23               | 113.39              |
| Cottonwood Creek @ Rd 20  | Diuron       | 03/15/11    | 31.48         | 1.1                | 980.56              |

Copper (D)-Dissolved Copper

\*Field Duplicate

### Source Identification and Outreach

The Coalition addressed source identification in the 2011 MPUR and, in the following sections, considers 2011 monitoring results and PUR data as it expands upon that discussion. The Coalition focuses its efforts on applied pesticides. During 2007 and 2008, the Coalition conducted additional copper MPM and upstream monitoring during the months when exceedances historically occurred to better characterize water quality in the subwatershed. From 2009 through 2010, Core Monitoring occurred at Cottonwood Creek, and MPM continued starting in 2010 to assess water quality in the subwatershed as outreach in the area progressed. Assessment Monitoring occurred at the site during 2011. The PUR data are reviewed to determine the most frequent crop type and timing associated with applications. Cottonwood Creek @ Rd 20 PUR data are available through June 2011.

Focused outreach to document current management practices and track implementation of additional management practices in the Cottonwood Creek @ Rd 20 subwatershed began in 2010 and continued through 2011. The Coalition actively engaged in grower outreach and education to address the subwatershed's priority constituents. The Coalition organized meetings and mailings to educate growers about management practices and their importance in achieving acceptable water quality. The Coalition contacted 100% of targeted growers (25) representing 5,768 acres within the Cottonwood Creek subwatershed. Twenty-four growers participated in follow up contacts to determine if additional management practices were implemented and if any were planned to be implemented, excluding one grower who sold the property after initial contact. Management Plan Monitoring and Assessment Monitoring will take place in 2012 to further assess the affect of outreach on water quality.

### *Priority A/B Constituents*

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Chlorpyrifos and diazinon are both priority A/B constituents listed in the Cottonwood Creek @ Rd 20 subwatershed management plan.

#### **Chlorpyrifos**

Chlorpyrifos exceeded the WQTL of 0.015µg/L three times (Table V-5) from 2005 through 2011 (January and February 2008 and January 2010). Chlorpyrifos was omitted from the monitoring schedule in October 2008 when the Coalition began monitoring under the current 2008 MRPP; chlorpyrifos is not monitored during Core Monitoring. Starting in 2010, as part of the MPM schedule, chlorpyrifos was monitored in January and February. The Coalition evaluated both monitoring and PUR data to identify possible sources.

In every high priority subwatershed, PUR data are reviewed for the number of monthly applications, pounds of AI applied of the constituent of concern, and acres treated of the constituent of concern (Table V-8, Figure V-2). The greatest chlorpyrifos use occurred in 2006 (7,703 lbs AI) with the lowest use occurring in 2008 (738 lbs AI). In 2005 and 2007 the greatest amount of chlorpyrifos use occurred in July, in 2006 and 2010, the greatest use occurred in May, and in 2008 and 2009 during March (Table V-8, Figure V-2). The most recent chlorpyrifos use prior to the 2008 January and February chlorpyrifos exceedances occurred in October 2007; no use was reported from November 2007 through February 2008. The most recent use preceding the January 2010 chlorpyrifos exceedance was in October 2009 (Figure V-2).

The Coalition also uses PUR data from each subwatershed to determine which crops receive the most applications. The top three application rates of chlorpyrifos in the Cottonwood Creek subwatershed were associated with almonds, oranges, and vineyards/grapes (Table V-9). The largest amount of chlorpyrifos applied from 2005 through 2011 was to almond orchards (9,383 lbs AI) followed by orange groves (3,008 lbs AI) and vineyards/grapes (2,479 lbs AI) (Table V-9). The most common product containing chlorpyrifos used within this subwatershed was Lorsban (Table V-9).

**Table V-8. Cottonwood Creek @ Rd 20 site subwatershed chlorpyrifos applications, lbs AI applied, and acres treated by month (2005-2011).**

PUR data available through June 2011 for Madera County. If month is not included in table, no applications were made.

| MONTH/YEAR               | NUMBER OF CHLORPYRIFOS APPLICATIONS | POUNDS OF AI APPLIED | ACRES TREATED |
|--------------------------|-------------------------------------|----------------------|---------------|
| February, 2005           | 1                                   | 326.0                | 163.0         |
| March, 2005              | 1                                   | 0.4                  | 0.1           |
| May, 2005                | 2                                   | 296.1                | 241.0         |
| July, 2005               | 15                                  | 1371.2               | 735.0         |
| August, 2005             | 11                                  | 1039.5               | 351.1         |
| September, 2005          | 16                                  | 628.0                | 212.0         |
| February, 2006           | 3                                   | 353.1                | 181.0         |
| March, 2006              | 2                                   | 131.9                | 71.0          |
| May, 2006                | 20                                  | 4029.8               | 1140.0        |
| June, 2006               | 4                                   | 277.4                | 166.5         |
| July, 2006               | 17                                  | 1292.2               | 821.3         |
| August, 2006             | 12                                  | 882.3                | 338.8         |
| September, 2006          | 7                                   | 244.4                | 88.5          |
| October, 2006            | 4                                   | 492.5                | 110.0         |
| March, 2007              | 2                                   | 329.0                | 168.5         |
| April, 2007              | 1                                   | 48.5                 | 200.0         |
| May, 2007                | 2                                   | 57.1                 | 208.0         |
| July, 2007               | 8                                   | 369.9                | 197.2         |
| August, 2007             | 4                                   | 133.6                | 74.0          |
| October, 2007            | 1                                   | 33.5                 | 18.0          |
| March, 2008              | 2                                   | 346.0                | 201.0         |
| May, 2008                | 2                                   | 26.9                 | 58.0          |
| July, 2008               | 4                                   | 206.9                | 118.0         |
| August, 2008             | 1                                   | 160.1                | 80.0          |
| February, 2009           | 1                                   | 80.7                 | 40.0          |
| March, 2009              | 2                                   | 335.2                | 181.0         |
| May, 2009                | 1                                   | 9.0                  | 4.5           |
| June, 2009               | 1                                   | 80.8                 | 40.0          |
| July, 2009               | 1                                   | 75.1                 | 40.0          |
| August, 2009             | 2                                   | 146.8                | 73.0          |
| September, 2009          | 1                                   | 248.5                | 41.0          |
| October, 2009            | 5                                   | 262.9                | 140.0         |
| May, 2010                | 2                                   | 362.6                | 337.0         |
| June, 2010               | 4                                   | 356.5                | 105.0         |
| July, 2010               | 4                                   | 164.1                | 293.0         |
| August, 2010             | 2                                   | 347.1                | 56.9          |
| September, 2010          | 5                                   | 258.1                | 50.4          |
| October, 2010            | 3                                   | 293.0                | 156.0         |
| January, 2011            | 1                                   | 75.1                 | 40.0          |
| February, 2011           | 3                                   | 91.1                 | 48.5          |
| <b>Summaries by Year</b> |                                     |                      |               |
| 2005 Total               | 46                                  | 3661.3               | 1702.2        |
| 2006 Total               | 69                                  | 7703.7               | 2917.0        |
| 2007 Total               | 18                                  | 971.6                | 865.7         |
| 2008 Total               | 9                                   | 739.9                | 457.0         |
| 2009 Total               | 14                                  | 1239.0               | 559.5         |
| 2010 Total               | 20                                  | 1781.4               | 998.3         |
| 2011 Total               | 4                                   | 166.2                | 88.5          |
| <b>Total</b>             | <b>180</b>                          | <b>16263.0</b>       | <b>7588.2</b> |

**Figure V-2. Cottonwood Creek @ Rd 20 site subwatershed lbs chlorpyrifos applied by month (2005-2011).**

Asterisk (\*) denotes months with exceedances. PUR data available through June 2011 for Madera County.

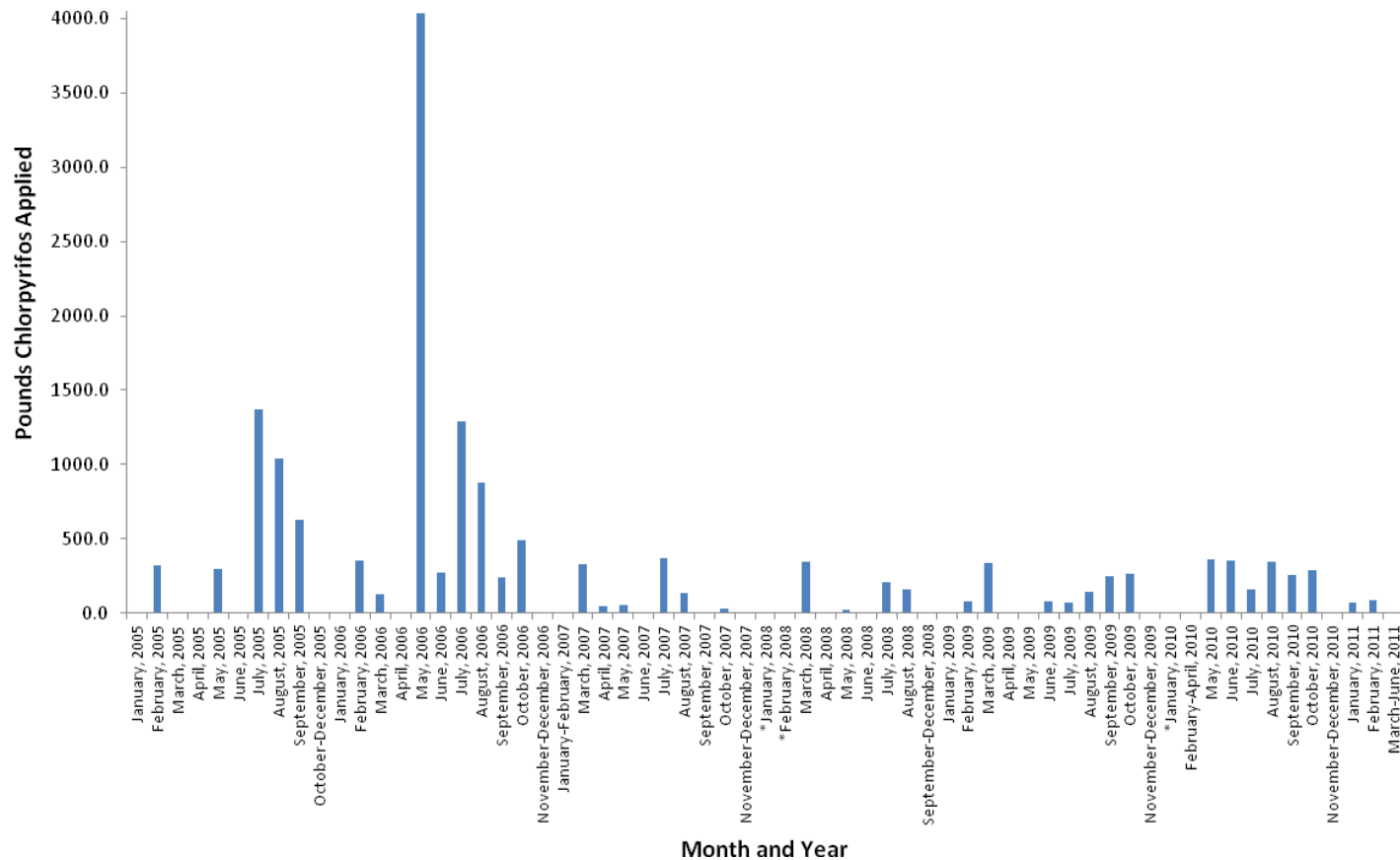


**Table V-9. Cottonwood Creek @ Rd 20 site subwatershed chlorpyrifos PUR data (2005-2011).**

PUR data available through June 2011 for Madera County.

| CHEMICAL NAME                                   | COMMODITY                               | PRODUCT NAME                      | LBS AI APPLIED         |
|-------------------------------------------------|-----------------------------------------|-----------------------------------|------------------------|
| CHLORPYRIFOS                                    | ALFALFA (FORAGE - FODDER) (ALFALFA HAY) | LOCK-ON INSECTICIDE               | 40.1                   |
|                                                 |                                         | LORSBAN 4E-HF                     | 117.6                  |
|                                                 |                                         | LORSBAN-4E                        | 224.9                  |
|                                                 | ALMOND                                  | AGRISOLUTIONS YUMA 4E INSECTICIDE | 80.7                   |
|                                                 |                                         | CHLORPYRIFOS 4E AG                | 0.4                    |
|                                                 |                                         | GOVERN 4E INSECTICIDE             | 1653.4                 |
|                                                 |                                         | LORSBAN 4E-HF                     | 727.8                  |
|                                                 |                                         | LORSBAN ADVANCED                  | 534.1                  |
|                                                 |                                         | LORSBAN-4E                        | 6086.4                 |
|                                                 |                                         | NUFOS 4E                          | 256.2                  |
|                                                 |                                         | WARHAWK                           | 44.4                   |
|                                                 |                                         | CHERRY                            | LORSBAN 4E INSECTICIDE |
|                                                 | CORN (FORAGE - FODDER)                  | LORSBAN 4E-HF                     | 117.6                  |
|                                                 | GRAPES                                  | LORSBAN 4E INSECTICIDE            | 1304.2                 |
|                                                 |                                         | LORSBAN ADVANCED                  | 668.9                  |
|                                                 |                                         | LORSBAN-4E                        | 506.4                  |
|                                                 | ORANGE                                  | CHLORPYRIFOS 4E AG                | 48.5                   |
|                                                 |                                         | GOVERN 4E INSECTICIDE             | 600.0                  |
|                                                 |                                         | LORSBAN 4E-HF                     | 748.3                  |
|                                                 |                                         | LORSBAN-4E                        | 1122.5                 |
|                                                 |                                         | NUFOS 4E                          | 488.7                  |
|                                                 | TANGELO                                 | LORSBAN-4E                        | 306.6                  |
|                                                 |                                         | NUFOS 4E                          | 94.6                   |
|                                                 | TANGERINE                               | GOVERN 4E INSECTICIDE             | 84.8                   |
|                                                 |                                         | LORSBAN-4E                        | 160.8                  |
|                                                 | WALNUT (ENGLISH WALNUT, PERSIAN WALNUT) | GOVERN 4E INSECTICIDE             | 161.6                  |
|                                                 |                                         | LORSBAN 4E-HF                     | 1.0                    |
|                                                 |                                         | LORSBAN-4E                        | 55.3                   |
| ALFALFA - Total Pounds Chlorpyrifos Applied     |                                         |                                   | 382.6                  |
| ALMOND - Total Pounds Chlorpyrifos Applied      |                                         |                                   | 9383.4                 |
| CHERRY - Total Pounds Chlorpyrifos Applied      |                                         |                                   | 27.1                   |
| CORN - Total Pounds Chlorpyrifos Applied        |                                         |                                   | 117.6                  |
| GRAPES - Total Pounds Chlorpyrifos Applied      |                                         |                                   | 2479.6                 |
| ORANGE - Total Pounds Chlorpyrifos Applied      |                                         |                                   | 3008.0                 |
| TANGELO - Total Pounds Chlorpyrifos Applied     |                                         |                                   | 401.2                  |
| TANGERINE - Total Pounds Chlorpyrifos Applied   |                                         |                                   | 245.7                  |
| WALNUT - Total Pounds Chlorpyrifos Applied      |                                         |                                   | 217.9                  |
| Total Pounds Chlorpyrifos Applied (2005 - 2011) |                                         |                                   | 16263.0                |

The Coalition determined the most probable source of chlorpyrifos in the Cottonwood Creek waterway to be spray drift from adjacent orchards. Cottonwood Creek has sandy soils and a large percentage of the adjacent acreage is orchards. Also, for a large portion of the watershed, the creek is raised above the level of the surrounding agricultural land and no drainage to the creek is possible. Consequently, it is likely that the exceedances of chlorpyrifos that occurred in 2008 were due to spray drift. Although no use was reported in November, December, January or February preceding the exceedances, applications

of chlorpyrifos during this time of year would be either for vine mealy bug control (applied to grapes) or dormant sprays (applied to orchards like cherries). The same assumption can be made concerning the January 2010 chlorpyrifos exceedance. There was no application associated with this exceedance and there were no applications reported since October 2009. Consequently, outreach efforts focused on encouraging management practices aimed at reducing spray drift and also improving orchard and vineyard water management. Outreach efforts were directed toward management practices designed to reduce spray drift and increase effective management of parcels adjacent to the creek.

Coalition outreach since 2007 has included grower meetings and the mailing/distribution of information such as available funding for management practice implementation. A complete list of coalition outreach during 2011 is provided in the Actions Taken to Address Water Quality Exceedances section of the 2012 AMR (Table 46, page 142).

In accordance with the Coalition's Management Plan strategy, individual contacts with targeted growers began in November 2009. Targeted growers were selected based on the potential of their agricultural practices to cause pesticide drift to the creek. In the Cottonwood Creek subwatershed, 25 targeted growers representing 5,768 acres were contacted with the potential to drain or drift directly into the creek. Coalition representatives met with growers on their property to discuss the Cottonwood Creek Management Plan and recommend management practices specific to the parcel and land owner/operator. This gave the Coalition a chance to better assess currently used management practices as well as review planned management practice implementation. Individual contacts focused mainly on chlorpyrifos exceedances however, all water quality results were reviewed and discussed including diazinon, copper, diuron, *E. coli*, DO, and lead exceedances.

The Coalition contacted all 25 targeted members, representing 45% of the subwatershed's direct drainage acreage. Of the 25 targeted members, recommended management practices to acreages in the Cottonwood Creek subwatershed included: control timing of pump/drain into waterway from storm water (27%) and spray when wind is blowing away from waterbodies (73%). Based on the exact timing of each individual meeting and/or a grower's resources, some owners would not be able to implement recommended management practices until the 2011 irrigation season.

The Coalition followed up with growers in April of 2011 to determine what practices were implemented during the first year of high priority monitoring. All members were responsive to the follow up interviews. Growers implemented all recommended practices as well as practices that were not specifically recommended for their operations. Newly implemented management practices within the Cottonwood Creek subwatershed include maintaining filter strips at least 10 feet wide around perimeter of orchard (1%), spraying close to waterbodies when the wind is blowing away from them (58%), using electronic controlled sprayer nozzles (20%), and using less water during surface irrigation (22%).

In 2012, the Coalition will continue to assess water quality at Cottonwood Creek @ Rd 20 through MPM during months of past exceedances.



## Diazinon

Concentrations of diazinon in samples exceeded the WQTL (0.1 µg/L) one time, on February 25, 2008 (Table V-5). Diazinon was not monitored at Cottonwood Creek from October 2008 through December 2009 due to a change in the current 2008 MRPP monitoring schedule. In 2010, MPM for diazinon began again during months of past exceedances and during 2011, monthly Assessment Monitoring occurred. There were no instances of diazinon exceedances in samples collected during 2010 or 2011.

All PUR data are reviewed for the number of monthly diazinon applications, pounds of active ingredient applied, and acres treated (Table V-10, Figure V-3). Overall, the amount of diazinon applied within the subwatershed decreased since 2005. The amount of diazinon used in 2005 was 1,087 lbs AI compared to 196 lbs AI in 2010 and 181 lbs AI through June 2011. Diazinon use generally occurs between December and March during dormant sprays. The exceedance that occurred in February 2008 was in the month of greatest diazinon use in 2008 (Figure V-3).

The Coalition also uses PUR data to assess which crops receive the most applications of diazinon. The largest amounts of diazinon applied are associated with peaches and almonds (1,981 lbs AI and 930 lbs AI respectively, Table V-11). Diazinon was applied to peach, almond, cherry and fig orchards prior to the February 2008 exceedance.

**Table V-10. Cottonwood Creek @ Rd 20 site subwatershed diazinon applications, lbs AI applied, and acres treated by month (2005-2011).**

PUR data available through June 2011 for Madera County. If month is not included in table, no applications were made.

| MONTH/YEAR               | NUMBER OF DIAZINON APPLICATIONS | POUNDS OF AI APPLIED | ACRES TREATED |
|--------------------------|---------------------------------|----------------------|---------------|
| January, 2005            | 11                              | 471.8                | 236.0         |
| February, 2005           | 9                               | 407.8                | 204.0         |
| May, 2005                | 6                               | 5.8                  | 4.2           |
| June, 2005               | 2                               | 162.5                | 50.0          |
| July, 2005               | 1                               | 4.0                  | 4.0           |
| August, 2005             | 1                               | 35.8                 | 35.8          |
| January, 2006            | 18                              | 756.8                | 398.8         |
| February, 2006           | 3                               | 86.1                 | 42.5          |
| May, 2006                | 7                               | 8.1                  | 32.2          |
| June, 2006               | 1                               | 31.2                 | 40.0          |
| January, 2007            | 17                              | 887.6                | 449.8         |
| February, 2007           | 1                               | 20.0                 | 10.0          |
| March, 2007              | 1                               | 42.0                 | 28.0          |
| January, 2008            | 8                               | 238.0                | 122.5         |
| February, 2008           | 10                              | 537.6                | 610.5         |
| March, 2008              | 1                               | 42.0                 | 28.0          |
| February, 2009           | 10                              | 291.7                | 147.0         |
| December, 2009           | 2                               | 134.9                | 68.0          |
| January, 2010            | 6                               | 176.6                | 96.5          |
| February, 2010           | 1                               | 19.9                 | 10.0          |
| January, 2011            | 6                               | 161.3                | 81.0          |
| February, 2011           | 1                               | 19.9                 | 10.0          |
| <b>Summaries by Year</b> |                                 |                      |               |
| 2005 Total               | 30                              | 1087.7               | 534.0         |
| 2006 Total               | 29                              | 882.2                | 513.5         |
| 2007 Total               | 19                              | 949.6                | 487.8         |
| 2008 Total               | 19                              | 817.5                | 761.0         |
| 2009 Total               | 12                              | 426.6                | 215.0         |
| 2010 Total               | 7                               | 196.5                | 106.5         |
| 2011 Total               | 7                               | 181.2                | 91.0          |
| <b>Total</b>             | <b>123</b>                      | <b>4541.4</b>        | <b>2708.8</b> |

**Figure V-3. Cottonwood Creek @ Rd 20 site subwatershed lbs diazinon applied by month (2005-2011).**

Asterisk (\*) denotes months with exceedances. PUR data available through June 2011 for Madera County.

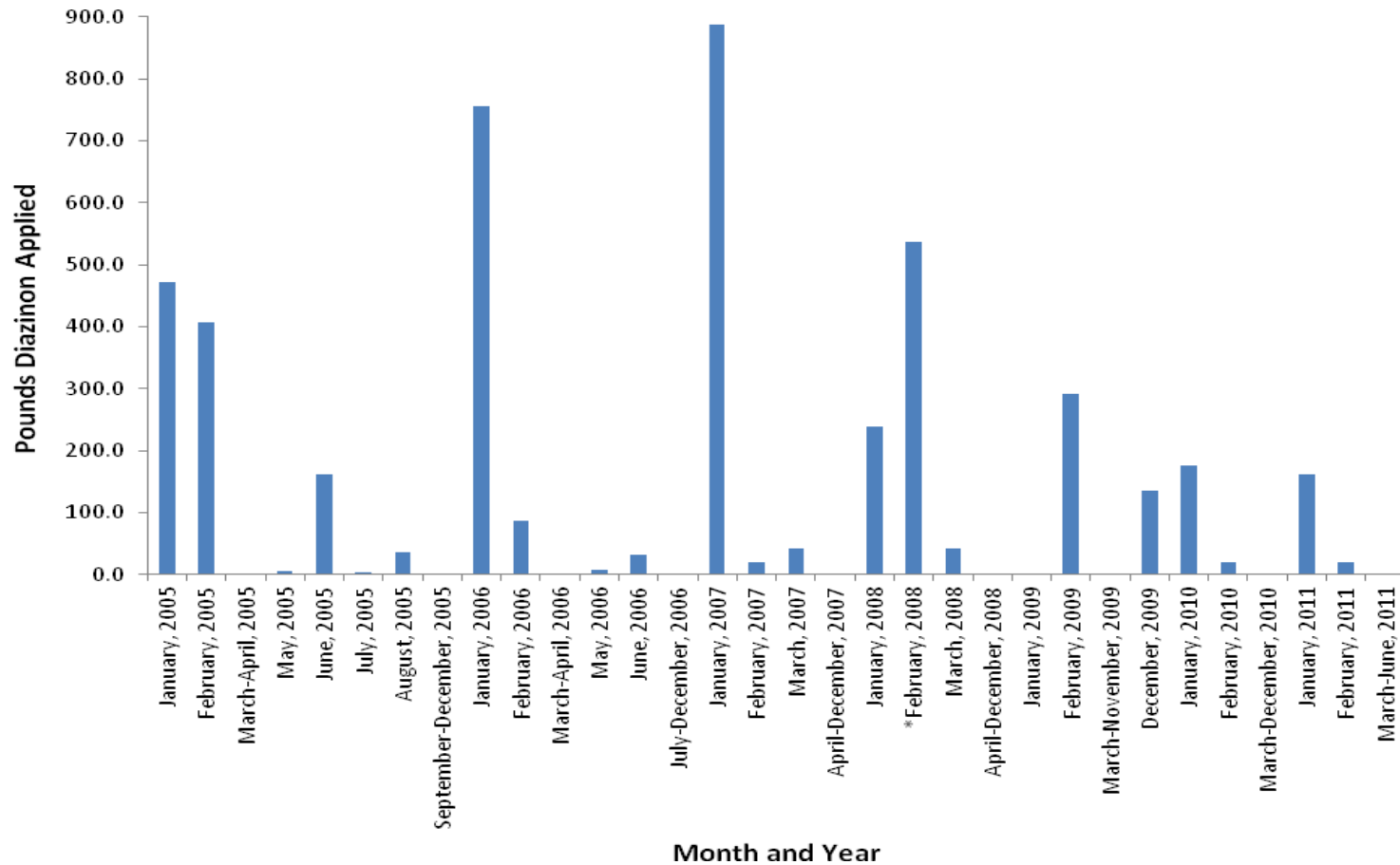


**Table V-11. Cottonwood Creek @ Rd 20 site subwatershed diazinon PUR data (2005-2011).**

PUR data available through June 2011 for Madera County.

| CHEMICAL NAME                               | COMMODITY                               | PRODUCT NAME                          | LBS AI APPLIED |
|---------------------------------------------|-----------------------------------------|---------------------------------------|----------------|
| DIAZINON                                    | ALMOND                                  | CLEAN CROP DIAZINON AG500 INSECTICIDE | 417.9          |
|                                             |                                         | DIAZINON 50W                          | 100.0          |
|                                             |                                         | DIAZINON AG 500                       | 234.2          |
|                                             |                                         | DIAZINON AG500 INSECTICIDE            | 71.7           |
|                                             |                                         | GOWAN DIAZINON 4E                     | 106.0          |
|                                             | APPLE                                   | DIAZINON 50W                          | 0.4            |
|                                             | APRICOT                                 | DIAZINON 50W                          | 4.7            |
|                                             | CHERRY                                  | CLEAN CROP DIAZINON AG500 INSECTICIDE | 39.4           |
|                                             |                                         | DIAZINON AG 500                       | 19.8           |
|                                             |                                         | DIAZINON AG500 INSECTICIDE            | 39.8           |
|                                             |                                         | DIAZOL 50 W                           | 20.0           |
|                                             |                                         | GOWAN DIAZINON 4E                     | 20.0           |
|                                             | FIG                                     | DIAZOL AG 500                         | 220.8          |
|                                             | GRAPES                                  | GOWAN DIAZINON 50 WSB                 | 39.8           |
|                                             | NECTARINE                               | DIAZINON 50W                          | 4.3            |
|                                             |                                         | DIAZINON AG 500                       | 158.8          |
|                                             |                                         | GOWAN DIAZINON 4E                     | 292.3          |
|                                             | PEACH                                   | CLEAN CROP DIAZINON AG500 INSECTICIDE | 677.2          |
|                                             |                                         | DIAZINON 50W                          | 4.3            |
|                                             |                                         | DIAZINON AG 500                       | 412.8          |
|                                             |                                         | DIAZINON AG500 INSECTICIDE            | 15.9           |
|                                             |                                         | DIAZOL 50 W                           | 81.0           |
|                                             |                                         | GOWAN DIAZINON 4E                     | 790.0          |
|                                             | PLUM                                    | CLEAN CROP DIAZINON AG500 INSECTICIDE | 146.9          |
|                                             |                                         | DIAZINON 50W                          | 4.8            |
|                                             |                                         | DIAZINON AG 500                       | 192.5          |
|                                             |                                         | DIAZINON AG500 INSECTICIDE            | 73.7           |
|                                             |                                         | GOWAN DIAZINON 4E                     | 60.0           |
|                                             | PRUNE                                   | DIAZINON 50W                          | 93.8           |
|                                             |                                         | DIAZINON AG500 INSECTICIDE            | 42.8           |
|                                             |                                         | DIAZOL 50 W                           | 42.0           |
|                                             | STONE FRUIT                             | DIAZINON 50W                          | 1.7            |
|                                             | WALNUT (ENGLISH WALNUT, PERSIAN WALNUT) | GOWAN DIAZINON 4E                     | 112.5          |
| ALMOND - Total Pounds Diazinon Applied      |                                         |                                       | 929.7          |
| APPLE - Total Pounds Diazinon Applied       |                                         |                                       | 0.4            |
| APRICOT - Total Pounds Diazinon Applied     |                                         |                                       | 4.7            |
| CHERRY - Total Pounds Diazinon Applied      |                                         |                                       | 139.1          |
| FIG - Total Pounds Diazinon Applied         |                                         |                                       | 220.8          |
| GRAPES - Total Pounds Diazinon Applied      |                                         |                                       | 39.8           |
| NECTARINE - Total Pounds Diazinon Applied   |                                         |                                       | 455.3          |
| PEACH - Total Pounds Diazinon Applied       |                                         |                                       | 1981.1         |
| PLUM - Total Pounds Diazinon Applied        |                                         |                                       | 477.8          |
| PRUNE - Total Pounds Diazinon Applied       |                                         |                                       | 178.6          |
| STONE FRUIT - Total Pounds Diazinon Applied |                                         |                                       | 1.7            |
| WALNUT - Total Pounds Diazinon Applied      |                                         |                                       | 112.5          |
| Total Pounds Diazinon Applied (2005 - 2011) |                                         |                                       | 4541.4         |

Applications of diazinon in January 2008 were associated with the February 2008 exceedance; however months with higher application rates did not result in exceedances. The 2008 exceedance was most likely due to spray drift from parcels located next to the creek. Therefore, the Coalition focused its outreach to target growers with the potential to drift to the creek. Orchard operators were advised to manage spray drift as well as storm water runoff to prevent the winter exceedances. Individual contacts which occurred within this subwatershed are described under the chlorpyrifos outreach section above and included discussions of diazinon exceedances as well as spray drift and storm runoff management practices. Monitoring for diazinon found no exceedances for two or more consecutive years of monitoring during months of past exceedances. A letter was submitted to the Regional Board on January 6, 2012, petitioning to remove it from the active Cottonwood Creek management plan.

### *Priority C Constituents*

Copper and diuron are listed as priority C constituents in the Cottonwood Creek @ Rd 20 subwatershed management plan.

#### **Copper**

Copper in water samples exceeded the hardness based WQTL numerous times in this subwatershed from 2005 through 2011 based on total and dissolved copper analyses (Table V-5). The Coalition began monitoring for both the total and dissolved copper fractions in October 2008 to better characterize copper contamination in the subwatershed.

Additional and upstream MPM confirmed that copper is a water quality concern throughout the subwatershed. The Coalition began MPM monitoring for copper (both total and dissolved) in 2010 (April-September) and continued in 2011 (January, February, and April-September) including monthly Assessment Monitoring.

PUR data are reviewed for the number of monthly copper applications, pounds of AI applied, and acres treated (Table V-12, Figure V-4). In the years since 2006, the amount of copper applied within the subwatershed varied slightly (ranging from 21,824 lbs AI applied to 14,564 lbs AI applied). Copper use was inconsistent from month to month between 2005 and 2011. The greatest amount of applied copper in 2011 was in January, but PUR data are only available through June 2011. Not all exceedances occurred during the month of the greatest use, or within three months of the greatest use (Figure V-4).

The Coalition also uses PUR data to determine which crops receive the most applications of copper. The crops associated with the largest amount of copper applied from 2005 through 2011 were grapes (71,669 lbs AI), almonds (29,256 lbs AI) and oranges (18,014 lbs AI) (Table V-13). The most common product containing copper used within this subwatershed is Kocide (Table V-13).

**Table V-12. Cottonwood Creek @ Rd 20 site subwatershed copper applications, lbs AI applied, and acres treated by month (2005-2011).**

PUR data available through June 2011 for Madera County. If month is not included in table, no applications were made.

| MONTH/YEAR      | NUMBER OF COPPER APPLICATIONS | POUNDS OF AI APPLIED | ACRES TREATED |
|-----------------|-------------------------------|----------------------|---------------|
| January, 2005   | 25                            | 3955.7               | 806.3         |
| February, 2005  | 18                            | 2146.3               | 395.0         |
| March, 2005     | 75                            | 5211.5               | 4200.7        |
| April, 2005     | 112                           | 6402.9               | 5439.5        |
| May, 2005       | 12                            | 229.3                | 231.0         |
| June, 2005      | 9                             | 678.8                | 536.0         |
| August, 2005    | 9                             | 1473.7               | 487.0         |
| September, 2005 | 3                             | 705.0                | 235.0         |
| October, 2005   | 7                             | 1219.3               | 238.0         |
| November, 2005  | 25                            | 2553.9               | 602.4         |
| January, 2006   | 46                            | 8362.3               | 2085.8        |
| February, 2006  | 24                            | 1999.9               | 452.2         |
| March, 2006     | 11                            | 839.2                | 720.6         |
| April, 2006     | 226                           | 12599.0              | 12864.3       |
| May, 2006       | 45                            | 2657.9               | 2294.1        |
| June, 2006      | 9                             | 640.3                | 450.0         |
| July, 2006      | 3                             | 281.6                | 107.0         |
| August, 2006    | 3                             | 393.8                | 190.0         |
| September, 2006 | 1                             | 108.0                | 36.0          |
| October, 2006   | 10                            | 1294.7               | 409.8         |
| November, 2006  | 15                            | 1670.1               | 650.3         |
| December, 2006  | 5                             | 677.2                | 183.5         |
| January, 2007   | 28                            | 2787.0               | 944.8         |
| February, 2007  | 8                             | 612.7                | 303.0         |
| March, 2007     | 88                            | 4409.2               | 4487.6        |
| April, 2007     | 59                            | 2592.4               | 2850.0        |
| May, 2007       | 9                             | 159.8                | 178.8         |
| July, 2007      | 9                             | 1017.0               | 684.2         |
| August, 2007    | 2                             | 82.5                 | 30.0          |
| September, 2007 | 2                             | 348.0                | 116.0         |
| October, 2007   | 4                             | 1044.0               | 393.8         |
| November, 2007  | 8                             | 1183.4               | 421.5         |
| December, 2007  | 3                             | 328.1                | 76.0          |
| January, 2008   | 46                            | 7163.7               | 2949.8        |
| February, 2008  | 12                            | 1499.5               | 490.5         |
| March, 2008     | 46                            | 1203.7               | 2112.0        |
| April, 2008     | 110                           | 4721.3               | 5543.2        |
| May, 2008       | 3                             | 549.2                | 471.2         |
| June, 2008      | 7                             | 134.6                | 68.0          |
| July, 2008      | 2                             | 289.9                | 112.0         |
| October, 2008   | 11                            | 897.6                | 350.0         |
| November, 2008  | 4                             | 1510.3               | 470.0         |
| December, 2008  | 5                             | 198.4                | 192.0         |
| January, 2009   | 19                            | 2533.8               | 938.9         |
| February, 2009  | 20                            | 1150.7               | 374.1         |
| March, 2009     | 31                            | 971.4                | 1473.9        |
| April, 2009     | 99                            | 3184.1               | 5019.8        |

| MONTH/YEAR               | NUMBER OF COPPER APPLICATIONS | POUNDS OF AI APPLIED | ACRES TREATED  |
|--------------------------|-------------------------------|----------------------|----------------|
| May, 2009                | 7                             | 184.8                | 186.0          |
| June, 2009               | 1                             | 11.1                 | 16.0           |
| August, 2009             | 3                             | 201.0                | 76.0           |
| September, 2009          | 3                             | 4944.5               | 217.0          |
| October, 2009            | 17                            | 1594.5               | 905.0          |
| November, 2009           | 16                            | 2189.5               | 752.7          |
| December, 2009           | 8                             | 214.4                | 220.0          |
| January, 2010            | 62                            | 9972.5               | 3036.8         |
| February, 2010           | 4                             | 355.6                | 71.0           |
| March, 2010              | 89                            | 3736.5               | 5031.9         |
| April, 2010              | 121                           | 4355.9               | 5902.9         |
| May, 2010                | 13                            | 387.3                | 412.2          |
| June, 2010               | 1                             | 33.7                 | 40.0           |
| July, 2010               | 1                             | 67.5                 | 80.0           |
| August, 2010             | 3                             | 157.5                | 120.0          |
| September, 2010          | 3                             | 101.5                | 80.0           |
| October, 2010            | 2                             | 108.0                | 72.0           |
| November, 2010           | 1                             | 282.0                | 100.0          |
| December, 2010           | 5                             | 2266.8               | 593.0          |
| January, 2011            | 47                            | 5684.9               | 2024.0         |
| February, 2011           | 20                            | 1911.8               | 858.9          |
| March, 2011              | 36                            | 1375.0               | 1307.4         |
| April, 2011              | 80                            | 3052.9               | 3995.3         |
| May, 2011                | 5                             | 106.7                | 110.0          |
| June, 2011               | 8                             | 864.8                | 412.6          |
| <b>Summaries by Year</b> |                               |                      |                |
| 2005 Total               | 295                           | 24576.4              | 13170.8        |
| 2006 Total               | 398                           | 31524.0              | 20443.6        |
| 2007 Total               | 220                           | 14564.1              | 10485.7        |
| 2008 Total               | 246                           | 18168.3              | 12758.6        |
| 2009 Total               | 224                           | 17179.6              | 10179.3        |
| 2010 Total               | 305                           | 21824.9              | 15539.8        |
| 2011 Total               | 196                           | 12996.2              | 8708.2         |
| <b>Total</b>             | <b>1884</b>                   | <b>140833.4</b>      | <b>91285.9</b> |

**Figure V-4. Cottonwood Creek @ Rd 20 site subwatershed lbs copper applied by month (2005-2011).**

Asterisk (\*) denotes months with exceedances. PUR data available through June 2011 for Madera County.

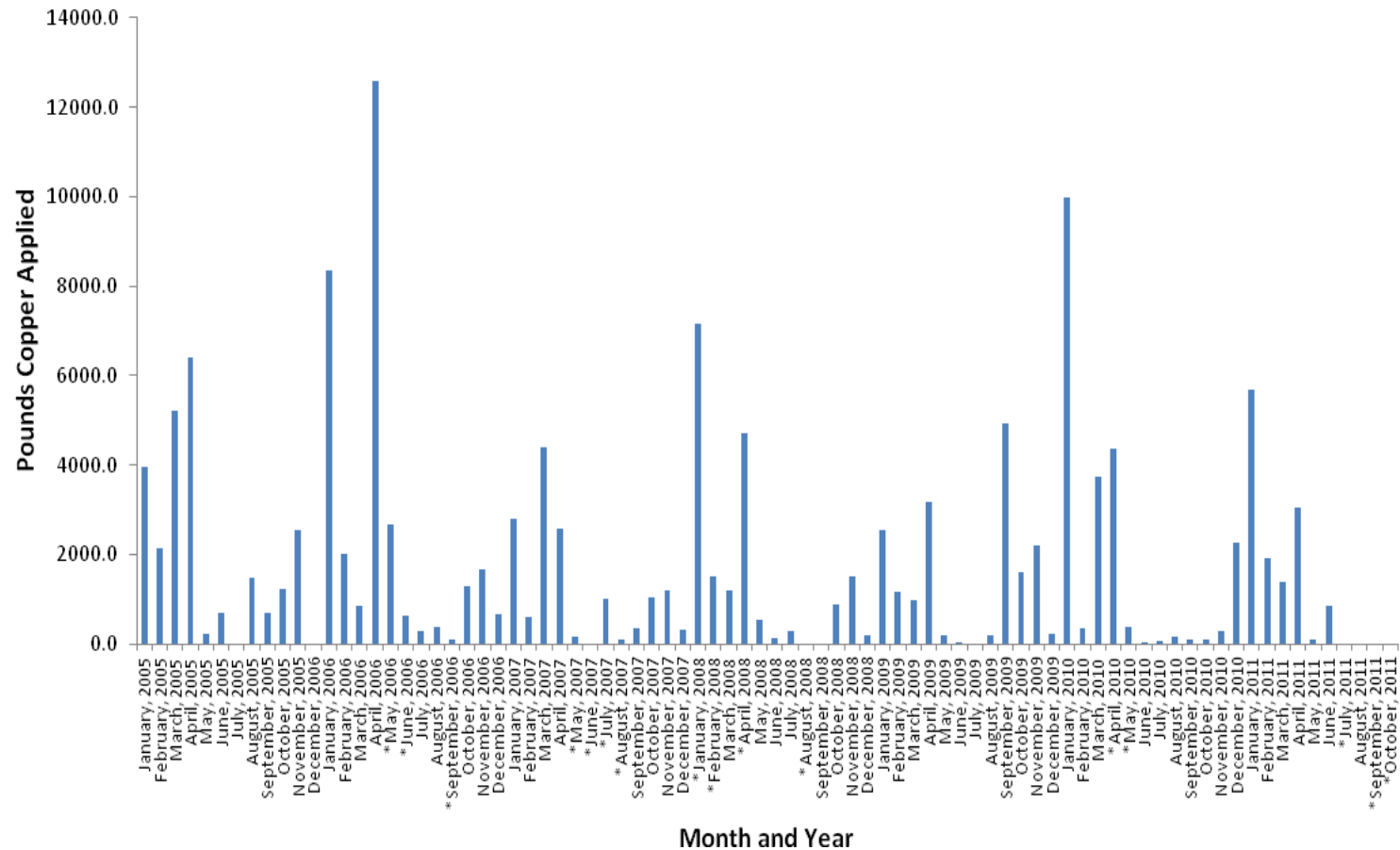




**Table V-13. Cottonwood Creek @ Rd 20 site subwatershed copper PUR data (2005-2011).**

PUR data available through June 2011 for Madera County.

| CHEMICAL NAME | COMMODITY                               | PRODUCT NAME                             | LBS AI APPLIED |
|---------------|-----------------------------------------|------------------------------------------|----------------|
| COPPER        | ALFALFA (FORAGE - FODDER) (ALFALFA HAY) | DUPONT KOCIDE 2000 FUNGICIDE/BACTERICIDE | 2.4            |
|               | ALMOND                                  | BADGE X2                                 | 45.1           |
|               |                                         | CHAMP DRY PRILL                          | 5642.3         |
|               |                                         | CHAMP FORMULA 2 FLOWABLE                 | 8552.0         |
|               |                                         | CHAMP WG                                 | 970.2          |
|               |                                         | CUPROFIX DISPERS                         | 243.5          |
|               |                                         | CUPROFIX ULTRA 40 DISPERS                | 1253.8         |
|               |                                         | DUPONT GX-569 FUNGICIDE/BACTERICIDE      | 23.1           |
|               |                                         | DUPONT KOCIDE 101 FUNGICIDE/BACTERICIDE  | 15.4           |
|               |                                         | DUPONT KOCIDE 2000 FUNGICIDE/BACTERICIDE | 3127.8         |
|               |                                         | DUPONT KOCIDE 3000 FUNGICIDE/BACTERICIDE | 3168.7         |
|               |                                         | KOCIDE 101                               | 1188.9         |
|               |                                         | KOCIDE 2000                              | 1087.5         |
|               |                                         | KOCIDE DF                                | 2173.6         |
|               |                                         | NORDOX 75 WG                             | 1573.1         |
|               |                                         | TRIANGLE BRAND COPPER SULFATE CRYSTAL    | 190.9          |
|               | APPLE                                   | KOCIDE 2000                              | 0.9            |
|               |                                         | NU-COP 50DF                              | 8.9            |
|               | APRICOT                                 | KOCIDE 2000                              | 3.6            |
|               |                                         | NU-COP 50DF                              | 27.7           |
|               | CHERRY                                  | CUPROFIX ULTRA 40 DISPERS                | 53.7           |
|               |                                         | DUPONT KOCIDE 2000 FUNGICIDE/BACTERICIDE | 113.0          |
|               |                                         | DUPONT KOCIDE 3000 FUNGICIDE/BACTERICIDE | 51.6           |
|               |                                         | KENTAN DF                                | 49.0           |
|               |                                         | KOCIDE DF                                | 122.8          |
|               | FIG                                     | TRIANGLE BRAND BASIC COPPER SULFATE      | 73.7           |
|               | GRAPES                                  | BADGE X2                                 | 347.3          |
|               |                                         | BASIC COPPER 53                          | 138.2          |
|               |                                         | BRITZ COPPER SULFUR 15-25 DUST           | 9332.8         |
|               |                                         | CHAMP DRY PRILL                          | 46.1           |
|               |                                         | CHAMP FORMULA 2 FLOWABLE                 | 14462.3        |
|               |                                         | CHAMP WG                                 | 183.0          |
|               |                                         | CHAMPION FLOWABLE                        | 8.4            |
|               |                                         | CHAMPION WETTABLE POWDER                 | 2231.9         |
|               |                                         | CHIPCO COPPER SULFATE CRYSTALS           | 5.0            |
|               |                                         | CLEAN CROP C-O-C-S 15 SULFUR 25 DUST     | 3435.0         |
|               |                                         | COPPER SULFATE CRYSTALS                  | 134.6          |
|               |                                         | CSC COPPER SULFUR DUST                   | 1737.7         |
|               |                                         | CUPROFIX DISPERS                         | 8.9            |
|               |                                         | CUPROFIX ULTRA 40 DISPERS                | 3371.5         |
|               |                                         | DUPONT KOCIDE 2000 FUNGICIDE/BACTERICIDE | 4190.1         |
|               |                                         | DUPONT KOCIDE 3000 FUNGICIDE/BACTERICIDE | 8502.9         |
|               |                                         | DUPONT KOCIDE DF FUNGICIDE/BACTERICIDE   | 184.7          |
|               |                                         | HYDROX                                   | 92.4           |
|               |                                         | IAP COPPER SULFUR 15-25 DUST             | 37.5           |
|               |                                         | KENTAN DF                                | 445.0          |
|               |                                         | KOCIDE 101                               | 1855.5         |
|               |                                         | KOCIDE 2000                              | 9195.6         |

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| CHEMICAL NAME | COMMODITY                                      | PRODUCT NAME                                 | LBS AI APPLIED |
|---------------|------------------------------------------------|----------------------------------------------|----------------|
| COPPER        | GRAPES                                         | KOCIDE 4.5 LF                                | 1467.9         |
|               |                                                | KOCIDE DF                                    | 3309.9         |
|               |                                                | NORDOX                                       | 742.1          |
|               |                                                | NORDOX 75 WG                                 | 3481.8         |
|               |                                                | NU-COP 50 WP                                 | 860.1          |
|               |                                                | NU-COP 50DF                                  | 791.8          |
|               |                                                | NU-COP HB                                    | 547.5          |
|               |                                                | OXYCOP                                       | 400.0          |
|               |                                                | STRETCH FUNGICIDE                            | 1.9            |
|               |                                                | ZINC COPOSIL SULFUR 15-30 DUST               | 120.0          |
|               | NECTARINE                                      | DUPONT KOCIDE 2000 FUNGICIDE/BACTERICIDE     | 534.4          |
|               |                                                | KENTAN DF                                    | 175.9          |
|               |                                                | KOCIDE 2000                                  | 574.1          |
|               |                                                | KOCIDE DF                                    | 982.4          |
|               |                                                | NU-COP 50DF                                  | 107.8          |
|               | N-OUTDR GRWN TRNSPLNT/PRPGTV MTRL              | CHAMP FORMULA 2 FLOWABLE                     | 371.9          |
|               | OLIVE                                          | CUPROFIX ULTRA 40 DISPERSS                   | 501.3          |
|               |                                                | DUPONT KOCIDE 2000 FUNGICIDE/BACTERICIDE     | 387.4          |
|               | ONION (DRY, SPANISH, WHITE, YELLOW, RED, ETC.) | NORDOX 75 WG                                 | 9.1            |
|               | ORANGE                                         | BASIC COPPER 53                              | 3965.9         |
|               |                                                | BASIC COPPER SULFATE                         | 3118.4         |
|               |                                                | BLUE SHIELD DF                               | 30.8           |
|               |                                                | COP-O-ZINC                                   | 301.3          |
|               |                                                | CUPROFIX ULTRA 40 DISPERSS                   | 455.0          |
|               |                                                | DUPONT KOCIDE 3000 FUNGICIDE/BACTERICIDE     | 27.7           |
|               |                                                | KOCIDE 20/20                                 | 1345.9         |
|               |                                                | KOCIDE DF                                    | 1726.8         |
|               |                                                | NORDOX                                       | 5552.3         |
|               |                                                | NU-COP 50DF                                  | 1489.6         |
|               | PEACH                                          | CHAMP FORMULA 2 FLOWABLE                     | 77.2           |
|               |                                                | CUPROFIX ULTRA 40 DISPERSS                   | 76.8           |
|               |                                                | DUPONT KOCIDE 2000 FUNGICIDE/BACTERICIDE     | 2388.7         |
|               |                                                | DUPONT KOCIDE 3000 FUNGICIDE/BACTERICIDE     | 16.1           |
|               |                                                | KENTAN DF                                    | 622.8          |
|               |                                                | KOCIDE 2000                                  | 971.5          |
|               |                                                | KOCIDE DF                                    | 2781.4         |
|               |                                                | NORDOX 75 WG                                 | 201.4          |
|               |                                                | NU-COP 50DF                                  | 266.4          |
|               |                                                | STRETCH FUNGICIDE                            | 0.7            |
|               | PISTACHIO (PISTACHE NUT)                       | TRIANGLE BRAND COPPER SULFATE CRYSTAL        | 99.0           |
|               |                                                | TRIANGLE BRAND COPPER SULFATE INSTANT POWDER | 27.5           |
|               | PLUM                                           | DUPONT KOCIDE 2000 FUNGICIDE/BACTERICIDE     | 551.6          |
|               |                                                | KENTAN DF                                    | 328.6          |
|               |                                                | KOCIDE 2000                                  | 3.2            |
|               |                                                | KOCIDE DF                                    | 368.4          |
|               |                                                | NU-COP 50DF                                  | 129.4          |
|               | PRUNE                                          | CHAMP WG                                     | 699.8          |
|               | STONE FRUIT                                    | DUPONT GX-569 FUNGICIDE/BACTERICIDE          | 7.9            |
|               |                                                | DUPONT KOCIDE 20/20 FUNGICIDE/BACTERICIDE    | 18.9           |
|               |                                                | DUPONT KOCIDE 3000 FUNGICIDE/BACTERICIDE     | 13.2           |

| CHEMICAL NAME                                       | COMMODITY                               | PRODUCT NAME                             | LBS AI APPLIED |
|-----------------------------------------------------|-----------------------------------------|------------------------------------------|----------------|
| COPPER                                              | TANGELO                                 | BASIC COPPER 53                          | 250.9          |
|                                                     |                                         | COP-O-ZINC                               | 175.0          |
|                                                     |                                         | DUPONT KOCIDE 3000 FUNGICIDE/BACTERICIDE | 23.1           |
|                                                     |                                         | KOCIDE 20/20                             | 359.2          |
|                                                     |                                         | KOCIDE DF                                | 226.0          |
|                                                     |                                         | NORDOX                                   | 1983.4         |
|                                                     |                                         | NU-COP 50DF                              | 215.6          |
|                                                     | TANGERINE                               | BASIC COPPER 53                          | 2030.6         |
|                                                     |                                         | CHAMPION WETTABLE POWDER                 | 431.2          |
|                                                     |                                         | DUPONT KOCIDE 3000 FUNGICIDE/BACTERICIDE | 597.0          |
|                                                     |                                         | NORDOX                                   | 868.6          |
|                                                     | TOMATOES, FOR PROCESSING/CANNING        | KOCIDE 2000                              | 95.8           |
|                                                     | UNKNOWN                                 | BASIC COPPER 53                          | 75.3           |
|                                                     |                                         | CUPROFIX ULTRA 40 DISPERSS               | 31.7           |
|                                                     | VEGETABLES (ALL OR UNSPEC)              | NEUDORFF CUEVA FUNGICIDE CONCENTRATE     | 2.1            |
|                                                     | WALNUT (ENGLISH WALNUT, PERSIAN WALNUT) | CHAMP DRY PRILL                          | 324.9          |
|                                                     |                                         | NORDOX 75 WG                             | 402.7          |
|                                                     |                                         |                                          |                |
| ALFALFA - Total Pounds Copper Applied               |                                         |                                          | 2.4            |
| ALMOND - Total Pounds Copper Applied                |                                         |                                          | 29255.8        |
| APPLE - Total Pounds Copper Applied                 |                                         |                                          | 9.7            |
| APRICOT - Total Pounds Copper Applied               |                                         |                                          | 31.3           |
| CHERRY - Total Pounds Copper Applied                |                                         |                                          | 390.1          |
| FIG - Total Pounds Copper Applied                   |                                         |                                          | 73.7           |
| GRAPES - Total Pounds Copper Applied                |                                         |                                          | 71669.5        |
| NECTARINE - Total Pounds Copper Applied             |                                         |                                          | 2374.6         |
| N-OUTDR GRWN TRNSPLNT - Total Pounds Copper Applied |                                         |                                          | 371.9          |
| OLIVE - Total Pounds Copper Applied                 |                                         |                                          | 888.6          |
| ONION - Total Pounds Copper Applied                 |                                         |                                          | 9.1            |
| ORANGE - Total Pounds Copper Applied                |                                         |                                          | 18013.6        |
| PEACH - Total Pounds Copper Applied                 |                                         |                                          | 7402.9         |
| PISTACHIO - Total Pounds Copper Applied             |                                         |                                          | 126.5          |
| PLUM - Total Pounds Copper Applied                  |                                         |                                          | 1381.1         |
| PRUNE - Total Pounds Copper Applied                 |                                         |                                          | 699.8          |
| STONE FRUIT - Total Pounds Copper Applied           |                                         |                                          | 40.0           |
| TANGELO - Total Pounds Copper Applied               |                                         |                                          | 3233.0         |
| TANGERINE - Total Pounds Copper Applied             |                                         |                                          | 3927.3         |
| TOMATOES - Total Pounds Copper Applied              |                                         |                                          | 95.8           |
| VEGETABLES - Total Pounds Copper Applied            |                                         |                                          | 2.1            |
| WALNUT - Total Pounds Copper Applied                |                                         |                                          | 727.6          |
| UNKNOWN - Total Pounds Copper Applied               |                                         |                                          | 107.0          |
| Total Pounds Copper Applied (2005 - 2011)           |                                         |                                          | 140833.4       |

The Coalition will continue with its Management Plan strategy for addressing copper exceedances in the Cottonwood Creek @ Rd 20 subwatershed as outlined in the chlorpyrifos Source Identification and Outreach section above. Orchard and vineyard operators were advised to manage irrigation tailwater and management to prevent copper from entering the waterway with runoff when applicable. Storm runoff management relevant to copper applications was advised to reduce runoff prevent the winter

exceedances. Individual contacts with growers within this subwatershed are described under the chlorpyrifos outreach section above and under the copper outreach section, as are discussions of copper exceedances and relevant management practices. Copper MPM will continue during 2012 during months of past exceedances (January, February, April-October).

#### Diuron

Concentrations of diuron exceeded the WQTL twice in this subwatershed from 2005 through 2011 (January and February 2008; Table V-5). Core Monitoring took place at Cottonwood Creek during 2009. Diuron MPM began in January 2010 and continued through 2011 (January and February). Diuron was also monitored monthly during 2011 Assessment Monitoring.

All PUR data are reviewed for the number of monthly diuron applications, pounds of AI applied, and acres treated (Table V-14, Figure V-5). There has been a general decrease in diuron use since 2005. The amount of diuron used in 2005 was 3,372 lbs compared to 1,235 lbs in 2011 (PUR data available for Cottonwood Creek through June 2011). Neither of the exceedances occurred during months of the greatest amount of use, although February was the month with the second highest amount of use in 2008 (Figure V-5). The highest application rates and largest amount of diuron applied from 2005 through 2011 were associated with grapes and oranges (Table V-15). The most common product containing diuron used within this subwatershed was Karmex (Table V-15).

**Table V-14. Cottonwood Creek @ Rd 20 site subwatershed diuron applications, lbs AI applied, and acres treated by month (2005-2011).**

PUR data available through June 2011 for Madera County. If month is not included in table, no applications were made.

| MONTH/YEAR      | NUMBER OF DIURON APPLICATIONS | POUNDS OF AI APPLIED | ACRES TREATED |
|-----------------|-------------------------------|----------------------|---------------|
| January, 2005   | 4                             | 103.7                | 83.3          |
| February, 2005  | 18                            | 539.4                | 466.0         |
| March, 2005     | 29                            | 620.1                | 663.2         |
| April, 2005     | 12                            | 270.8                | 360.6         |
| May, 2005       | 1                             | 9.6                  | 6.0           |
| October, 2005   | 5                             | 10.5                 | 184.0         |
| November, 2005  | 3                             | 974.4                | 434.0         |
| December, 2005  | 30                            | 843.9                | 681.5         |
| January, 2006   | 9                             | 464.7                | 392.7         |
| February, 2006  | 35                            | 1321.3               | 1851.3        |
| March, 2006     | 20                            | 793.0                | 582.3         |
| April, 2006     | 3                             | 100.8                | 83.0          |
| October, 2006   | 4                             | 3.4                  | 106.0         |
| November, 2006  | 13                            | 449.6                | 854.2         |
| December, 2006  | 7                             | 314.0                | 338.0         |
| January, 2007   | 6                             | 87.1                 | 324.0         |
| February, 2007  | 10                            | 391.9                | 389.7         |
| March, 2007     | 15                            | 792.2                | 689.0         |
| April, 2007     | 3                             | 164.8                | 226.0         |
| September, 2007 | 1                             | 14.8                 | 403.0         |
| October, 2007   | 2                             | 0.7                  | 32.0          |
| November, 2007  | 2                             | 248.9                | 171.5         |

| MONTH/YEAR               | NUMBER OF DIURON APPLICATIONS | POUNDS OF AI APPLIED | ACRES TREATED  |
|--------------------------|-------------------------------|----------------------|----------------|
| December, 2007           | 6                             | 343.2                | 153.8          |
| January, 2008            | 1                             | 8.0                  | 20.0           |
| February, 2008           | 18                            | 690.7                | 627.3          |
| March, 2008              | 17                            | 826.3                | 797.9          |
| April, 2008              | 2                             | 296.0                | 240.0          |
| December, 2008           | 5                             | 223.2                | 258.0          |
| January, 2009            | 14                            | 336.0                | 401.9          |
| February, 2009           | 20                            | 425.1                | 522.1          |
| March, 2009              | 12                            | 294.0                | 429.0          |
| April, 2009              | 1                             | 246.4                | 154.0          |
| November, 2009           | 12                            | 554.5                | 449.7          |
| December, 2009           | 3                             | 30.8                 | 44.0           |
| January, 2010            | 7                             | 177.3                | 197.0          |
| February, 2010           | 11                            | 578.1                | 381.3          |
| March, 2010              | 8                             | 197.1                | 183.0          |
| April, 2010              | 2                             | 56.0                 | 22.5           |
| November, 2010           | 3                             | 54.0                 | 90.0           |
| December, 2010           | 1                             | 113.2                | 141.9          |
| February, 2011           | 19                            | 793.7                | 546.8          |
| March, 2011              | 27                            | 400.5                | 363.1          |
| April, 2011              | 5                             | 41.0                 | 30.7           |
| <b>Summaries by Year</b> |                               |                      |                |
| 2005 Total               | 102                           | 3372.5               | 2878.6         |
| 2006 Total               | 91                            | 3446.7               | 4207.5         |
| 2007 Total               | 45                            | 2043.7               | 2389.0         |
| 2008 Total               | 43                            | 2044.2               | 1943.2         |
| 2009 Total               | 62                            | 1886.8               | 2000.7         |
| 2010 Total               | 32                            | 1175.7               | 1015.7         |
| 2011 Total               | 51                            | 1235.2               | 940.6          |
| <b>Total</b>             | <b>426</b>                    | <b>15204.8</b>       | <b>15375.3</b> |

**Figure V-5. Cottonwood Creek @ Rd 20 site subwatershed lbs diuron applied by month (2005-2011).**

Asterisk (\*) denotes months with exceedances. PUR data available through June 2011 for Madera County.

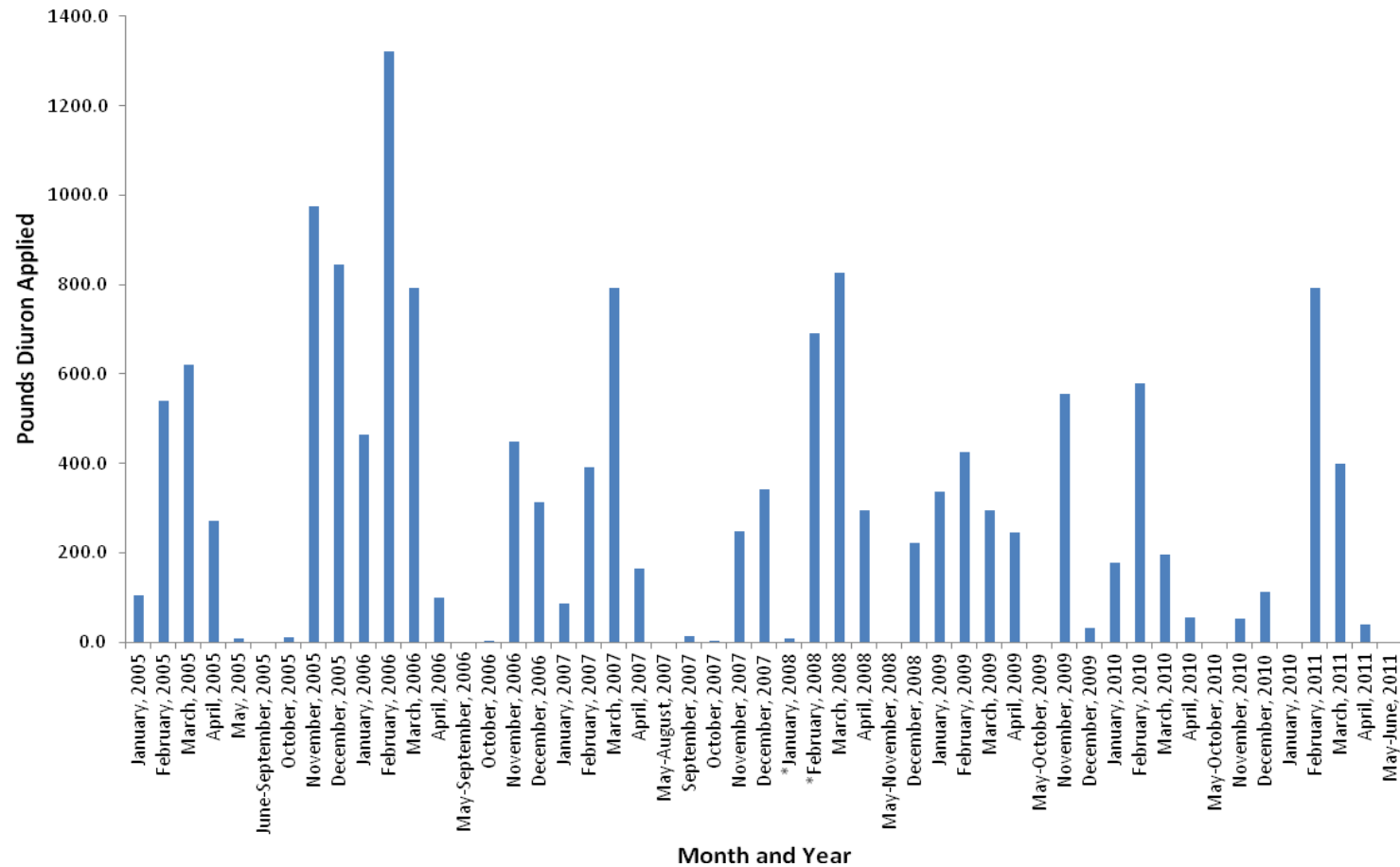


**Table V-15. Cottonwood Creek @ Rd 20 site subwatershed diuron PUR data (2005-2011).**

PUR data available through June 2011 for Madera County.

| CHEMICAL NAME                             | COMMODITY                               | PRODUCT NAME                  | LBS AI APPLIED |
|-------------------------------------------|-----------------------------------------|-------------------------------|----------------|
| DIURON                                    | ALFALFA (FORAGE - FODDER) (ALFALFA HAY) | DIURON 80 DF HERBICIDE        | 248.0          |
|                                           |                                         | DREXEL DIURON 80 HERBICIDE    | 940.0          |
|                                           |                                         | DUPONT DIREX 4L HERBICIDE     | 164.0          |
|                                           | COTTON (GENERAL)                        | ADIOS COTTON DEFOLIANT        | 14.8           |
|                                           |                                         | GINSTAR EC COTTON DEFOLIANT   | 14.7           |
|                                           | GRAPES                                  | DIREX 4L                      | 191.4          |
|                                           |                                         | DIREX 80DF                    | 533.5          |
|                                           |                                         | DIURON 4L                     | 65.6           |
|                                           |                                         | DIURON 4L HERBICIDE           | 6.6            |
|                                           |                                         | DIURON 80 DF HERBICIDE        | 74.4           |
|                                           |                                         | DIURON 80 WP WEED KILLER      | 9.6            |
|                                           |                                         | DREXEL DIURON 4L HERBICIDE    | 241.2          |
|                                           |                                         | DREXEL DIURON 80 HERBICIDE    | 862.0          |
|                                           |                                         | DU PONT KARMEX                | 29.2           |
|                                           |                                         | DU PONT KARMEX DF HERBICIDE   | 785.2          |
|                                           |                                         | DUPONT DIREX 4L HERBICIDE     | 71.0           |
|                                           |                                         | DUPONT KARMEX DF HERBICIDE    | 722.0          |
|                                           |                                         | DUPONT KARMEX XP HERBICIDE    | 334.0          |
|                                           |                                         | KARMEX DF HERBICIDE           | 506.0          |
|                                           |                                         | KARMEX XP HERBICIDE           | 2079.8         |
|                                           | OLIVE                                   | DU PONT KARMEX                | 12.8           |
|                                           |                                         | DU PONT KARMEX DF HERBICIDE   | 6.4            |
|                                           |                                         | DUPONT DIREX 4L HERBICIDE     | 8.1            |
|                                           | ORANGE                                  | DIREX 80DF                    | 2120.3         |
|                                           |                                         | DREXEL DIURON 80 HERBICIDE    | 277.6          |
|                                           |                                         | DU PONT KROVAR I DF HERBICIDE | 1438.4         |
|                                           |                                         | DUPONT KARMEX DF HERBICIDE    | 96.0           |
|                                           |                                         | DUPONT KARMEX XP HERBICIDE    | 297.6          |
|                                           |                                         | KARMEX DF HERBICIDE           | 467.2          |
|                                           | TANGELO                                 | KARMEX XP HERBICIDE           | 202.8          |
|                                           |                                         | DREXEL DIURON 80 HERBICIDE    | 51.2           |
|                                           |                                         | DU PONT KROVAR I DF HERBICIDE | 879.6          |
|                                           |                                         | DUPONT KARMEX XP HERBICIDE    | 38.4           |
|                                           | TANGERINE                               | KARMEX XP HERBICIDE           | 9.6            |
|                                           |                                         | DU PONT KROVAR I DF HERBICIDE | 450.0          |
|                                           |                                         | DUPONT KARMEX DF HERBICIDE    | 2.0            |
|                                           |                                         | DUPONT KARMEX XP HERBICIDE    | 914.7          |
|                                           | WALNUT (ENGLISH WALNUT, PERSIAN WALNUT) | DIREX 4L                      | 39.1           |
| ALFALFA - Total Pounds Diuron Applied     |                                         |                               | 1352.0         |
| COTTON - Total Pounds Diuron Applied      |                                         |                               | 29.5           |
| GRAPES - Total Pounds Diuron Applied      |                                         |                               | 6511.5         |
| OLIVE - Total Pounds Diuron Applied       |                                         |                               | 27.3           |
| ORANGE - Total Pounds Diuron Applied      |                                         |                               | 4899.9         |
| TANGELO - Total Pounds Diuron Applied     |                                         |                               | 978.8          |
| TANGERINE - Total Pounds Diuron Applied   |                                         |                               | 1366.7         |
| WALNUT - Total Pounds Diuron Applied      |                                         |                               | 39.1           |
| Total Pounds Diuron Applied (2005 - 2011) |                                         |                               | 15204.8        |

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Diuron is most likely transported to Cottonwood Creek by drift from dormant sprays or direct applications to the berms along the water way. As discussed above, diuron applications decreased since 2005 and no exceedances have occurred in the subwatershed since 2008. The Coalition provides information on a subwatershed basis to growers to review their operation and determine if storm water runoff and irrigation discharge to waterways is managed properly. Monitoring for diuron resulted in no exceedances for two or more consecutive years of monitoring during months of past exceedances. A letter was submitted to the Regional Board on January 6, 2012, petitioning to remove it from the active Cottonwood Creek management plan.

Cottonwood Creek returned to Core Monitoring in 2012, and diuron MPM occurred during January and February.

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### *Priority E Constituents*

The following priority E constituents listed under the Cottonwood Creek management plan are DO, *E. coli*, and lead.

One DO exceedance and three *E. coli* exceedances occurred during 2011 monthly Assessment Monitoring. Although these constituents remain low priority, the Coalition will continue to collect priority E constituent monitoring data as part of Core and/or Assessment Monitoring at Cottonwood Creek @ Rd 20. Dissolved oxygen is a Core Monitoring constituent monitored monthly at the site and *E. coli* and lead will be monitored again during Assessment Monitoring at this site in 2014. All priority E constituents are discussed during individual grower contacts and will continue to be discussed at annual grower meetings. In addition, the Coalition plans to participate in a focus group along with other Coalitions and Regional Board staff to develop a joint Work Plan to address *E. coli* exceedances by determining the potential agricultural sources of *E. coli* and identifying management practices to prevent discharges to surface waters.

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### *Evaluation*

Cottonwood Creek @ Rd 20 is one of the four second high priority site subwatersheds within the ESJWQC and just completed its second year of focused outreach (2010-2012). Therefore, the Coalition focused its resources on identifying sources of agricultural discharge within this subwatershed that could result in water quality impairments, extending outreach to individual Coalition members, and setting evaluation goals based on the effectiveness of management practices (by considering changes in water quality over time).

The Coalition's strategy for the Cottonwood Creek subwatershed is to target growers along or adjacent to the waterway that have the potential to discharge into the creek. Focus is on implementing management practices that retain water on the grower's property and minimizing spray drift. Outreach includes grower notification, management practice outreach and education, tracking management practice implementation, and providing information on special studies of management practice efficacy.



Individual grower surveys documenting current management practices and assessing future implementations were completed and returned representing 100% of targeted growers. The Second Priority Subwatersheds Summary of Implemented Management Practices section of this report summarizes the results of these contacts.

During 2012, Cottonwood Creek @ Rd 20 is scheduled for Core Monitoring and MPM will continue during months of past exceedances. Although chlorpyrifos and copper remain high priority constituents in the Cottonwood Creek management plan, monitoring for diazinon and diuron found no exceedances for two or more consecutive years of monitoring during months of past exceedances. A letter was submitted to the Regional Board on January 6, 2012 petitioning to remove these constituents from the active Cottonwood Creek management plan.

## VI. DUCK SLOUGH @ GURR RD

### Management Plan Constituents

#### Priority A/B

- Chlorpyrifos

#### Priority C

- Copper

#### Priority D

- *Ceriodaphnia dubia* water column toxicity
- *Selenastrum capricornutum* water column toxicity
- *Hyalella azteca* sediment toxicity

#### Priority E

- Dissolved Oxygen
- *E. coli*
- Lead
- pH
- Specific Conductivity
- Total Dissolved Solids

### Description of Duck Slough @ Gurr Rd Site Subwatershed

Duck Slough @ Gurr Rd (20,414 irrigated acres) – This site subwatershed is a monitoring location downstream from Duck Slough @ Hwy 99. Duck Slough flows west eventually becoming Deadman Creek in the western portion of the Coalition region. The slough eventually flows into the San Joaquin River via Deadman Creek and Deep Slough. The city of Merced delivers treated waste water effluent to Duck Slough a few miles upstream of the Gurr Road site. This site subwatershed also includes upstream locations (Duck Slough @ Hwy 59 and North Slough @ Hwy 59) that were sampled in 2008. Table VI-1 includes the station name (sample site), station code and target latitude/longitudes for sites sampled within this subwatershed. Located to the south and west of Merced, this site drains field crops immediately upstream and deciduous nuts further upstream as well as some irrigated pasture (Figure VI-1).

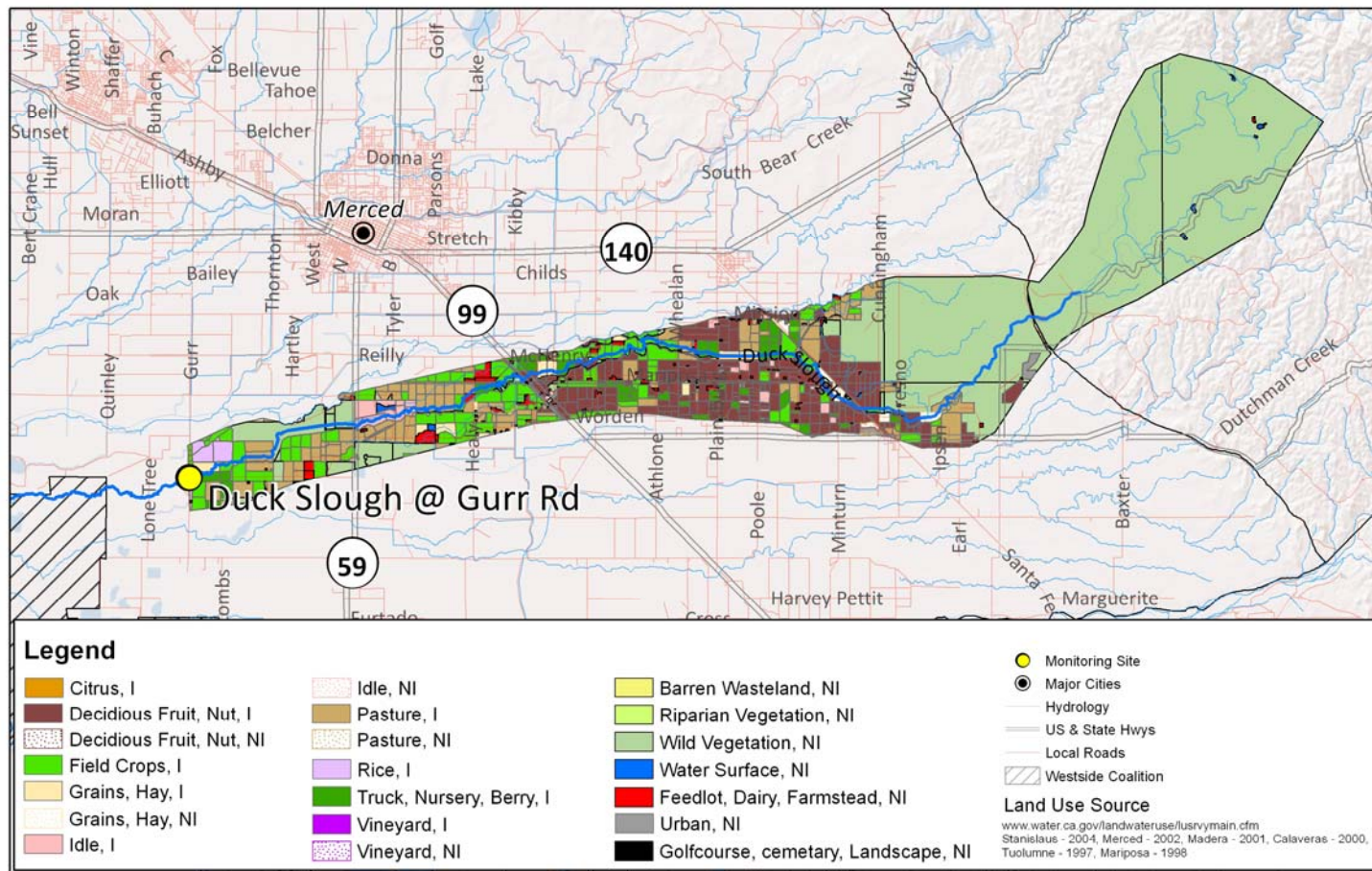
**Table VI-1. Duck Slough @ Gurr Rd site subwatershed sampling locations coordinates.**

| SITE NAME                          | STATION CODE | TARGET LATITUDE | TARGET LONGITUDE |
|------------------------------------|--------------|-----------------|------------------|
| Duck Slough @ Gurr Rd*             | 535XDSAGR    | 37.2142         | -120.5596        |
| Duck Slough @ Hwy 59 <sup>U</sup>  | 535XDSHFN    | 37.2345         | -120.4881        |
| North Slough @ Hwy 59 <sup>U</sup> | 535XNSHFN    | 37.2277         | -120.4880        |

<sup>U</sup>Upstream sites

\*Original ESJWQC sampling site

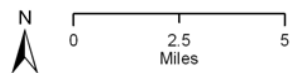
Figure VI-1. Duck Slough @ Gurr Rd site subwatershed land use map.



Source of Layers:  
Hydrology - NHD hydrodata, 1:24,000-scale, <http://nhd.usgs.gov/>  
Roads, highways, railroads, county boundary, city outlines - California Spatial Information Library  
TRS - Teale Public Land Survey System, Pub. date: 20050101, California Spatial Information Library  
Parcel Layer - Stanislaus 2010, Merced 2011, Madera 2011  
Basemap, Shaded Relief - ESRI  
GSC North America 1983

Date Prepared: 08/08/11

ESJWQC



Duck Slough @ Gurr Rd

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## Subwatershed Monitoring History

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Monitoring at Duck Slough @ Gurr Rd began during the irrigation season of 2004 and continued through fall 2011 (Table VI-2). Under the current ESJWQC 2008 MRPP, Duck Slough @ Gurr Rd is the Core Monitoring location in Zone 5. In 2006, 2007 and 2008 normal irrigation and storm monitoring occurred. Core constituents were monitored at Duck Slough @ Gurr Rd beginning in the fall of 2008 through the fall 2010. Assessment Monitoring was initiated in 2011 and is scheduled to occur every third year thereafter (e.g. 2014, 2017, etc.). The constituents sampled at this location from 2004 through 2011 are listed in Table VI-3. Core Monitoring will resume at this site in 2012.

There are two upstream monitoring locations in the Duck Slough @ Gurr Rd subwatershed: Duck Slough @ Hwy 59 and North Slough @ Hwy 59. In 2008, upstream MPM occurred at Duck Slough @ Hwy 59 for *S. capricornutum* water column toxicity (July and September). Upstream monitoring also occurred in 2008 at North Slough @ Hwy 59 for *S. capricornutum* water column toxicity (July and September); the site was dry for both monitoring events. Upstream monitoring ended after the September 2008 monitoring events.

MPM occurred within the Duck Slough @ Gurr Rd subwatershed in 2007 for chlorpyrifos, thiobencarb and copper and in 2008 for copper and *S. capricornutum* toxicity (Table VI-4). Duck Slough was monitored twice a month in June and July 2007. MPM in 2008 occurred at Duck Slough @ Hwy 59 for copper (June), for copper and *S. capricornutum* toxicity (July), for *S. capricornutum* toxicity (September), and at North Slough @ Hwy 59 for copper and *S. capricornutum* toxicity (July) and for *S. capricornutum* toxicity (September, Table VI-4). There were no MPM samples collected in 2009. Starting in January 2010, the Coalition began collecting MPM samples during January, February and March (previously MPM was limited to irrigation months). Duck Slough MPM samples were collected in 2010 for copper (January-February and June-July), chlorpyrifos (April and July 2010), toxicity to *S. capricornutum* (July and September) and sediment toxicity to *H. azteca* (September) (Table VI-4). In 2011, Duck Slough @ Gurr Rd was an Assessment Monitoring location and all MPM constituents were analyzed monthly from January through December.

Duck Slough @ Gurr Rd is currently on California's 2008-2010 303d List of Impaired Waterbodies for chlorpyrifos, *E. coli*, sediment toxicity and unknown water column toxicity.

**Table VI-2. Duck Slough @ Gurr Rd site subwatershed sampling events per season and year (including MPM).**

| YEAR | SEASON     | EVENTS SAMPLED | EVENTS NOT SAMPLED <sup>1</sup> | TOTAL |
|------|------------|----------------|---------------------------------|-------|
| 2004 | Irrigation | 3              | 0                               | 3     |
| 2005 | Storm      | 2              | 0                               | 2     |
|      | Irrigation | 5              | 0                               | 5     |
| 2006 | Storm      | 2              | 0                               | 2     |
|      | Irrigation | 5              | 0                               | 5     |
| 2007 | Storm      | 2              | 0                               | 2     |
|      | Irrigation | 8              | 0                               | 8     |
| 2008 | Storm      | 2              | 0                               | 2     |
|      | Irrigation | 6              | 0                               | 6     |
|      | Fall       | 0              | 2                               | 2     |
| 2009 | Winter     | 2              | 0                               | 2     |
|      | Storm      | 2              | 0                               | 2     |
|      | Irrigation | 6              | 0                               | 6     |
|      | Fall       | 2              | 0                               | 2     |
| 2010 | Winter     | 1              | 0                               | 1     |
|      | Storm      | 3              | 0                               | 3     |
|      | Irrigation | 5              | 0                               | 5     |
|      | Fall       | 2              | 1                               | 3     |
| 2011 | Winter     | 2              | 0                               | 2     |
|      | Storm      | 1              | 0                               | 1     |
|      | Irrigation | 6              | 0                               | 6     |
|      | Fall       | 2              | 1                               | 3     |

<sup>1</sup>If an event was not sampled during scheduled monitoring, the site was dry.

NA – Not applicable. This site was not scheduled for sampling during this season/year.

**Table VI-3. Duck Slough @ Gurr Rd site subwatershed analyses per sampling season and year.**

Only environmental samples with a sample replicate and lab replicate number of one are shown.

| METHOD                        | ANALYTE                         | 2004       | 2005  |            | 2006  |            | 2007  |            | 2008  |            |      | 2009   |       |            |      | 2010   |       |            |      | 2011   |       |            |      |
|-------------------------------|---------------------------------|------------|-------|------------|-------|------------|-------|------------|-------|------------|------|--------|-------|------------|------|--------|-------|------------|------|--------|-------|------------|------|
|                               |                                 | IRRIGATION | STORM | IRRIGATION | STORM | IRRIGATION | STORM | IRRIGATION | STORM | IRRIGATION | FALL | WINTER | STORM | IRRIGATION | FALL | WINTER | STORM | IRRIGATION | FALL | WINTER | STORM | IRRIGATION | FALL |
| Field and Physical Parameters |                                 |            |       |            |       |            |       |            |       |            |      |        |       |            |      |        |       |            |      |        |       |            |      |
| EPA 110.2                     | Color                           | 3          | 2     | 5          | 2     | 6          | 3     | 6          | 2     | 6          |      |        |       |            |      |        |       |            |      |        |       |            |      |
| EPA 160.1                     | Dissolved Solids                | 3          | 2     | 5          | 2     | 6          | 3     | 6          | 3     | 6          |      | 2      | 2     | 6          | 2    | 1      | 3     | 5          | 2    | 2      | 1     | 6          | 2    |
| EPA 160.2                     | Suspended Solids                |            |       |            |       |            |       |            | 1     |            |      | 2      | 2     | 6          | 2    | 1      | 3     | 5          | 2    | 2      | 1     | 6          | 2    |
| EPA 180.1                     | Turbidity                       | 3          | 2     | 5          | 2     | 6          | 3     | 6          | 3     | 6          |      | 2      | 2     | 6          | 2    | 1      | 3     | 5          | 2    | 2      | 1     | 6          | 2    |
| EPA 405.1                     | BOD                             |            |       |            |       | 2          | 3     | 2          |       |            |      |        |       |            |      |        |       |            |      |        |       |            |      |
| EPA 415.1                     | Total Organic Carbon            | 2          | 2     | 5          | 1     | 6          | 3     | 6          | 3     | 6          |      | 2      | 2     | 6          | 2    | 1      | 3     | 5          | 2    | 2      | 1     | 6          | 2    |
| Walkley-Black                 | Total Organic Carbon (sediment) |            |       |            |       |            |       |            |       |            |      |        |       |            |      |        |       |            |      | 1      |       | 1          |      |
| SM 9223                       | <i>E. coli</i>                  | 3          | 2     | 5          | 2     | 6          | 3     | 6          | 3     | 6          |      | 2      | 2     | 6          | 2    | 1      | 3     | 5          | 2    | 2      | 1     | 6          | 2    |
| ASTM D422 or ASTM D4464       | Grain size (sediment)           |            |       |            |       |            |       |            |       |            |      |        |       |            |      |        |       | 1          |      | 1      |       | 1          |      |
| NA                            | Dissolved Oxygen                | 3          | 2     | 5          | 5     | 5          | 3     | 10         | 4     | 7          |      | 2      | 2     | 6          | 2    | 1      | 3     | 5          | 2    | 3      | 1     | 6          | 2    |
| NA                            | Specific Conductivity           | 3          | 2     | 5          | 5     | 5          | 3     | 10         | 4     | 7          |      | 2      | 2     | 6          | 2    | 1      | 3     | 5          | 2    | 3      | 1     | 6          | 2    |
| NA                            | pH                              | 3          | 2     | 5          | 5     | 5          | 3     | 10         | 4     | 7          |      | 2      | 2     | 6          | 2    | 1      | 3     | 5          | 2    | 3      | 1     | 6          | 2    |
| Carbamates                    |                                 |            |       |            |       |            |       |            |       |            |      |        |       |            |      |        |       |            |      |        |       |            |      |
| EPA 8321A                     | Aldicarb                        |            |       |            |       | 5          | 2     | 6          | 2     | 6          |      |        |       |            |      |        |       |            |      | 2      | 1     | 6          | 2    |
| EPA 8321A                     | Carbaryl                        |            |       |            |       | 5          | 2     | 6          | 2     | 6          |      |        |       |            |      |        |       |            |      | 2      | 1     | 6          | 2    |
| EPA 8321A                     | Carbofuran                      |            |       |            |       | 5          | 2     | 6          | 2     | 6          |      |        | 1     | 4          | 2    | 1      | 3     | 5          | 2    | 2      | 1     | 6          | 2    |
| EPA 8321A                     | Diuron                          |            |       |            |       | 5          | 2     | 6          | 2     | 6          |      |        |       |            |      |        |       |            |      | 2      | 1     | 6          | 2    |
| EPA 8321A                     | Linuron                         |            |       |            |       | 5          | 2     | 6          | 2     | 6          |      |        |       |            |      |        |       |            |      | 2      | 1     | 6          | 2    |
| EPA 8321A                     | Methiocarb                      |            |       |            |       | 5          | 2     | 6          | 2     | 6          |      |        |       |            |      |        |       |            |      | 2      | 1     | 6          | 2    |
| EPA 8321A                     | Methomyl                        |            |       |            |       | 5          | 2     | 6          | 2     | 6          |      |        |       |            |      |        |       |            |      | 2      | 1     | 6          | 1    |
| EPA 8321A                     | Oxamyl                          |            |       |            |       | 5          | 2     | 6          | 2     | 6          |      |        |       |            |      |        |       |            |      | 2      | 1     | 6          | 2    |
| Organochlorines               |                                 |            |       |            |       |            |       |            |       |            |      |        |       |            |      |        |       |            |      |        |       |            |      |
| EPA 8081A                     | DDD(p,p')                       |            |       |            |       | 5          | 2     | 6          | 2     | 6          |      |        |       |            |      |        |       |            |      | 2      | 1     | 4          |      |
| EPA 8081A                     | DDE(p,p')                       |            |       |            |       | 5          | 2     | 6          | 2     | 6          |      |        |       |            |      |        |       |            |      | 2      | 1     | 4          |      |
| EPA 8081A                     | DDT(p,p')                       |            |       |            |       | 5          | 2     | 6          | 2     | 6          |      |        |       |            |      |        |       |            |      | 2      | 1     | 4          |      |
| EPA 8081A                     | Dicofol                         |            |       |            |       | 5          | 2     | 6          | 2     | 6          |      |        |       |            |      |        |       |            |      | 2      | 1     | 4          |      |
| EPA 8081A                     | Dieldrin                        |            |       |            |       | 5          | 2     | 6          | 2     | 6          |      |        |       |            |      |        |       |            |      | 2      | 1     | 4          |      |
| EPA 8081A                     | Endrin                          |            |       |            |       | 5          | 2     | 6          | 2     | 6          |      |        |       |            |      |        |       |            |      | 2      | 1     | 4          |      |

| METHOD             | ANALYTE            | 2004       | 2005  |            | 2006  |            | 2007  |            | 2008  |            |      | 2009   |       |            | 2010 |        |       |            | 2011 |        |       |            |      |
|--------------------|--------------------|------------|-------|------------|-------|------------|-------|------------|-------|------------|------|--------|-------|------------|------|--------|-------|------------|------|--------|-------|------------|------|
|                    |                    | IRRIGATION | STORM | IRRIGATION | STORM | IRRIGATION | STORM | IRRIGATION | STORM | IRRIGATION | FALL | WINTER | STORM | IRRIGATION | FALL | WINTER | STORM | IRRIGATION | FALL | WINTER | STORM | IRRIGATION | FALL |
| EPA 8081A          | Methoxychlor       |            |       |            |       | 5          | 2     | 6          | 2     | 6          |      |        |       |            |      |        |       |            |      | 2      | 1     | 4          |      |
| Group A Pesticides |                    |            |       |            |       |            |       |            |       |            |      |        |       |            |      |        |       |            |      |        |       |            |      |
| EPA 8081A          | Aldrin             |            |       |            |       |            |       |            |       |            |      |        |       |            |      |        |       |            |      | 2      | 1     | 4          |      |
| EPA 8081A          | Chlordane          |            |       |            |       |            |       |            |       |            |      |        |       |            |      |        |       |            |      | 2      | 1     | 4          |      |
| EPA 8081A          | Endosulfan I       |            |       |            |       |            |       |            |       |            |      |        |       |            |      |        |       |            |      | 2      | 1     | 4          |      |
| EPA 8081A          | Endosulfan II      |            |       |            |       |            |       |            |       |            |      |        |       |            |      |        |       |            |      | 2      | 1     | 4          |      |
| EPA 8081A          | HCH, alpha         |            |       |            |       |            |       |            |       |            |      |        |       |            |      |        |       |            |      | 2      | 1     | 4          |      |
| EPA 8081A          | HCH, beta          |            |       |            |       |            |       |            |       |            |      |        |       |            |      |        |       |            |      | 2      | 1     | 4          |      |
| EPA 8081A          | HCH, delta         |            |       |            |       |            |       |            |       |            |      |        |       |            |      |        |       |            |      | 2      | 1     | 4          |      |
| EPA 8081A          | HCH, gamma         |            |       |            |       |            |       |            |       |            |      |        |       |            |      |        |       |            |      | 2      | 1     | 4          |      |
| EPA 8081A          | Heptachlor         |            |       |            |       |            |       |            |       |            |      |        |       |            |      |        |       |            |      | 2      | 1     | 4          |      |
| EPA 8081A          | Heptachlor epoxide |            |       |            |       |            |       |            |       |            |      |        |       |            |      |        |       |            |      | 2      | 1     | 4          |      |
| EPA 8081A          | Toxaphene          |            |       |            |       |            |       |            |       |            |      |        |       |            |      |        |       |            |      | 2      | 1     | 4          |      |
| Organophosphates   |                    |            |       |            |       |            |       |            |       |            |      |        |       |            |      |        |       |            |      |        |       |            |      |
| EPA 8141A          | Azinphos methyl    |            |       |            |       | 5          | 2     | 7          | 3     | 6          |      | 2      | 1     | 2          |      |        |       |            |      | 2      | 1     | 6          | 2    |
| EPA 8141A          | Chlorpyrifos       | 3          | 2     | 5          | 2     | 5          | 2     | 7          | 3     | 6          |      | 2      | 1     | 2          |      |        | 1     | 1          |      | 2      | 1     | 6          | 2    |
| EPA 8141A          | Demeton-s          |            |       |            |       |            |       |            | 1     |            |      | 2      | 1     | 2          |      |        |       |            |      | 2      | 1     | 6          | 2    |
| EPA 8141A          | Diazinon           | 3          | 2     | 5          | 2     | 5          | 2     | 7          | 3     | 6          |      | 2      | 1     | 2          |      |        |       |            |      | 2      | 1     | 6          | 2    |
| EPA 8141A          | Dichlorvos         |            |       |            |       |            |       |            | 1     |            |      | 2      | 1     | 2          |      |        |       |            |      | 2      | 1     | 6          | 2    |
| EPA 8141A          | Dimethoate         | 1          |       |            |       | 5          | 2     | 7          | 3     | 6          |      | 2      | 1     | 2          |      |        |       |            |      | 2      | 1     | 6          | 2    |
| EPA 8141A          | Disulfoton         | 1          |       |            |       | 5          | 2     | 7          | 3     | 6          |      | 2      | 1     | 2          |      |        |       |            |      | 2      | 1     | 6          | 2    |
| EPA 8141A          | Malathion          | 1          |       |            |       | 5          | 2     | 7          | 3     | 6          |      | 2      | 1     | 2          |      |        |       |            |      | 2      | 1     | 6          | 2    |
| EPA 8321A          | Methamidophos      |            |       |            |       | 5          | 2     | 6          | 3     | 6          |      | 2      | 1     | 2          |      |        |       |            |      | 2      | 1     | 6          | 2    |
| EPA 8141A          | Methidathion       |            |       |            |       | 5          | 2     | 7          | 3     | 6          |      | 2      | 1     | 2          |      |        |       |            |      | 2      | 1     | 6          | 2    |
| EPA 8141A          | Molinate           |            |       |            |       | 5          | 2     | 7          | 2     | 6          |      |        |       |            |      |        |       |            |      |        |       |            |      |
| EPA 8141A          | Parathion, Methyl  | 1          |       |            |       | 5          | 2     | 7          | 3     | 6          |      | 2      | 1     | 2          |      |        |       |            |      | 2      | 1     | 6          | 2    |
| EPA 8141A          | Phorate            | 1          |       |            |       | 5          | 2     | 7          | 3     | 6          |      | 2      | 1     | 2          |      |        |       |            |      | 2      | 1     | 6          | 2    |
| EPA 8141A          | Phosmet            |            |       |            |       | 5          | 2     | 7          | 3     | 6          |      | 2      | 1     | 2          |      |        |       |            |      | 2      | 1     | 6          | 2    |
| EPA 8141A          | Thiobencarb        |            |       |            |       | 5          | 2     | 9          | 2     | 6          |      |        |       |            |      |        |       |            |      |        |       |            |      |
| EPA 8141A          | Trifluralin        |            |       |            |       |            |       |            |       |            |      |        |       |            |      |        |       |            |      | 2      | 1     | 6          | 2    |
| Pyrethroids        |                    |            |       |            |       |            |       |            |       |            |      |        |       |            |      |        |       |            |      |        |       |            |      |
| EPA 8081A          | Bifenthrin         |            |       | 1          | 2     | 5          | 2     | 9          | 2     | 6          |      |        |       |            |      |        |       |            |      |        |       |            |      |

| METHOD             | ANALYTE                           | 2004       | 2005  |            | 2006  |            | 2007  |            | 2008  |            |      | 2009   |       |            | 2010 |        |       |            | 2011 |        |       |            |      |
|--------------------|-----------------------------------|------------|-------|------------|-------|------------|-------|------------|-------|------------|------|--------|-------|------------|------|--------|-------|------------|------|--------|-------|------------|------|
|                    |                                   | IRRIGATION | STORM | IRRIGATION | STORM | IRRIGATION | STORM | IRRIGATION | STORM | IRRIGATION | FALL | WINTER | STORM | IRRIGATION | FALL | WINTER | STORM | IRRIGATION | FALL | WINTER | STORM | IRRIGATION | FALL |
| EPA 8081A          | Cyfluthrin, total                 |            |       | 1          | 2     | 5          | 2     | 7          | 2     | 6          |      |        |       |            |      |        |       |            |      |        |       |            |      |
| EPA 8081A          | Cyhalothrin, lambda, total        | 3          | 2     | 5          | 2     | 5          | 2     | 7          | 2     | 6          |      |        |       |            |      |        |       |            |      |        |       |            |      |
| EPA 8081A          | Cypermethrin, total               | 3          | 2     | 5          | 2     | 5          | 2     | 7          | 2     | 6          |      |        |       |            |      |        |       |            |      |        |       |            |      |
| EPA 8081A          | Esfenvalerate/ Fenvalerate, total | 3          | 2     | 5          | 2     | 5          | 2     | 7          | 2     | 6          |      |        |       |            |      |        |       |            |      |        |       |            |      |
| EPA 8081A          | Permethrin, total                 | 3          | 2     | 5          | 2     | 5          | 2     | 7          | 2     | 6          |      |        |       |            |      |        |       |            |      |        |       |            |      |
| Triazines          |                                   |            |       |            |       |            |       |            |       |            |      |        |       |            |      |        |       |            |      |        |       |            |      |
| EPA 547M           | Glyphosate                        |            |       |            |       | 5          | 2     | 6          | 2     | 6          |      |        |       |            |      |        |       |            |      | 2      |       | 4          |      |
| EPA 549.2M         | Paraquat dichloride               |            |       |            |       | 5          | 2     | 6          | 2     | 6          |      |        |       |            |      |        |       |            |      | 2      |       | 4          |      |
| EPA 619            | Atrazine                          |            |       |            |       | 5          | 2     | 6          | 2     | 6          |      |        |       |            |      |        |       |            |      | 2      | 1     | 6          | 2    |
| EPA 619            | Cyanazine                         |            |       |            |       | 5          | 2     | 6          | 2     | 6          |      |        |       |            |      |        |       |            |      | 2      | 1     | 6          | 2    |
| EPA 619            | Simazine                          |            |       |            |       | 5          | 2     | 6          | 2     | 6          |      |        |       |            |      |        |       |            |      | 2      | 1     | 6          | 2    |
| Metals (Total)     |                                   |            |       |            |       |            |       |            |       |            |      |        |       |            |      |        |       |            |      |        |       |            |      |
| EPA 200.8          | Arsenic                           |            |       |            |       | 6          | 3     | 6          | 3     | 6          |      | 2      | 1     | 1          |      |        |       |            |      | 2      | 1     | 5          |      |
| EPA 200.8          | Boron                             |            |       |            |       | 6          | 3     | 6          | 3     | 6          |      | 2      | 1     | 2          |      |        |       |            |      | 2      | 1     | 6          | 2    |
| EPA 200.8          | Cadmium                           |            |       |            |       | 6          | 3     | 6          | 3     | 6          |      | 2      | 1     | 1          |      |        |       |            |      | 2      | 1     | 5          |      |
| EPA 200.8          | Copper                            |            |       |            |       | 6          | 3     | 9          | 3     | 6          |      | 2      | 1     | 2          |      |        | 2     | 2          |      | 2      | 1     | 6          | 2    |
| EPA 200.8          | Lead                              |            |       |            |       | 6          | 3     | 6          | 3     | 6          |      | 2      | 1     | 1          |      |        |       |            |      | 2      | 1     | 5          |      |
| EPA 200.8          | Molybdenum                        |            |       |            |       |            |       |            | 1     |            |      | 2      | 1     | 1          |      |        |       |            |      | 2      | 1     | 5          |      |
| EPA 200.8          | Nickel                            |            |       |            |       | 6          | 3     | 6          | 3     | 6          |      | 2      | 1     | 2          |      |        |       |            |      | 2      | 1     | 6          | 2    |
| EPA 200.8          | Selenium                          |            |       |            |       | 6          | 3     | 2          | 3     | 6          |      | 2      | 1     | 2          |      |        |       |            |      | 2      | 1     | 5          | 2    |
| EPA 200.8          | Zinc                              |            |       |            |       | 6          | 3     | 7          | 3     | 6          |      | 2      | 1     | 2          |      |        |       |            |      | 2      | 1     | 6          | 2    |
| Metals (Dissolved) |                                   |            |       |            |       |            |       |            |       |            |      |        |       |            |      |        |       |            |      |        |       |            |      |
| EPA 200.8          | Cadmium                           |            |       |            |       |            |       |            | 1     |            |      | 2      | 1     | 1          |      |        |       |            |      | 2      | 1     | 5          |      |
| EPA 200.8          | Copper                            |            |       |            |       |            |       |            | 1     |            |      | 2      | 1     | 2          |      |        | 2     | 2          |      | 2      | 1     | 6          | 2    |
| EPA 200.8          | Lead                              |            |       |            |       |            |       |            | 1     |            |      | 2      | 1     | 1          |      |        |       |            |      | 2      | 1     | 5          |      |
| EPA 200.8          | Nickel                            |            |       |            |       |            |       |            | 1     |            |      | 2      | 1     | 2          |      |        |       |            |      | 2      | 1     | 6          | 2    |
| EPA 200.8          | Zinc                              |            |       |            |       |            |       |            | 1     |            |      | 2      | 1     | 2          |      |        |       |            |      | 2      | 1     | 6          | 2    |
| Nutrients          |                                   |            |       |            |       |            |       |            |       |            |      |        |       |            |      |        |       |            |      |        |       |            |      |
| SM 2340 C          | Hardness as CaCO3                 |            |       |            |       | 6          | 3     | 9          | 3     | 6          |      | 2      | 1     | 2          |      |        | 2     | 2          |      | 2      | 1     | 6          | 2    |
| EPA 300.0          | Nitrate as N                      |            |       |            |       | 6          | 3     | 6          | 2     | 6          |      |        |       |            |      |        |       |            |      |        |       |            |      |
| EPA 350.2          | Ammonia as N                      |            |       |            |       | 6          | 3     | 6          | 3     | 6          |      | 2      | 2     | 6          | 2    | 1      | 3     | 5          | 2    | 2      | 1     | 6          | 2    |
| EPA 351.3          | Nitrogen, Total Kjeldahl          |            |       |            |       | 6          | 3     | 6          | 3     | 6          |      | 2      | 1     | 1          |      |        |       | 3          | 2    | 2      | 1     | 6          | 2    |



| METHOD              | ANALYTE                    | 2004       | 2005  |            | 2006  |            | 2007  |            | 2008  |            |      | 2009   |       |            |      | 2010   |       |            |      | 2011   |       |            |      |
|---------------------|----------------------------|------------|-------|------------|-------|------------|-------|------------|-------|------------|------|--------|-------|------------|------|--------|-------|------------|------|--------|-------|------------|------|
|                     |                            | IRRIGATION | STORM | IRRIGATION | STORM | IRRIGATION | STORM | IRRIGATION | STORM | IRRIGATION | FALL | WINTER | STORM | IRRIGATION | FALL | WINTER | STORM | IRRIGATION | FALL | WINTER | STORM | IRRIGATION | FALL |
| EPA 354.1           | Nitrite as N               |            |       |            |       | 6          | 3     | 6          | 2     | 6          |      |        |       |            |      |        |       |            |      |        |       |            |      |
| EPA 353.2           | Nitrate + Nitrite as N     |            |       |            |       |            |       |            | 1     |            |      | 2      | 2     | 6          | 2    | 1      | 3     | 5          | 2    | 2      | 1     | 6          | 2    |
| EPA 365.2           | OrthoPhosphate as P        |            |       |            |       | 6          | 3     | 6          | 3     | 6          |      | 2      | 1     | 1          |      |        |       | 3          | 2    | 2      | 1     | 6          | 2    |
| EPA 365.2           | Phosphate as P             |            |       |            |       | 6          | 3     | 6          | 3     | 6          |      | 2      | 2     | 6          | 2    | 1      | 3     | 5          | 2    | 2      | 1     | 6          | 2    |
| Sediment Pesticides |                            |            |       |            |       |            |       |            |       |            |      |        |       |            |      |        |       |            |      |        |       |            |      |
| EPA 8270M_NCI       | Bifenthrin                 |            |       |            |       |            |       |            |       |            |      |        |       |            |      |        |       | 1          |      |        |       |            |      |
| EPA 8270M_NCI       | Chlorpyrifos               |            |       |            |       |            |       |            |       |            |      |        |       |            |      |        |       | 1          |      |        |       |            |      |
| EPA 8270M_NCI       | Cyfluthrin                 |            |       |            |       |            |       |            |       |            |      |        |       |            |      |        |       | 1          |      |        |       |            |      |
| EPA 8270M_NCI       | Cyhalothrin, lambda        |            |       |            |       |            |       |            |       |            |      |        |       |            |      |        |       | 1          |      |        |       |            |      |
| EPA 8270M_NCI       | Cypermethrin               |            |       |            |       |            |       |            |       |            |      |        |       |            |      |        |       | 1          |      |        |       |            |      |
| EPA 8270M_NCI       | Deltamethrin: Tralomethrin |            |       |            |       |            |       |            |       |            |      |        |       |            |      |        |       | 1          |      |        |       |            |      |
| EPA 8270M_NCI       | Esfenvalerate/ Fenvalerate |            |       |            |       |            |       |            |       |            |      |        |       |            |      |        |       | 1          |      |        |       |            |      |
| EPA 8270M_NCI       | Fenpropathrin              |            |       |            |       |            |       |            |       |            |      |        |       |            |      |        |       | 1          |      |        |       |            |      |
| EPA 8270M_NCI       | Permethrin                 |            |       |            |       |            |       |            |       |            |      |        |       |            |      |        |       | 1          |      |        |       |            |      |
| Toxicity            |                            |            |       |            |       |            |       |            |       |            |      |        |       |            |      |        |       |            |      |        |       |            |      |
| EPA 821/R-02-012    | Ceriodaphnia dubia         | 3          | 2     | 5          | 4     | 5          | 3     | 7          | 2     | 7          |      |        |       |            |      |        |       |            |      | 2      | 1     | 6          | 2    |
| EPA 821/R-02-012    | Pimephales promelas        | 3          | 2     | 5          | 2     | 5          | 3     | 7          | 2     | 7          |      |        |       |            |      |        |       |            |      | 2      | 1     | 6          | 2    |
| EPA 821/R-02-013    | Selenastrum capricornutum  | 3          | 2     | 5          | 2     | 5          | 3     | 8          | 2     | 7          |      |        |       |            |      |        |       | 2          |      | 2      | 1     | 6          | 2    |
| EPA 600/R-99-064    | Hyalella azteca            | 2          |       | 5          | 1     | 1          | 1     | 1          | 1     | 2          |      |        |       |            |      |        |       | 1          |      | 1      |       | 1          |      |

**Table VI-4. Duck Slough @ Gurr Rd site subwatershed Management Plan Monitoring schedule (2007-2011).**

Upstream locations included.

| SITE NAME             | SAMPLE DATE | MONITORING TYPE | COPPER | CHLORPYRIFOS | THIOBENCARB | C. DUBIA | S. CAPRICORNUTUM | H. AZTECA |
|-----------------------|-------------|-----------------|--------|--------------|-------------|----------|------------------|-----------|
| Duck Slough @ Gurr Rd | 19-Jun-07   | A               | X      |              | X           |          |                  |           |
| Duck Slough @ Gurr Rd | 31-Jul-07   | A               | X      | X            | X           |          |                  |           |
| Duck Slough @ Hwy 59  | 24-Jun-08   | U               | X      |              |             |          |                  |           |
| Duck Slough @ Hwy 59  | 29-Jul-08   | U               | X      |              |             |          | X                |           |
| North Slough @ Hwy 59 | 29-Jul-08   | U               | X      |              |             |          | X                |           |
| Duck Slough @ Hwy 59  | 30-Sep-08   | U               |        |              |             |          | X                |           |
| North Slough @ Hwy 59 | 30-Sep-08   | U               |        |              |             |          | X                |           |
| Duck Slough @ Gurr Rd | 19-Jan-10   | MPM             | X      |              |             |          |                  |           |
| Duck Slough @ Gurr Rd | 23-Feb-10   | MPM             | X      |              |             |          |                  |           |
| Duck Slough @ Gurr Rd | 20-Apr-10   | MPM             |        | X            |             |          |                  |           |
| Duck Slough @ Gurr Rd | 15-Jun-10   | MPM             | X      |              |             |          |                  |           |
| Duck Slough @ Gurr Rd | 20-Jul-10   | MPM             | X      | X            |             |          | X                |           |
| Duck Slough @ Gurr Rd | 14-Sep-10   | MPM             |        |              |             |          | X                | X         |
| Duck Slough @ Gurr Rd | 18-Jan-11   | MPM             | X      |              |             |          |                  |           |
| Duck Slough @ Gurr Rd | 17-Feb-11   | MPM             | X      |              |             | X        |                  |           |
| Duck Slough @ Gurr Rd | 15-Mar-11   | MPM             |        |              |             | X        |                  |           |
| Duck Slough @ Gurr Rd | 17-May-11   | MPM             | X      |              |             |          |                  |           |
| Duck Slough @ Gurr Rd | 21-Jun-11   | MPM             | X      |              |             |          |                  |           |
| Duck Slough @ Gurr Rd | 19-Jul-11   | MPM             | X      | X            |             |          | X                |           |
| Duck Slough @ Gurr Rd | 13-Sep-11   | MPM             |        |              |             |          | X                | X         |

A – Additional sampling

U – Upstream sampling

X – Constituent sampled for Management Plan Monitoring (MPM)

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### Exceedance History

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Samples collected from the Duck Slough @ Gurr Rd subwatershed (including Duck Slough @ Hwy 59 and North Slough @ Hwy 59) from 2005 through 2011 exceeded the WQTLs for field and physical parameters, *E. coli*, nutrients, metals, pesticides, and water column and sediment toxicity (Table VI-5). During ambient water monitoring several exceedances occurred at the Normal Monitoring and upstream MPM sites, including DO (7), pH (6), SC (3), TDS (1), *E. coli* (22), nitrate + nitrite (1), copper (9), lead (4), carbofuran (1), chlorpyrifos (1), and thiobencarb (2). Toxicity to *C. dubia* (3), *S. capricornutum* (2), *P. promelas* (1), and *H. azteca* sediment (7) occurred (Table VI-5).

During 2011, exceedances detected at the Normal Monitoring site included DO (1), pH (1), and *E. coli* (2). Toxicity to *P. promelas* (1) and *H. azteca* sediment (1) occurred.

All exceedances are listed in Table VI-5 by season and date and are based on WQTLs listed in the introduction to the ESJWQC Management Plan. The highest priority constituents in the Duck Slough @ Gurr Road subwatershed are chlorpyrifos (A/B), copper (C), and toxicity to *C. dubia*, *S. capricornutum* and *H. azteca* (D).

**Table VI-5. Duck Slough @ Gurr Rd site subwatershed exceedances (2004-2011).**

The WQTL used to evaluate the data are listed in the header after the analyte. Upstream site is italicized.

| SITE NAME             | SEASON     | SAMPLE DATE | OXYGEN, DISSOLVED, <7 MG/L | PH, <6.5 AND > 8.5 UNITS | SPECIFIC CONDUCTIVITY, >700 µS/CM | E. COLI, >235 MPN/100 ML | DISSOLVED SOLIDS, >450 MG/L | NITRATE + NITRITE AS N, >10 MG/L | COPPER, DISSOLVED <sup>1</sup> , µG/L | COPPER, TOTAL <sup>2</sup> , >1,300 µG/L | LEAD, TOTAL <sup>2</sup> , >15 µG/L | CARBOFURAN, >0 µG/L | CHLORPYRIFOS, >0.015 µG/L | THIOBENCARB, >0 µG/L | C. DUBIA, (% CONTROL) | P. PROMELAS, (% CONTROL) | S. CAPRICORNUTUM, (% CONTROL) | H. AZTECA, (% CONTROL) |
|-----------------------|------------|-------------|----------------------------|--------------------------|-----------------------------------|--------------------------|-----------------------------|----------------------------------|---------------------------------------|------------------------------------------|-------------------------------------|---------------------|---------------------------|----------------------|-----------------------|--------------------------|-------------------------------|------------------------|
| Duck Slough @ Gurr Rd | Irrigation | 7/31/2004   |                            |                          |                                   | 350                      |                             |                                  |                                       |                                          |                                     |                     | 0.045                     |                      |                       |                          |                               |                        |
| Duck Slough @ Gurr Rd | Irrigation | 8/31/2004   |                            |                          |                                   |                          |                             |                                  |                                       |                                          |                                     |                     |                           |                      |                       |                          |                               | 36                     |
| Duck Slough @ Gurr Rd | Irrigation | 9/29/2004   |                            |                          | 701                               |                          | 540                         |                                  |                                       |                                          |                                     |                     |                           |                      |                       |                          | 74                            |                        |
| Duck Slough @ Gurr Rd | Storm      | 2/16/2005   |                            |                          |                                   | 1600                     |                             |                                  |                                       |                                          |                                     |                     |                           |                      |                       |                          |                               |                        |
| Duck Slough @ Gurr Rd | Storm      | 3/21/2005   |                            |                          |                                   | 1600                     |                             |                                  |                                       |                                          |                                     |                     |                           |                      |                       |                          |                               |                        |
| Duck Slough @ Gurr Rd | Irrigation | 5/10/2005   |                            |                          |                                   | 1600                     |                             |                                  |                                       |                                          |                                     |                     |                           |                      |                       |                          |                               |                        |
| Duck Slough @ Gurr Rd | Irrigation | 6/14/2005   |                            |                          |                                   | 300                      |                             |                                  |                                       |                                          |                                     |                     |                           |                      |                       |                          |                               |                        |
| Duck Slough @ Gurr Rd | Irrigation | 7/12/2005   |                            |                          |                                   | 300                      |                             |                                  |                                       |                                          |                                     |                     |                           |                      |                       |                          |                               | 65                     |
| Duck Slough @ Gurr Rd | Irrigation | 8/16/2005   |                            |                          |                                   | 240                      |                             |                                  |                                       |                                          |                                     |                     |                           |                      |                       |                          |                               |                        |
| Duck Slough @ Gurr Rd | Irrigation | 9/20/2005   |                            |                          |                                   |                          |                             |                                  |                                       |                                          |                                     |                     |                           |                      |                       |                          |                               | 4                      |
| Duck Slough @ Gurr Rd | Storm      | 2/28/2006   |                            |                          |                                   |                          |                             |                                  |                                       |                                          |                                     |                     |                           |                      | 37                    |                          |                               |                        |
| Duck Slough @ Gurr Rd | Storm      | 3/10/2006   |                            |                          |                                   |                          |                             |                                  |                                       |                                          |                                     |                     |                           |                      | 35                    |                          |                               |                        |
| Duck Slough @ Gurr Rd | Storm      | 3/15/2006   |                            |                          |                                   | 300                      |                             |                                  |                                       |                                          |                                     |                     |                           |                      | 42                    |                          |                               |                        |
| Duck Slough @ Gurr Rd | Irrigation | 5/17/2006   |                            | 8.6                      |                                   | 2000                     |                             |                                  |                                       |                                          |                                     |                     |                           |                      |                       |                          |                               |                        |
| Duck Slough @ Gurr Rd | Irrigation | 6/14/2006   |                            |                          |                                   | 690                      |                             |                                  |                                       | 120 (10.9)                               |                                     |                     |                           | 5.8                  |                       |                          |                               |                        |
| Duck Slough @ Gurr Rd | Irrigation | 7/12/2006   | 6.18                       |                          |                                   |                          |                             |                                  |                                       | 14 (9.3)                                 |                                     |                     |                           | 0.29                 |                       |                          |                               |                        |
| Duck Slough @ Gurr Rd | Irrigation | 9/13/2006   | 5.53                       |                          |                                   |                          |                             |                                  |                                       |                                          |                                     |                     |                           |                      |                       |                          |                               |                        |

| SITE NAME             | SEASON     | SAMPLE DATE | OXYGEN, DISSOLVED, <7 MG/L | PH, <6.5 AND > 8.5 UNITS | SPECIFIC CONDUCTIVITY, > 700 µS/CM | E. COLI, >235 MPN/100 ML | DISSOLVED SOLIDS, >450 MG/L | NITRATE + NITRITE AS N, >10 MG/L | COPPER, DISSOLVED <sup>1</sup> , µG/L | COPPER, TOTAL <sup>2</sup> , >1,300 µG/L | LEAD, TOTAL <sup>2</sup> , >15 µG/L | CARBOFURAN, >0 µG/L | CHLORPYRIFOS, >0.015 µG/L | THIOBENCARB, >0 µG/L | C. DUBIA, (% CONTROL) | P. PROMELAS, (% CONTROL) | S. CAPRICORNUTUM, (% CONTROL) | H. AZTECA, (% CONTROL) |
|-----------------------|------------|-------------|----------------------------|--------------------------|------------------------------------|--------------------------|-----------------------------|----------------------------------|---------------------------------------|------------------------------------------|-------------------------------------|---------------------|---------------------------|----------------------|-----------------------|--------------------------|-------------------------------|------------------------|
| Duck Slough @ Gurr Rd | Storm      | 2/12/2007   |                            |                          |                                    | 2400                     |                             |                                  |                                       | 47 (12.4)                                | 13 (4.88)                           |                     |                           |                      |                       |                          |                               |                        |
| Duck Slough @ Gurr Rd | Storm      | 2/28/2007   |                            |                          |                                    | 2000                     |                             |                                  |                                       | 11 (8.8)                                 |                                     |                     |                           |                      |                       |                          |                               |                        |
| Duck Slough @ Gurr Rd | Storm      | 3/7/2007    |                            | 9.17                     |                                    |                          |                             |                                  |                                       |                                          |                                     |                     |                           |                      |                       |                          |                               |                        |
| Duck Slough @ Gurr Rd | Irrigation | 5/29/2007   |                            |                          |                                    | 820                      |                             |                                  |                                       |                                          |                                     |                     |                           |                      |                       |                          |                               |                        |
| Duck Slough @ Gurr Rd | Irrigation | 6/19/2007   | 5.85                       |                          |                                    |                          |                             |                                  |                                       | 5.4 (3.0)                                |                                     |                     |                           |                      |                       |                          |                               |                        |
| Duck Slough @ Gurr Rd | Irrigation | 6/26/2007   |                            |                          |                                    |                          |                             |                                  |                                       | 4.6 (3.7)                                | 1 (0.81)                            |                     |                           |                      |                       |                          |                               |                        |
| Duck Slough @ Gurr Rd | Irrigation | 7/24/2007   |                            |                          |                                    |                          |                             |                                  |                                       |                                          |                                     |                     |                           |                      |                       |                          | 74                            |                        |
| Duck Slough @ Gurr Rd | Irrigation | 9/18/2007   |                            |                          |                                    | 370                      |                             |                                  |                                       |                                          |                                     |                     |                           |                      |                       |                          |                               |                        |
| Duck Slough @ Gurr Rd | Storm      | 1/25/2008   |                            |                          |                                    | >2400                    |                             |                                  |                                       | 13 (9.0)                                 | 2.7 (2.4)                           |                     |                           |                      |                       |                          |                               |                        |
| Duck Slough @ Gurr Rd | Storm      | 2/25/2008   |                            |                          |                                    | >2400                    |                             |                                  |                                       | 17 (9.3)                                 | 3.7 (3.2)                           |                     |                           |                      |                       |                          |                               |                        |
| Duck Slough @ Gurr Rd | Irrigation | 4/29/2008   |                            |                          |                                    |                          |                             |                                  |                                       |                                          |                                     | 0.05                |                           |                      |                       |                          |                               |                        |
| Duck Slough @ Hwy 59  | Irrigation | 6/24/2008   | 4.22                       |                          | 841                                |                          |                             |                                  |                                       |                                          |                                     |                     |                           |                      |                       |                          |                               |                        |
| Duck Slough @ Hwy 59  | Irrigation | 7/29/2008   | 4.83                       |                          |                                    |                          |                             |                                  |                                       |                                          |                                     |                     |                           |                      |                       |                          |                               |                        |
| Duck Slough @ Gurr Rd | Sediment   | 8/28/2008   |                            |                          |                                    |                          |                             |                                  |                                       |                                          |                                     |                     |                           |                      |                       |                          |                               | 63                     |
| Duck Slough @ Hwy 59  | Irrigation | 9/30/2008   | 3.33                       |                          |                                    |                          |                             |                                  |                                       |                                          |                                     |                     |                           |                      |                       |                          |                               |                        |
| Duck Slough @ Gurr Rd | Sediment   | 10/2/2008   |                            |                          |                                    |                          |                             |                                  |                                       |                                          |                                     |                     |                           |                      |                       |                          |                               | 93                     |
| Duck Slough @ Gurr Rd | Storm      | 2/7/2009    |                            |                          |                                    |                          |                             | 13                               |                                       |                                          |                                     |                     |                           |                      |                       |                          |                               |                        |
| Duck Slough @ Gurr Rd | Winter     | 3/17/2009   |                            | 9.7                      |                                    |                          |                             |                                  |                                       |                                          |                                     |                     |                           |                      |                       |                          |                               |                        |

| SITE NAME             | SEASON     | SAMPLE DATE | OXYGEN, DISSOLVED, <7 MG/L | PH, <6.5 AND > 8.5 UNITS | SPECIFIC CONDUCTIVITY, >700 µS/cm | E. COLI, >235 MPN/100 ML | DISSOLVED SOLIDS, >450 MG/L | NITRATE + NITRITE AS N, >10 MG/L | COPPER, DISSOLVED <sup>1</sup> , µG/L | COPPER, TOTAL <sup>2</sup> , >1,300 µG/L | LEAD, TOTAL <sup>2</sup> , >15 µG/L | CARBOFURAN, >0 µG/L | CHLORPYRIFOS, >0.015 µG/L | THIOBENCARB, >0 µG/L | C. DUBIA, (% CONTROL) | P. PROMELAS, (% CONTROL) | S. CAPRICORNUTUM, (% CONTROL) | H. AZTECA, (% CONTROL) |
|-----------------------|------------|-------------|----------------------------|--------------------------|-----------------------------------|--------------------------|-----------------------------|----------------------------------|---------------------------------------|------------------------------------------|-------------------------------------|---------------------|---------------------------|----------------------|-----------------------|--------------------------|-------------------------------|------------------------|
| Duck Slough @ Gurr Rd | Irrigation | 5/19/2009   |                            |                          |                                   | >2400                    |                             |                                  | 7.3 (6.12)                            |                                          |                                     |                     |                           |                      |                       |                          |                               |                        |
| Duck Slough @ Gurr Rd | Irrigation | 9/22/2009   |                            | 9.03                     |                                   |                          |                             |                                  |                                       |                                          |                                     |                     |                           |                      |                       |                          |                               |                        |
| Duck Slough @ Gurr Rd | Fall       | 11/17/2009  |                            |                          | 1215                              | 340                      |                             |                                  |                                       |                                          |                                     |                     |                           |                      |                       |                          |                               |                        |
| Duck Slough @ Gurr Rd | Storm      | 12/15/2009  |                            |                          |                                   | >2400                    |                             |                                  |                                       |                                          |                                     |                     |                           |                      |                       |                          |                               |                        |
| Duck Slough @ Gurr Rd | Irrigation | 7/20/2010   |                            | 5.41                     |                                   |                          |                             |                                  |                                       |                                          |                                     |                     |                           |                      |                       |                          |                               |                        |
| Duck Slough @ Gurr Rd | Irrigation | 9/14/2010   |                            |                          |                                   |                          |                             |                                  |                                       |                                          |                                     |                     |                           |                      |                       |                          |                               | 70                     |
| Duck Slough @ Gurr Rd | Fall       | 10/19/2010  |                            |                          |                                   | 250                      |                             |                                  |                                       |                                          |                                     |                     |                           |                      |                       |                          |                               |                        |
| Duck Slough @ Gurr Rd | Storm      | 2/17/2011   |                            | 8.65                     |                                   |                          |                             |                                  |                                       |                                          |                                     |                     |                           |                      |                       |                          |                               |                        |
| Duck Slough @ Gurr Rd | Winter     | 3/15/2011   | 6.78                       |                          |                                   |                          |                             |                                  |                                       |                                          |                                     |                     |                           |                      |                       |                          |                               |                        |
| Duck Slough @ Gurr Rd | Irrigation | 6/21/2011   |                            |                          |                                   | 240                      |                             |                                  |                                       |                                          |                                     |                     |                           |                      |                       |                          |                               |                        |
| Duck Slough @ Gurr Rd | Irrigation | 8/16/2011   |                            |                          |                                   | 580                      |                             |                                  |                                       |                                          |                                     |                     |                           |                      |                       |                          |                               |                        |
| Duck Slough @ Gurr Rd | Irrigation | 9/13/2011   |                            |                          |                                   |                          |                             |                                  |                                       |                                          |                                     |                     |                           |                      |                       |                          |                               | 90                     |
| Duck Slough @ Gurr Rd | Fall       | 10/11/2011  |                            |                          |                                   |                          |                             |                                  |                                       |                                          |                                     |                     |                           |                      |                       | 90                       |                               |                        |
| Constituent Priority  |            |             | E                          | E                        | E                                 | E                        | E                           | NP                               | C                                     | C                                        | E                                   | NP                  | A/B                       | NP <sup>R</sup>      | D                     | NP                       | D                             | D                      |

<sup>1</sup>Dissolved metals not analyzed until October 2008; WQTL variable based on hardness.

<sup>2</sup>Total metal WQTL variable based on hardness.

NP – Not Prioritized; less than two exceedances within three consecutive monitoring years and currently no TMDL.

NP<sup>R</sup> – Not Prioritized; thiobencarb is only applied to rice and therefore will be managed under the Rice Coalition.

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## 2007-2011 Management Plan Monitoring Results

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All monitoring results for high priority management plan constituents in the Duck Slough @ Gurr Rd subwatershed are listed in Table VI-6. These constituents include thiobencarb, copper (dissolved and total), chlorpyrifos, *C. dubia*, *S. capricornutum* and *H. azteca* toxicity.

Duck Slough @ Gurr Rd was sampled both upstream and downstream of the bridge on Gurr Rd on June 19, 2007 to determine if a difference in water quality existed between the two waterbodies (Table VI-6). The water upstream of the bridge was dammed and was not flowing downstream although a pipe was discharging water into a pool. Just downstream of this dam is Dean Drain which inputs water from the north. To date, sampling always occurs downstream of Dean Drain. Both samples collected from Duck Slough on June 19, 2007 had detections of copper and no thiobencarb.

A single exceedance of the chlorpyrifos WQTL occurred at Duck Slough @ Gurr Rd in July 2004. Chlorpyrifos was monitored during July 2007 as part of additional MPM and did not exceed the WQTL. In addition to MPM during months of past exceedances, this location was sampled monthly during storm and irrigation monitoring in 2006, 2007 and 2008, chlorpyrifos was analyzed during these events and no exceedances occurred. High priority MPM for chlorpyrifos took place in 2010 (April and July) and Assessment Monitoring was conducted monthly in 2011. There were no exceedances of the chlorpyrifos WQTL in samples collected from Duck Slough @ Gurr Rd 2006, 2007 and 2008 (during the storm and irrigation seasons), 2010 (MPM) or 2011 (monthly Assessment Monitoring). In 2012, Duck Slough @ Gurr Rd will be monitored for Core Monitoring constituents and MPM for chlorpyrifos is scheduled to continue in July.

There were two exceedances of thiobencarb at Duck Slough @ Gurr Rd, both occurred during 2006 (June and July). During 2007, thiobencarb was monitored monthly and additional MPM occurred in both June and July for the constituent (Table VI-6). There were no other instances of thiobencarb exceedances in samples collected from Duck Slough @ Gurr Rd. The Coalition no longer initiates MPM for thiobencarb as the constituent is covered under the Rice Coalition's management plan.

Exceedances of total copper occurred at Duck Slough @ Gurr Rd in 2006 (June and July), 2007 (February and June), 2008 (January and February) and a single exceedance of the dissolved copper fraction occurred in 2009 (May). During 2007, copper was monitored monthly (during the storm and irrigation seasons) and as additional MPM during June and July. The 2007 samples resulted in exceedances of the copper WQTL based on hardness in both MPM and NM samples collected in June (Table VI-6). In 2008, Normal Monitoring and MPM monitoring for copper resulted in detections in every sample including samples collected from the upstream site at Duck Slough @ Hwy 59. In 2009, both the total and dissolved copper fractions were analyzed from January through May and a single exceedance occurred in May. In 2010 and 2011, MPM for copper (both total and dissolved) took place during months of past exceedances and no exceedances occurred during either year (Table VI-6). In 2012, MPM for copper is scheduled to occur during months of past exceedances (January-February and May-July).

Water column toxicity to *C. dubia* occurred in samples collected during storm monitoring in 2006 (February and March) at Duck Slough @ Gurr Rd. Since the last toxicity in March 2006, no other instances of *C. dubia* toxicity occurred at the site from Normal Monitoring in 2008 (storm and irrigation) or 2011 Assessment Monitoring (January-December). In 2012, MPM for *C. dubia* toxicity is scheduled to occur (February and March).

Water column toxicity to *S. capricornutum* occurred in samples collected in 2004 (September) and 2007 (July). Toxicity to *S. capricornutum* combined with exceedances of copper in the past, resulted in *S. capricornutum* toxicity being categorized as a high priority constituent. A TIE was initiated only if algal growth was less than 50% compared to the control. Neither the 2004 or 2007 toxicities required a TIE. The resample collected from the July 2007 event indicated that the toxicity was not persistent. Since the most recent toxicity in July 2007, there were no more instances of toxicity to *S. capricornutum* in samples collected from Duck Slough @ Gurr Rd. The Coalition monitored for *S. capricornutum* in 2008 (during the storm and irrigation season), during 2010 MPM and 2011 Assessment Monitoring. None of the samples from 2008, 2010 or 2011 were toxic to *S. capricornutum*. In addition to 2008 Normal Monitoring at Duck Slough @ Gurr Rd, MPM for *S. capricornutum* toxicity took place at both upstream locations. The upstream location North Slough @ Hwy 59 was dry during both its scheduled MPM events in July and September, and samples from Duck Slough @ Hwy 59 were not toxic (Table VI-6). In 2012, MPM for *S. capricornutum* toxicity is scheduled to occur (July and September).

Sediment toxicity to *H. azteca* occurred in samples collected from the irrigation season in 2004, 2005, 2008, 2010 and 2011. Management Plan Monitoring for *H. azteca* toxicity was conducted during the 2010 irrigation season and samples were toxic. In 2011, sediment samples were collected during the storm and irrigation events and the MPM for *H. azteca* toxicity collected during the irrigation event tested toxic (Table VI-6). In 2012, MPM for *H. azteca* toxicity will continue in September.



**Table VI-6. Duck Slough @ Gurr Rd site subwatershed monitoring results for high priority constituents (2007-2011).**

Exceedance values are in bold. Resampling (RS) due to toxicity not included in table.

|                                           | MONTH:                                       | JAN     | FEB     | MAR     | APR     | MAY     | JUN     | JUL                  | AUG     | SEP     | OCT     | NOV | DEC |    |
|-------------------------------------------|----------------------------------------------|---------|---------|---------|---------|---------|---------|----------------------|---------|---------|---------|-----|-----|----|
| 2007 NM<br>(@ Gurr Rd)                    | Date                                         | NA      | 2/12/07 | 2/28/07 | NA      | 4/24/07 | 5/29/07 | 6/26/07              | 7/24/07 | 8/21/07 | 9/18/07 | NA  | NA  | NA |
|                                           | Copper (µg/L)                                | NA      | 47      | 11      | NA      | 4.6     | 5.3     | 4.6                  | 4       | 4.8     | 5.5     | NA  | NA  | NA |
|                                           | Chlorpyrifos (µg/L)                          | NA      | <0.003  | <0.003  | NA      | <0.003  | <0.003  | <0.003               | 0.007   | <0.003  | 0.009   | NA  | NA  | NA |
|                                           | Thiobencarb (µg/L)                           | NA      | <0.06   | <0.06   | NA      | <0.06   | <0.06   | <0.06                | <0.06   | <0.06   | <0.06   | NA  | NA  | NA |
| 2007 MPM A<br>(@ Gurr Rd)                 | Date                                         | NA      | NA      | NA      | NA      | NA      | 6/19/07 | 6/19/07 <sup>u</sup> | 7/31/07 | NA      | NA      | NA  | NA  | NA |
|                                           | Copper (µg/L)                                | NA      | NA      | NA      | NA      | NA      | 5.4     | 15                   | 8.6     | NA      | NA      | NA  | NA  | NA |
|                                           | Chlorpyrifos (µg/L)                          | NA      | NA      | NA      | NA      | NA      | NA      | NA                   | 0.007   | NA      | NA      | NA  | NA  | NA |
|                                           | Thiobencarb (µg/L)                           | NA      | NA      | NA      | NA      | NA      | <0.06   | <0.06                | <0.06   | NA      | NA      | NA  | NA  | NA |
| 2008 NM<br>(@ Gurr Rd)                    | Date                                         | 1/25/08 | 2/25/08 | NA      | 4/29/08 | 5/27/08 | 6/24/08 | 7/29/08              | 8/26/08 | 9/30/08 | NA      | NA  | NA  |    |
|                                           | Copper (µg/L)                                | 13      | 17      | NA      | 2.7     | 7.1     | 4.0     | 5.4                  | 3.5     | 6.1     | NA      | NA  | NA  |    |
|                                           | <i>S. capricornutum</i> toxicity (% Control) | 126     | 97      | NA      | 175     | 309     | 459     | 350                  | 262     | 263     | NA      | NA  | NA  |    |
| 2008 MPM<br>US<br>(@ Hwy 59)              | Date                                         | NA      | NA      | NA      | NA      | NA      | 6/24/08 | 7/29/08              | NA      | 9/30/08 | NA      | NA  | NA  |    |
|                                           | Copper (µg/L)                                | NA      | NA      | NA      | NA      | NA      | 12      | 18                   | NA      | NA      | NA      | NA  | NA  |    |
|                                           | <i>S. capricornutum</i> toxicity (% Control) | NA      | NA      | NA      | NA      | NA      | NA      | 271                  | NA      | 131     | NA      | NA  | NA  |    |
| 2008 MPM<br>US<br>(North Slough @ Hwy 59) | Date                                         | NA      | NA      | NA      | NA      | NA      | NA      | 7/29/08              | NA      | 9/30/08 | NA      | NA  | NA  |    |
|                                           | Copper (µg/L)                                | NA      | NA      | NA      | NA      | NA      | NA      | Dry                  | NA      | Dry     | NA      | NA  | NA  |    |
|                                           | <i>S. capricornutum</i> toxicity (% Control) | NA      | NA      | NA      | NA      | NA      | NA      | Dry                  | NA      | Dry     | NA      | NA  | NA  |    |
| 2009 NM<br>(@ Gurr Rd)                    | Date                                         | 1/20/09 | 2/7/09  | 3/17/09 | 4/21/09 | 5/19/09 | 6/16/09 | 7/21/09              | 8/18/09 | 9/22/09 | NA      | NA  | NA  |    |
|                                           | Copper, dissolved (µg/L)                     | 0.2     | 7.6     | 4.6     | 2.6     | 7.3     | NA      | NA                   | NA      | NA      | NA      | NA  | NA  |    |
|                                           | Copper, total (µg/L)                         | 0.4     | 11      | 6.3     | 3.3     | 15      | NA      | NA                   | NA      | NA      | NA      | NA  | NA  |    |
| 2010 MPM<br>(@ Gurr Rd)                   | Date                                         | 1/19/10 | 2/23/10 | NA      | 4/20/10 | 5/18/10 | 6/15/10 | 7/20/10              | 8/17/10 | 9/14/10 | NA      | NA  | NA  |    |
|                                           | Copper, dissolved (µg/L)                     | 2       | 4.4     | NA      | NA      | NA      | 1.2     | 1.0                  | NA      | NA      | NA      | NA  | NA  |    |
|                                           | Copper, total (µg/L)                         | 12      | 5.4     | NA      | NA      | NA      | 3.3     | 3.6                  | NA      | NA      | NA      | NA  | NA  |    |
|                                           | Chlorpyrifos (µg/L)                          | NA      | NA      | NA      | <0.003  | NA      | NA      | <0.003               | NA      | NA      | NA      | NA  | NA  |    |
|                                           | <i>S. capricornutum</i> toxicity (% Control) | NA      | NA      | NA      | NA      | NA      | NA      | 542                  | NA      | 423     | NA      | NA  | NA  |    |
|                                           | <i>H. azteca</i> toxicity (% Control)        | NA      | NA      | NA      | NA      | NA      | NA      | NA                   | NA      | 70      | NA      | NA  | NA  |    |

|                                          | MONTH:                                       | JAN     | FEB     | MAR     |         | APR     | MAY     | JUN     | JUL     | AUG     | SEP     | OCT      | NOV     | DEC     |
|------------------------------------------|----------------------------------------------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|----------|---------|---------|
|                                          | Date                                         | 1/18/11 | 2/17/11 | 3/15/11 | 3/17/11 | 4/19/11 | 5/17/11 | 6/21/11 | 7/19/11 | 8/16/11 | 9/13/11 | 10/11/11 | 11/8/11 | 12/6/11 |
| <b>2011 NM &amp; MPM<br/>(@ Gurr Rd)</b> | Copper, dissolved (µg/L)                     | 1.1*    | 1.4*    | 1.3     | NA      | 1.5     | 0.85*   | 1.5*    | 0.89*   | 0.91    | 0.50    | 0.42     | 0.75    | Dry     |
|                                          | Copper, total (µg/L)                         | 2.2*    | 1.6*    | 1.9     | NA      | 3.3     | 2.6*    | 8.5*    | 3.0*    | 4.0     | 3.1     | 2.8      | 1.7     | Dry     |
|                                          | Chlorpyrifos (µg/L)                          | <0.003  | <0.003  | <0.003  | NA      | <0.003  | <0.003  | <0.003  | <0.003  | <0.003  | <0.003  | <0.003   | <0.003  | Dry     |
|                                          | <i>C. dubia</i> toxicity (% Control)         | 100     | 100*    | 100*    | NA      | 100     | 100     | 100     | 100     | 95      | 100     | 100      | 100     | Dry     |
|                                          | <i>S. capricornutum</i> toxicity (% Control) | 953     | 393     | 1054    | NA      | 671     | 652     | 276     | 409     | 980     | 616*    | 554      | 2370    | Dry     |
|                                          | <i>H. azteca</i> toxicity (% Control)        | NA      | NA      | NA      | 98      | NA      | NA      | NA      | NA      | NA      | 90*     | NA       | NA      | NA      |
|                                          |                                              |         |         |         |         |         |         |         |         |         |         |          |         |         |

A – Additional MPM conducted in 2007 only.

MPM – Management Plan Monitoring (see Table 4 for MPM schedule)

NA – Not applicable. No monitoring occurred on this date for this constituent.

NM – Normal Monitoring

<sup>U</sup>Upstream of bridge on Gurr Rd

US – Upstream MPM conducted in 2008 only.

\*NM & MPM occurred during this date for this constituent.

## Load Calculations

Loads have been calculated for all chlorpyrifos and copper detections in the site subwatershed (Table VI-7) based on the following formula:

$$\text{Load} = \text{Discharge (cfs)} \times 28.317\text{L/ft}^3 \times \text{Concentration (mg/L} \times 1000 \text{ or } \mu\text{g/L)}.$$

The load values for constituents in this report represent instantaneous loads only. These values should not be used to extrapolate loading over any period of time (e.g. weekly, monthly, seasonal or annual).

The primary purpose for reporting instantaneous loads is to provide a normalization of the concentrations by flow for various constituents at the time the samples were collected.

**Table VI-7. Duck Slough @ Gurr Rd site subwatershed instantaneous load calculations for chlorpyrifos, and copper.**

Upstream site is italicized. Sorted by analyte and date.

| SITE NAME                   | ANALYTE NAME  | SAMPLE DATE     | DISCHARGE CFS | CONCENTRATION $\mu\text{G/L}$ | LOADING RATE $\mu\text{G/SEC}$ |
|-----------------------------|---------------|-----------------|---------------|-------------------------------|--------------------------------|
| Duck Slough @ Gurr Rd       | Chlorpyrifos  | 08/08/06        | 6.62          | 0.014                         | 2.62                           |
| Duck Slough @ Gurr Rd       | Chlorpyrifos  | 07/24/07        | 1.78          | 0.007                         | 0.35                           |
| Duck Slough @ Gurr Rd       | Chlorpyrifos  | 07/31/07        | 3.25          | 0.007                         | 0.64                           |
| Duck Slough @ Gurr Rd       | Chlorpyrifos  | 09/18/07        | 5.2           | 0.009                         | 1.33                           |
| Duck Slough @ Gurr Rd       | Chlorpyrifos  | 07/29/08        | 0.4           | 0.011                         | 0.12                           |
| Duck Slough @ Gurr Rd       | Chlorpyrifos  | 01/20/09        | 0.23          | 0.012                         | 0.08                           |
| Duck Slough @ Gurr Rd       | Copper        | 05/17/06        | 2.29          | 2.9                           | 188.05                         |
| Duck Slough @ Gurr Rd       | Copper        | 06/14/06        | 1.61          | 120                           | 5470.84                        |
| Duck Slough @ Gurr Rd       | Copper        | 07/12/06        | 10.93         | 14                            | 4333.07                        |
| Duck Slough @ Gurr Rd       | Copper        | 08/08/06        | 6.62          | 3.8                           | 712.34                         |
| Duck Slough @ Gurr Rd*      | Copper        | 09/13/06        | 0.96          | 4                             | 108.74                         |
| Duck Slough @ Gurr Rd       | Copper        | 09/13/06        | 0.96          | 4.1                           | 111.46                         |
| Duck Slough @ Gurr Rd*      | Copper        | 02/12/07        | 298.79        | 44                            | 372276.80                      |
| Duck Slough @ Gurr Rd*      | Copper        | 02/12/07        | 298.79        | 46                            | 389198.48                      |
| Duck Slough @ Gurr Rd       | Copper        | 02/12/07        | 298.79        | 47                            | 397659.31                      |
| Duck Slough @ Gurr Rd       | Copper        | 02/28/07        | 321.45        | 11                            | 100127.50                      |
| Duck Slough @ Gurr Rd       | Copper        | 04/24/07        | 1.88          | 4.6                           | 244.89                         |
| Duck Slough @ Gurr Rd       | Copper        | 05/29/07        | 1.02          | 5.3                           | 153.08                         |
| Duck Slough @ Gurr Rd       | Copper        | 06/19/07        | 0             | 15                            | 0                              |
| Duck Slough @ Gurr Rd       | Copper        | 06/19/07        | 0.99          | 5.4                           | 151.38                         |
| Duck Slough @ Gurr Rd       | Copper        | 06/26/07        | 1.12          | 4.6                           | 145.89                         |
| Duck Slough @ Gurr Rd       | Copper        | 07/24/07        | 1.78          | 4                             | 201.62                         |
| Duck Slough @ Gurr Rd       | Copper        | 07/31/07        | 3.25          | 8.6                           | 791.46                         |
| Duck Slough @ Gurr Rd       | Copper        | 08/21/07        | 1.38          | 4.8                           | 187.57                         |
| Duck Slough @ Gurr Rd       | Copper        | 09/18/07        | 5.2           | 5.5                           | 809.87                         |
| Duck Slough @ Gurr Rd*      | Copper        | 09/18/07        | 5.2           | 6.4                           | 942.39                         |
| Duck Slough @ Gurr Rd       | Copper        | 04/29/08        | 0.56          | 2.7                           | 42.82                          |
| Duck Slough @ Gurr Rd       | Copper        | 05/27/08        | 0.43          | 7.1                           | 86.45                          |
| Duck Slough @ Gurr Rd*      | Copper        | 05/27/08        | 0.43          | 7.3                           | 88.89                          |
| Duck Slough @ Gurr Rd       | Copper        | 06/24/08        | 0.65          | 4                             | 73.62                          |
| <i>Duck Slough @ Hwy 59</i> | <i>Copper</i> | <i>06/24/08</i> | <i>0.64</i>   | <i>12</i>                     | <i>217.47</i>                  |
| Duck Slough @ Gurr Rd       | Copper        | 07/29/08        | 0.4           | 5.4                           | 61.16                          |
| <i>Duck Slough @ Hwy 59</i> | <i>Copper</i> | <i>07/29/08</i> | <i>0.47</i>   | <i>18</i>                     | <i>239.56</i>                  |

| SITE NAME              | ANALYTE NAME | SAMPLE DATE | DISCHARGE CFS | CONCENTRATION µG/L | LOADING RATE µG/SEC |
|------------------------|--------------|-------------|---------------|--------------------|---------------------|
| Duck Slough @ Gurr Rd  | Copper       | 08/26/08    | 1.1           | 3.5                | 109.02              |
| Duck Slough @ Gurr Rd  | Copper       | 09/30/08    | 0.21          | 6.1                | 36.27               |
| Duck Slough @ Gurr Rd  | Copper       | 12/16/08    | 0.31          | 1.2                | 10.53               |
| Duck Slough @ Gurr Rd  | Copper       | 01/20/09    | 0.23          | 0.4                | 2.61                |
| Duck Slough @ Gurr Rd  | Copper       | 02/07/09    | 2.57          | 11                 | 800.52              |
| Duck Slough @ Gurr Rd  | Copper       | 03/17/09    | 0             | 6.3                | 0                   |
| Duck Slough @ Gurr Rd  | Copper       | 04/21/09    | 0.67          | 3.3                | 62.61               |
| Duck Slough @ Gurr Rd  | Copper       | 05/19/09    | 0.19          | 15                 | 80.70               |
| Duck Slough @ Gurr Rd  | Copper       | 01/19/10    | 0             | 12                 | 0                   |
| Duck Slough @ Gurr Rd  | Copper       | 02/23/10    | 3.07          | 5.4                | 469.44              |
| Duck Slough @ Gurr Rd  | Copper       | 06/15/10    | 5.97          | 3.3                | 557.87              |
| Duck Slough @ Gurr Rd  | Copper       | 07/20/10    | 21.67         | 3.6                | 2209.07             |
| Duck Slough @ Gurr Rd  | Copper       | 01/18/11    | 58.55         | 2.2                | 3647.51             |
| Duck Slough @ Gurr Rd* | Copper       | 02/17/11    | 23            | 1.5                | 976.94              |
| Duck Slough @ Gurr Rd  | Copper       | 02/17/11    | 23            | 1.6                | 1042.07             |
| Duck Slough @ Gurr Rd  | Copper       | 03/15/11    | 20.47         | 1.9                | 1101.33             |
| Duck Slough @ Gurr Rd* | Copper       | 03/15/11    | 20.47         | 1.9                | 1101.33             |
| Duck Slough @ Gurr Rd  | Copper       | 06/21/11    | 2.73          | 8.5                | 657.10              |
| Duck Slough @ Gurr Rd  | Copper       | 07/19/11    | 15.97         | 3                  | 1356.67             |
| Duck Slough @ Gurr Rd  | Copper       | 09/13/11    | 52.21         | 3.1                | 4583.13             |
| Duck Slough @ Gurr Rd  | Copper       | 10/11/11    | 79.08         | 2.8                | 6270.06             |
| Duck Slough @ Gurr Rd  | Copper       | 11/08/11    | 5.81          | 1.7                | 279.69              |
| Duck Slough @ Gurr Rd  | Copper (D)   | 12/16/08    | 0.31          | 0.3                | 2.63                |
| Duck Slough @ Gurr Rd  | Copper (D)   | 01/20/09    | 0.23          | 0.2                | 1.30                |
| Duck Slough @ Gurr Rd  | Copper (D)   | 02/07/09    | 2.57          | 7.6                | 553.09              |
| Duck Slough @ Gurr Rd  | Copper (D)   | 03/17/09    | 0             | 4.6                | 0                   |
| Duck Slough @ Gurr Rd  | Copper (D)   | 04/21/09    | 0.67          | 2.6                | 49.33               |
| Duck Slough @ Gurr Rd  | Copper (D)   | 05/19/09    | 0.19          | 7.3                | 39.28               |
| Duck Slough @ Gurr Rd  | Copper (D)   | 01/19/10    | 0             | 2                  | 0                   |
| Duck Slough @ Gurr Rd  | Copper (D)   | 02/23/10    | 3.07          | 4.4                | 382.51              |
| Duck Slough @ Gurr Rd  | Copper (D)   | 06/15/10    | 5.97          | 1.2                | 202.86              |
| Duck Slough @ Gurr Rd  | Copper (D)   | 07/20/10    | 21.67         | 1                  | 613.63              |
| Duck Slough @ Gurr Rd  | Copper (D)   | 01/18/11    | 58.55         | 1.1                | 1823.76             |
| Duck Slough @ Gurr Rd* | Copper (D)   | 02/17/11    | 23            | 1.2                | 781.55              |
| Duck Slough @ Gurr Rd  | Copper (D)   | 02/17/11    | 23            | 1.4                | 911.81              |
| Duck Slough @ Gurr Rd* | Copper (D)   | 03/15/11    | 20.47         | 1.1                | 637.61              |
| Duck Slough @ Gurr Rd  | Copper (D)   | 03/15/11    | 20.47         | 1.3                | 753.54              |
| Duck Slough @ Gurr Rd  | Copper (D)   | 06/21/11    | 2.73          | 1.5                | 115.96              |
| Duck Slough @ Gurr Rd  | Copper (D)   | 07/19/11    | 15.97         | 0.89               | 402.48              |
| Duck Slough @ Gurr Rd  | Copper (D)   | 09/13/11    | 52.21         | 0.5                | 739.22              |
| Duck Slough @ Gurr Rd  | Copper (D)   | 10/11/11    | 79.08         | 0.42               | 940.51              |
| Duck Slough @ Gurr Rd  | Copper (D)   | 11/08/11    | 5.81          | 0.75               | 123.39              |

Copper (D)-Dissolved Copper

\*Field Duplicate

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### Source Identification and Outreach

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To address source identification and determine an outreach strategy, the Coalition focuses its efforts on applied pesticides by considering past monitoring results and associated PUR data. In 2007 and 2008, the Coalition conducted additional MPM and upstream monitoring during the months when exceedances historically occurred to better characterize water quality in the subwatershed. MPM resumed at Duck Slough @ Gurr Rd in 2010 during months when past exceedances historically occurred and continued in 2011 to assess water quality in the subwatershed as outreach in the area progressed. The Coalition also reviews PUR data to determine the most frequent crop type and timing associated with high priority constituent applications. Duck Creek @ Gurr Rd subwatershed PUR data are available through October 2011.

Focused outreach to document current management practices and track implementation of additional management practices in the Duck Slough @ Gurr Rd subwatershed began in 2010 and continued through 2011. The Coalition organized grower meetings and mailings to educate growers about management practices and their importance in achieving acceptable water quality. The Coalition contacted 100% of targeted growers (6) representing 2,656 acres within the Duck Slough @ Gurr Rd subwatershed. All six growers participated in follow up contacts to determine if additional management practices were implemented and if any are planned to be implemented. MPM will continue in the Duck Slough @ Gurr Rd subwatershed in 2012 as necessary to assess the effect of outreach on water quality.

### Priority A/B Constituents

Chlorpyrifos is the only priority A/B constituent in the Duck Slough @ Gurr Rd subwatershed management plan.

#### Chlorpyrifos

Chlorpyrifos exceeded the WQTL of 0.015 µg/L once in July, 2004. Additional MPM occurred for chlorpyrifos in 2007 and starting in 2010 MPM took place in April and July. Monthly Assessment Monitoring for chlorpyrifos was conducted in 2011. No exceedances of the chlorpyrifos WQTL occurred in the Duck Slough @ Gurr subwatershed since 2004. The Coalition evaluates monitoring and PUR data to identify possible sources of past exceedances.

PUR data are reviewed for the number of monthly applications, pounds of active ingredient applied of the constituent of concern, and acres treated by the constituent of concern (Table VI-8, Figure VI-2). The amount of chlorpyrifos applied within the subwatershed fluctuated over the years. The greatest chlorpyrifos use occurred in 2005 (5,293 lbs AI). The lowest use was in 2009 (646 lbs AI) and the month of greatest chlorpyrifos use varied over the years. In 2004 through 2007 the greatest amount of chlorpyrifos was applied in July, in 2008 and 2010 in August, in 2009 was March, and in 2011 the month of greatest use was June (Table VI-8, Figure VI-2). The 2004 exceedance did occur during the month of greatest chlorpyrifos use for that year, but months with greater use have not resulted in chlorpyrifos exceedances in the subwatershed (Figure VI-2).

The Coalition also uses PUR data to assess which crops receive the most applications (Table VI-9). The highest application rates of chlorpyrifos in the Duck Slough @ Gurr Rd subwatershed are associated with almonds (9,661 lbs AI), alfalfa (4,615 lbs AI), and corn (2,713 lbs AI). The most common product containing chlorpyrifos applied within the subwatershed was Lorsban (Table VI-9).

**Table VI-8. Duck Slough @ Gurr Road site subwatershed chlorpyrifos applications, lbs AI applied, and acres treated by month (2004-2011).**

PUR data available through October 2011 for Merced County. If month is not included in table, no applications were made.

| MONTH/YEAR      | NUMBER OF CHLORPYRIFOS APPLICATIONS | POUNDS OF AI APPLIED | ACRES TREATED |
|-----------------|-------------------------------------|----------------------|---------------|
| January, 2004   | 4.0                                 | 88.0                 | 43.6          |
| March, 2004     | 2.0                                 | 4.5                  | 97.0          |
| April, 2004     | 8.0                                 | 100.1                | 236.0         |
| May, 2004       | 1.0                                 | 77.9                 | 60.0          |
| June, 2004      | 3.0                                 | 204.9                | 128.0         |
| July, 2004      | 10.0                                | 457.5                | 375.0         |
| August, 2004    | 7.0                                 | 351.1                | 486.0         |
| January, 2005   | 4.0                                 | 76.9                 | 38.1          |
| March, 2005     | 21.0                                | 707.0                | 1224.5        |
| June, 2005      | 5.0                                 | 209.0                | 188.0         |
| July, 2005      | 16.0                                | 4199.8               | 800.0         |
| August, 2005    | 2.0                                 | 72.4                 | 143.5         |
| September, 2005 | 1.0                                 | 28.0                 | 14.0          |
| January, 2006   | 6.0                                 | 119.7                | 59.0          |

| MONTH/YEAR               | NUMBER OF CHLORPYRIFOS APPLICATIONS | POUNDS OF AI APPLIED | ACRES TREATED  |
|--------------------------|-------------------------------------|----------------------|----------------|
| March, 2006              | 5.0                                 | 105.9                | 336.0          |
| May, 2006                | 13.0                                | 706.5                | 433.0          |
| June, 2006               | 1.0                                 | 137.6                | 69.0           |
| July, 2006               | 5.0                                 | 570.2                | 508.0          |
| August, 2006             | 9.0                                 | 402.2                | 448.0          |
| September, 2006          | 7.0                                 | 359.1                | 331.5          |
| January, 2007            | 2.0                                 | 29.9                 | 15.0           |
| March, 2007              | 28.0                                | 694.0                | 1253.3         |
| April, 2007              | 3.0                                 | 28.8                 | 57.4           |
| May, 2007                | 3.0                                 | 327.3                | 177.8          |
| June, 2007               | 2.0                                 | 35.7                 | 27.0           |
| July, 2007               | 5.0                                 | 701.7                | 436.0          |
| August, 2007             | 12.0                                | 404.0                | 805.4          |
| March, 2008              | 29.0                                | 465.2                | 1038.6         |
| May, 2008                | 8.0                                 | 480.6                | 297.0          |
| June, 2008               | 1.0                                 | 10.2                 | 8.0            |
| July, 2008               | 13.0                                | 410.3                | 861.9          |
| August, 2008             | 24.0                                | 655.3                | 1193.0         |
| September, 2008          | 2.0                                 | 34.6                 | 98.0           |
| March, 2009              | 15.0                                | 356.1                | 890.0          |
| April, 2009              | 1.0                                 | 31.7                 | 42.2           |
| July, 2009               | 2.0                                 | 70.1                 | 140.0          |
| August, 2009             | 3.0                                 | 131.1                | 173.0          |
| September, 2009          | 4.0                                 | 57.2                 | 227.4          |
| March, 2010              | 22.0                                | 389.5                | 1061.9         |
| June, 2010               | 13.0                                | 655.7                | 874.3          |
| July, 2010               | 15.0                                | 413.3                | 691.2          |
| August, 2010             | 11.0                                | 2678.6               | 1577.1         |
| September, 2010          | 5.0                                 | 79.5                 | 278.0          |
| March, 2011              | 6.0                                 | 63.5                 | 308.5          |
| April, 2011              | 3.0                                 | 42.5                 | 196.0          |
| June, 2011               | 9.0                                 | 425.7                | 473.0          |
| July, 2011               | 2.0                                 | 36.7                 | 146.8          |
| August, 2011             | 9.0                                 | 306.1                | 590.2          |
| September, 2011          | 1.0                                 | 87.5                 | 175.0          |
| October, 2011            | 1.0                                 | 102.1                | 136.0          |
| <b>Summaries by Year</b> |                                     |                      |                |
| 2004 Total               | 35.0                                | 1284.0               | 1425.6         |
| 2005 Total               | 49.0                                | 5293.2               | 2408.1         |
| 2006 Total               | 46.0                                | 2401.0               | 2184.5         |
| 2007 Total               | 55.0                                | 2221.4               | 2772.0         |
| 2008 Total               | 77.0                                | 2056.0               | 3496.5         |
| 2009 Total               | 25.0                                | 646.1                | 1472.6         |
| 2010 Total               | 66.0                                | 4216.6               | 4482.5         |
| 2011 Total               | 31.0                                | 1064.1               | 2025.5         |
| <b>Total</b>             | <b>384.0</b>                        | <b>19182.5</b>       | <b>20267.3</b> |

**Figure VI-2. Duck Slough @ Gurr Rd site subwatershed lbs chlorpyrifos applied by month (2004-2011).**

Asterisk (\*) denotes months with exceedances. PUR data available through October 2011 for Merced County.

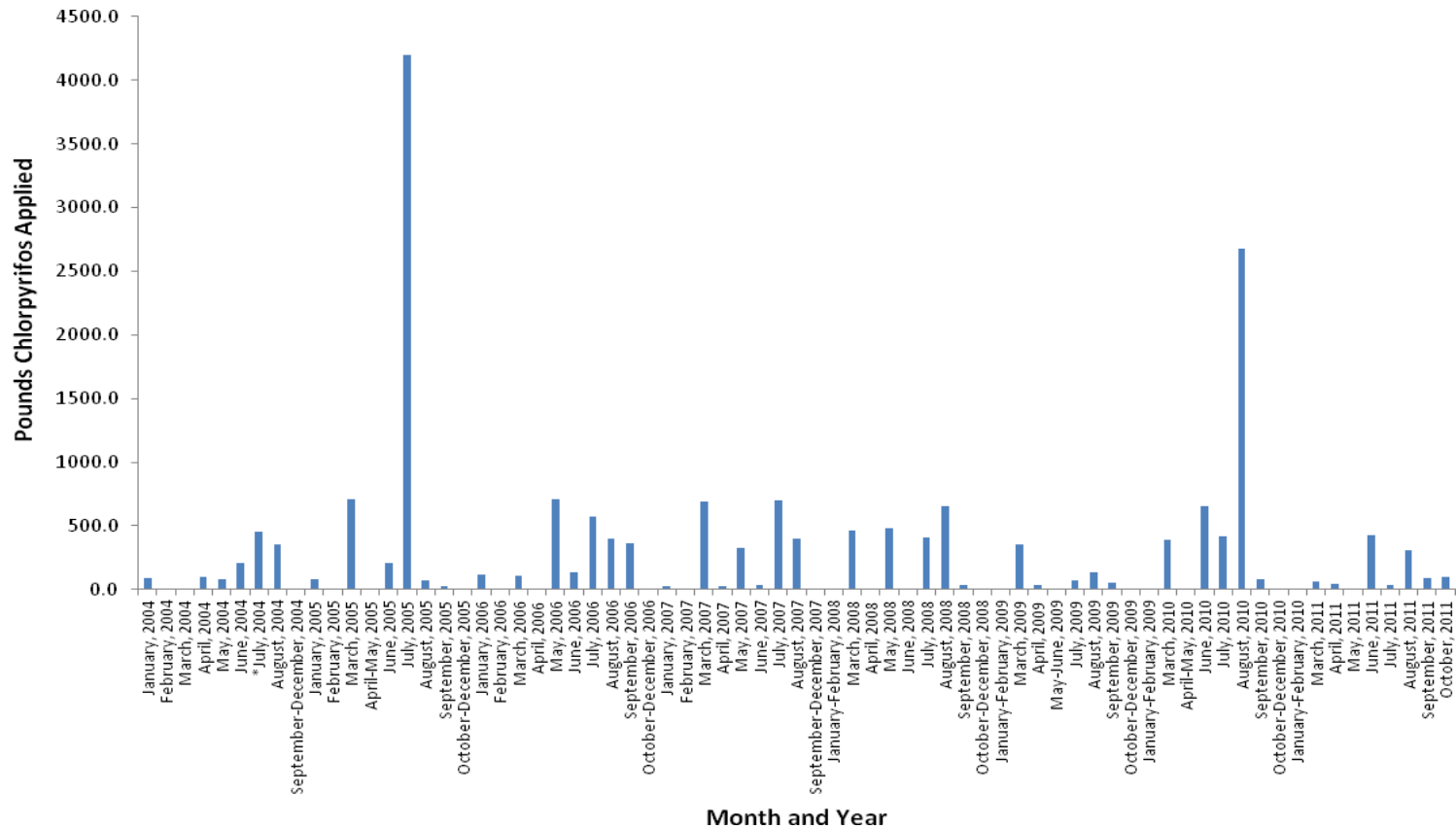




**Table VI-9. Duck Slough @ Gurr Rd site subwatershed chlorpyrifos PUR data (2004-2011).**

PUR data available through October 2011 for Merced County.

| CHEMICAL NAME                                   | COMMODITY                               | PRODUCT NAME                     | LBS AI APPLIED            |
|-------------------------------------------------|-----------------------------------------|----------------------------------|---------------------------|
| CHLORPYRIFOS                                    | ALFALFA (FORAGE - FODDER) (ALFALFA HAY) | COBALT                           | 197.5                     |
|                                                 |                                         | GOVERN 4E INSECTICIDE            | 741.0                     |
|                                                 |                                         | LOCK-ON INSECTICIDE              | 854.3                     |
|                                                 |                                         | LORSBAN 4E INSECTICIDE           | 63.9                      |
|                                                 |                                         | LORSBAN 4E-HF                    | 1022.6                    |
|                                                 |                                         | LORSBAN 4E-HF INSECTICIDE        | 63.4                      |
|                                                 |                                         | LORSBAN ADVANCED                 | 9.4                       |
|                                                 |                                         | LORSBAN-4E                       | 401.0                     |
|                                                 |                                         | NUFOS 4E                         | 744.4                     |
|                                                 |                                         | WARHAWK                          | 19.4                      |
|                                                 | ALMOND                                  | WHIRLWIND                        | 498.1                     |
|                                                 |                                         | CHLORPYRIFOS 4E AG               | 207.1                     |
|                                                 |                                         | GOVERN 4E INSECTICIDE            | 2187.7                    |
|                                                 |                                         | LORSBAN 4E INSECTICIDE           | 198.5                     |
|                                                 |                                         | LORSBAN 4E-HF                    | 1411.0                    |
|                                                 |                                         | LORSBAN ADVANCED                 | 10.9                      |
|                                                 |                                         | LORSBAN-4E                       | 3592.1                    |
|                                                 |                                         | NUFOS 4E                         | 1357.3                    |
|                                                 |                                         | WARHAWK                          | 20.2                      |
|                                                 | CORN (FORAGE - FODDER)                  | WHIRLWIND                        | 675.9                     |
|                                                 |                                         | CHLORPYRIFOS 4E AG               | 192.3                     |
|                                                 |                                         | GOVERN 4E INSECTICIDE            | 287.9                     |
|                                                 |                                         | LORSBAN 15G GRANULAR INSECTICIDE | 680.4                     |
|                                                 |                                         | LORSBAN 4E-HF                    | 146.4                     |
|                                                 |                                         | LORSBAN-4E                       | 104.2                     |
|                                                 |                                         | NUFOS 4E                         | 201.3                     |
|                                                 |                                         | SAURUS                           | 1081.4                    |
|                                                 | COTTON (GENERAL)                        | WHIRLWIND                        | 18.8                      |
|                                                 |                                         | CHLORPYRIFOS 4E AG               | 234.4                     |
|                                                 |                                         | LORSBAN ADVANCED                 | 161.1                     |
|                                                 |                                         | LORSBAN-4E                       | 15.8                      |
|                                                 | PEACH                                   | NUFOS 4E                         | 234.4                     |
|                                                 |                                         | CHLORPYRIFOS 4E AG               | 164.9                     |
|                                                 | SUGARBEET (GENERAL)                     | LORSBAN 4E-HF                    | 121.6                     |
|                                                 |                                         | LORSBAN-4E                       | 159.1                     |
|                                                 |                                         | NUFOS 4E                         | 52.9                      |
|                                                 | WALNUT                                  | WHIRLWIND                        | 18.8                      |
|                                                 |                                         | GOVERN 4E INSECTICIDE            | 15.2                      |
|                                                 |                                         | LORSBAN 4E-HF                    | 71.8                      |
|                                                 |                                         | LORSBAN-4E                       | 788.3                     |
|                                                 |                                         |                                  | QUALI-PRO CHLORPYRIFOS 4E |
| ALFALFA - Total Pounds Chlorpyrifos Applied     |                                         |                                  | 4615.2                    |
| ALMOND - Total Pounds Chlorpyrifos Applied      |                                         |                                  | 9660.7                    |
| CORN - Total Pounds Chlorpyrifos Applied        |                                         |                                  | 2712.8                    |
| COTTON- Total Pounds Chlorpyrifos Applied       |                                         |                                  | 645.6                     |
| PEACH - Total Pounds Chlorpyrifos Applied       |                                         |                                  | 286.5                     |
| SUGARBEET - Total Pounds Chlorpyrifos Applied   |                                         |                                  | 230.7                     |
| WALNUT - Total Pounds Chlorpyrifos Applied      |                                         |                                  | 1031.0                    |
| Total Pounds Chlorpyrifos Applied (2004 - 2011) |                                         |                                  | 19182.5                   |

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The Coalition determined the most probable source of chlorpyrifos in the Duck Slough @ Gurr Rd waterway to be spray drift from adjacent orchards. Growers were encouraged to review their farming operation to determine if their applications could result in spray drift. Operations with row crop were advised of methods to better manage their irrigation tailwater and storm water runoff, whereas outreach efforts to orchard growers focused on encouraging management practices to reduce spray drift and improve orchard and vineyard water management.

Coalition outreach since 2007 has included meetings and the mailing/distribution of information such as funding available for management practice implementation. A complete list of coalition outreach during 2011 is provided in the Actions Taken to Address Water Quality Exceedances section of the 2012 AMR (Table 46, page 142).

In accordance with the Coalition's Management Plan strategy, individual contacts with targeted growers began in June 2010. Targeted growers were selected based on the potential to drain or drift to the creek and those applying chlorpyrifos. Using these criteria, a list of six targeted growers was created comprising 2,656 acres in the subwatershed. Coalition representatives met with growers on their property to discuss the Duck Slough @ Gurr Rd management plan and offer recommendations specific to the parcel and land owner/operator. Current management practices were assessed by Coalition representatives and additional management practices were discussed and encouraged. Individual contacts focused mainly on chlorpyrifos exceedances; however, all water quality results were reviewed and discussed including copper, DO, *E. coli*, pH, SC, TDS, and lead as well as toxicity to *C. dubia*, *S. capricornutum*, and *H. azteca*.

To date, the Coalition contacted all six targeted members. Of the six members, recommended management practices to acreages in the Duck Slough @ Gurr Rd subwatershed include: recirculation/tailwater return system (34%), drainage basins/sediment ponds (33%), and use of polyacrylamide (33%). Based on the exact timing of each individual meeting and a grower's resources, some owners would not be able to implement recommended management practices until the 2011 irrigation season. In addition, long term structural BMPs (e.g. sediment ponds) will most likely take longer than two years to implement and will require additional tracking to document their implementation.

In April 2011, the Coalition followed up with growers to determine if the management practices recommended by Coalition representatives were implemented in 2010 and if any additional practices were planned for 2011. Implemented management practices in the Duck Slough @ Gurr Rd subwatershed included spraying areas close to waterbodies when the wind is blowing away from them (13%) and shutting off outside nozzles when spraying the outer rows of fields next to sensitive sites (87%). Growers who did not implement recommended practices indicated they had no available resources to do so. The Coalition will continue its strategy of notifying members about available funding opportunities and encourage them to take advantage of the application process.

To evaluate the management practice process, the Coalition monitored for high priority constituents at Duck Slough @ Gurr Rd monthly during 2011 Assessment Monitoring and is scheduled to continue MPM during months of past exceedances in 2012.

There were no chlorpyrifos exceedances for two or more consecutive years of monitoring during months of past exceedances in the Duck Slough @ Gurr subwatershed. A letter was submitted to the Regional Board on January 6, 2012, petitioning to remove the constituents from the active Duck Slough @ Gurr management plan.

### *Priority C Constituents*

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Copper is listed as the only priority C constituent for the Duck Slough @ Gurr Rd subwatershed.

#### **Copper**

Samples containing copper exceeded the hardness based WQTL nine times from 2006 through 2011. Upstream MPM during 2008 at the Hwy 59 location did not result in exceedances of copper. As of October 2008, the Coalition began to analyze for both total and dissolved fractions of copper. Total copper exceedances occurred during June and July 2006, February and June 2007, and in January and February 2008, while the single dissolved copper exceedance occurred in May 2009 (Table VI-5). Duck Slough @ Gurr Rd was not scheduled for MPM in 2009. The site became a high priority subwatershed in 2010 and MPM samples were collected and monthly Assessment Monitoring occurred in 2011. Since becoming a high priority subwatershed in 2010, there have been no other instances of copper exceedances.

PUR data are reviewed for the number of monthly copper applications, pounds of active ingredient applied, and acres treated (Table VI-10, Figure VI-3). The amount of copper applied within the subwatershed decreased continually each year from 2005 to 2009 with a slight increase occurring in 2010 and 2011. The largest amount of copper applied was in 2004 (15,249 lbs AI) while the smallest amount applied was in 2009 (1,949 lbs AI). The amount of copper applied in 2011 (through October) was 6,285 lbs AI. The month with the greatest amount of copper use has varied over time. In 2006, 2007, and 2011, the greatest amount of copper use occurred in January, whereas the greatest use amount occurred in December during 2008 and 2009. The greatest amount of copper use occurred in June in 2005 and January in 2011 (Table VI-10, Figure VI-3). Not all exceedances occurred during months of the greatest use (Figure VI-3).

The Coalition uses PUR data to assess which crops receive the most applications of copper. The largest amount of copper applied from 2004 through 2011 was associated with rice and almonds (Table VI-13). The most common product containing copper applied within the subwatershed was Kocide (Table VI-11).

**Table VI-10. Duck Slough @ Gurr Rd site subwatershed copper applications, lbs AI applied, and acres treated by month (2004-2011).**

PUR data available through October 2011 for Merced County. If month is not included in table, no applications were made.

| MONTH/YEAR      | NUMBER OF COPPER APPLICATIONS | POUNDS OF AI APPLIED | ACRES TREATED |
|-----------------|-------------------------------|----------------------|---------------|
| January, 2004   | 18.0                          | 2239.0               | 582.6         |
| February, 2004  | 6.0                           | 428.8                | 194.0         |
| March, 2004     | 3.0                           | 407.1                | 83.0          |
| April, 2004     | 5.0                           | 350.9                | 80.3          |
| May, 2004       | 5.0                           | 3177.9               | 213.6         |
| June, 2004      | 6.0                           | 3861.0               | 259.8         |
| July, 2004      | 1.0                           | 120.2                | 75.0          |
| August, 2004    | 3.0                           | 214.3                | 191.2         |
| September, 2004 | 1.0                           | 263.4                | 143.0         |
| October, 2004   | 4.0                           | 1328.3               | 575.0         |
| November, 2004  | 2.0                           | 550.1                | 224.0         |
| December, 2004  | 6.0                           | 2308.6               | 318.0         |
| January, 2005   | 12.0                          | 1568.7               | 376.1         |
| February, 2005  | 5.0                           | 514.8                | 159.7         |
| March, 2005     | 3.0                           | 369.9                | 81.0          |
| April, 2005     | 23.0                          | 1236.8               | 429.3         |
| May, 2005       | 10.0                          | 513.5                | 281.5         |
| June, 2005      | 10.0                          | 7053.8               | 475.0         |
| August, 2005    | 3.0                           | 139.8                | 127.8         |
| September, 2005 | 2.0                           | 82.4                 | 74.7          |
| October, 2005   | 1.0                           | 25.8                 | 21.0          |
| November, 2005  | 1.0                           | 69.1                 | 45.0          |
| December, 2005  | 5.0                           | 1122.8               | 153.0         |
| January, 2006   | 12.0                          | 1872.3               | 321.0         |
| February, 2006  | 8.0                           | 466.0                | 190.0         |
| March, 2006     | 3.0                           | 248.7                | 232.0         |
| April, 2006     | 10.0                          | 919.7                | 201.5         |
| May, 2006       | 11.0                          | 892.2                | 378.7         |
| June, 2006      | 1.0                           | 105.2                | 100.0         |
| August, 2006    | 1.0                           | 113.0                | 103.0         |
| October, 2006   | 2.0                           | 255.6                | 166.0         |
| December, 2006  | 2.0                           | 539.0                | 70.0          |
| January, 2007   | 9.0                           | 1502.7               | 223.0         |
| February, 2007  | 9.0                           | 549.1                | 290.0         |
| March, 2007     | 3.0                           | 309.2                | 115.0         |
| April, 2007     | 13.0                          | 601.1                | 212.5         |
| May, 2007       | 1.0                           | 136.8                | 130.0         |
| September, 2007 | 1.0                           | 137.2                | 85.0          |
| December, 2007  | 5.0                           | 247.0                | 88.0          |
| January, 2008   | 4.0                           | 601.0                | 110.0         |
| February, 2008  | 2.0                           | 650.3                | 42.0          |
| March, 2008     | 1.0                           | 8.1                  | 5.0           |
| April, 2008     | 2.0                           | 108.3                | 65.0          |
| May, 2008       | 3.0                           | 168.3                | 95.5          |
| September, 2008 | 1.0                           | 42.4                 | 92.0          |
| November, 2008  | 1.0                           | 166.0                | 60.0          |
| December, 2008  | 3.0                           | 901.0                | 100.0         |

| MONTH/YEAR               | NUMBER OF COPPER APPLICATIONS | POUNDS OF AI APPLIED | ACRES TREATED  |
|--------------------------|-------------------------------|----------------------|----------------|
| January, 2009            | 1.0                           | 220.5                | 70.0           |
| February, 2009           | 1.0                           | 35.6                 | 58.0           |
| April, 2009              | 6.0                           | 383.1                | 179.0          |
| May, 2009                | 6.0                           | 303.2                | 170.5          |
| August, 2009             | 1.0                           | 69.3                 | 30.0           |
| November, 2009           | 1.0                           | 77.0                 | 10.0           |
| December, 2009           | 4.0                           | 861.0                | 73.0           |
| January, 2010            | 6.0                           | 1178.9               | 149.3          |
| February, 2010           | 6.0                           | 119.7                | 112.5          |
| March, 2010              | 10.0                          | 222.3                | 180.5          |
| April, 2010              | 22.0                          | 1834.0               | 674.1          |
| May, 2010                | 18.0                          | 656.5                | 580.8          |
| January, 2011            | 16.0                          | 4229.2               | 1291.0         |
| February, 2011           | 5.0                           | 196.9                | 218.0          |
| March, 2011              | 1.0                           | 234.6                | 55.0           |
| April, 2011              | 12.0                          | 734.4                | 218.0          |
| May, 2011                | 12.0                          | 492.5                | 422.3          |
| June, 2011               | 15.0                          | 314.4                | 625.9          |
| October, 2011            | 4.0                           | 83.0                 | 182.2          |
| <b>Summaries by Year</b> |                               |                      |                |
| 2004 Total               | 60.0                          | 15249.6              | 2939.5         |
| 2005 Total               | 75.0                          | 12697.4              | 2224.1         |
| 2006 Total               | 50.0                          | 5411.9               | 1762.2         |
| 2007 Total               | 41.0                          | 3483.2               | 1143.5         |
| 2008 Total               | 17.0                          | 2645.2               | 569.5          |
| 2009 Total               | 20.0                          | 1949.7               | 590.5          |
| 2010 Total               | 62.0                          | 4011.5               | 1697.2         |
| 2011 Total               | 65.0                          | 6285.0               | 3012.4         |
| <b>Total</b>             | <b>390.0</b>                  | <b>51733.5</b>       | <b>13938.8</b> |

**Figure VI-3. Duck Slough @ Gurr Rd site subwatershed lbs copper applied by month (2004-2011).**

Asterisk (\*) denotes months with exceedances. PUR data available through October 2011 for Merced County.

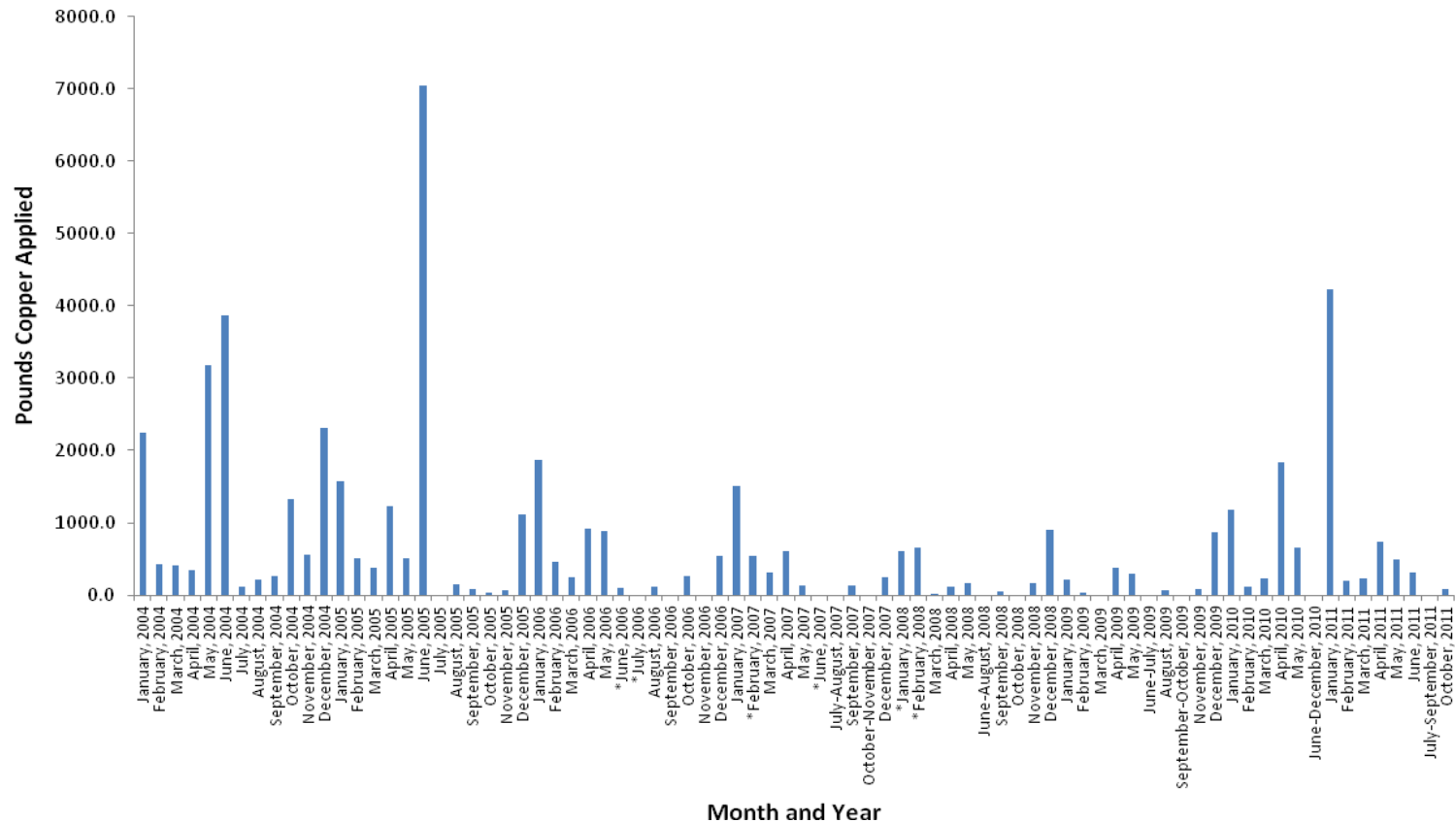


**Table VI-11. Duck Slough @ Gurr Rd site subwatershed copper PUR data (2004-2011).**

PUR data available through October 2011 for Merced County.

| CHEMICAL NAME | COMMODITY                                         | PRODUCT NAME                                                                     | LBS AI APPLIED |
|---------------|---------------------------------------------------|----------------------------------------------------------------------------------|----------------|
| COPPER        | ALFALFA (FORAGE - FODDER) (ALFALFA HAY)           | KOCIDE 2000                                                                      | 77.9           |
|               | ALMOND                                            | BASIC COPPER 53                                                                  | 254.8          |
|               |                                                   | BASICOP                                                                          | 307.4          |
|               |                                                   | CHAMPION WETTABLE POWDER                                                         | 80.1           |
|               |                                                   | CUPROFIX ULTRA 40 DISPERSS                                                       | 1539.9         |
|               |                                                   | DUPONT KOCIDE 2000 FUNGICIDE/BACTERICIDE                                         | 1569.3         |
|               |                                                   | DUPONT KOCIDE 3000 FUNGICIDE/BACTERICIDE                                         | 1015.4         |
|               |                                                   | DUPONT KOCIDE DF FUNGICIDE/BACTERICIDE                                           | 35.6           |
|               |                                                   | KOCIDE 101                                                                       | 2750.4         |
|               |                                                   | KOCIDE 2000                                                                      | 470.8          |
|               |                                                   | KOCIDE DF                                                                        | 1899.7         |
|               |                                                   | KOP-HYDROXIDE 50W                                                                | 468.2          |
|               |                                                   | NORDOX                                                                           | 76.7           |
|               |                                                   | NORDOX 75 WG                                                                     | 2747.2         |
|               |                                                   | NU-COP 50 WP                                                                     | 52.4           |
|               | APRICOT                                           | BASIC COPPER 53                                                                  | 58.8           |
|               |                                                   | KOCIDE 2000                                                                      | 118.4          |
|               |                                                   | KOCIDE DF                                                                        | 122.8          |
|               | CHERRY                                            | NU-COP 50DF                                                                      | 154.0          |
|               | NECTARINE                                         | BASIC COPPER 53                                                                  | 98.0           |
|               |                                                   | CHAMPION WETTABLE POWDER                                                         | 24.1           |
|               |                                                   | DUPONT GX-569 FUNGICIDE/BACTERICIDE                                              | 27.7           |
|               |                                                   | DUPONT KOCIDE 2000 FUNGICIDE/BACTERICIDE                                         | 42.4           |
|               |                                                   | DUPONT KOCIDE 3000 FUNGICIDE/BACTERICIDE                                         | 23.1           |
|               |                                                   | KOCIDE 101                                                                       | 1155.0         |
|               |                                                   | KOCIDE 2000                                                                      | 201.8          |
|               | N-OUTDR CONTAINER/FLD GRWN PLANTS                 | BASIC COPPER 53                                                                  | 1519.0         |
|               |                                                   | CUPROFIX ULTRA 40 DISPERSS                                                       | 113.8          |
|               |                                                   | DUPONT GX-569 FUNGICIDE/BACTERICIDE                                              | 53.4           |
|               |                                                   | DUPONT KOCIDE 2000 FUNGICIDE/BACTERICIDE                                         | 64.6           |
|               |                                                   | DUPONT KOCIDE 3000 FUNGICIDE/BACTERICIDE                                         | 497.9          |
|               |                                                   | KOCIDE 101                                                                       | 473.6          |
|               |                                                   | KOCIDE DF                                                                        | 306.3          |
|               | PEACH                                             | BASIC COPPER 53                                                                  | 2959.6         |
|               |                                                   | DUPONT KOCIDE 2000 FUNGICIDE/BACTERICIDE                                         | 172.2          |
|               |                                                   | DUPONT KOCIDE 3000 FUNGICIDE/BACTERICIDE                                         | 8.7            |
|               |                                                   | KOCIDE 101                                                                       | 154.0          |
|               |                                                   | KOCIDE DF                                                                        | 850.1          |
|               | PEPPERS (FRUITING VEGETABLE), (BELL, CHILI, ETC.) | DUPONT KOCIDE 3000 FUNGICIDE/BACTERICIDE                                         | 144.0          |
|               |                                                   | KOCIDE 101                                                                       | 21.9           |
|               | PISTACHIO (PISTACHE NUT)                          | CUPROFIX DISPERSS DRY FLOWABLE FUNGICIDE/BACTERICIDE FOR TURF AND ORNAMENTAL USE | 8.3            |
|               | PLUM (INCLUDES WILD PLUMS FOR HUMAN CONSUMPTION)  | DUPONT KOCIDE 2000 FUNGICIDE/BACTERICIDE                                         | 80.7           |
|               |                                                   | KOCIDE 101                                                                       | 154.0          |
|               |                                                   | KOCIDE DF                                                                        | 92.8           |
|               | PRUNE                                             | KOCIDE DF                                                                        | 110.5          |

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| CHEMICAL NAME                                   | COMMODITY            | PRODUCT NAME                                     | LBS AI APPLIED                           |        |
|-------------------------------------------------|----------------------|--------------------------------------------------|------------------------------------------|--------|
| COPPER                                          | PRUNE                | NORDOX 75 WG                                     | 342.3                                    |        |
|                                                 | RICE (ALL OR UNSPEC) | COPPER-Z 4/4                                     | 492.1                                    |        |
|                                                 |                      | TRIANGLE BRAND COPPER SULFATE ALGICIDE-HERBICIDE | 653.4                                    |        |
|                                                 |                      | TRIANGLE BRAND COPPER SULFATE CRYSTAL            | 13439.3                                  |        |
|                                                 |                      | BLUE SHIELD WP                                   | 127.8                                    |        |
|                                                 | TOMATO               | CHAMPION WETTABLE POWDER                         | 155.3                                    |        |
|                                                 |                      | DUPONT KOCIDE 2000 FUNGICIDE/BACTERICIDE         | 202.5                                    |        |
|                                                 |                      | DUPONT KOCIDE 3000 FUNGICIDE/BACTERICIDE         | 677.2                                    |        |
|                                                 |                      | DUPONT KOCIDE DF FUNGICIDE/BACTERICIDE           | 385.2                                    |        |
|                                                 |                      | KOCIDE 101                                       | 186.5                                    |        |
|                                                 |                      | KOCIDE 2000                                      | 804.8                                    |        |
|                                                 |                      | KOCIDE DF                                        | 920.1                                    |        |
|                                                 |                      | NU-COP 50 WP                                     | 127.8                                    |        |
|                                                 |                      | NU-COP 50DF                                      | 1578.3                                   |        |
|                                                 |                      | NU-COP HB                                        | 1.2                                      |        |
|                                                 |                      | WALNUT                                           | CUPROFIX ULTRA 40 DISPERSS               | 234.6  |
|                                                 |                      |                                                  | DUPONT KOCIDE 2000 FUNGICIDE/BACTERICIDE | 1244.3 |
|                                                 |                      |                                                  | DUPONT KOCIDE 3000 FUNGICIDE/BACTERICIDE | 1179.6 |
|                                                 |                      |                                                  | KOCIDE 101                               | 1984.8 |
|                                                 | KOCIDE 2000          |                                                  | 1669.1                                   |        |
|                                                 | KOP-HYDROXIDE 50W    |                                                  | 396.6                                    |        |
|                                                 | NORDOX 75 WG         |                                                  | 151.0                                    |        |
|                                                 | NU-COP 50DF          |                                                  | 1288.6                                   |        |
|                                                 | NU-COP HB            | 334.2                                            |                                          |        |
| ALFALFA - Total Pounds Copper Applied           |                      |                                                  | 77.9                                     |        |
| ALMOND - Total Pounds Copper Applied            |                      |                                                  | 13267.8                                  |        |
| APRICOT - Total Pounds Copper Applied           |                      |                                                  | 300.0                                    |        |
| CHERRY - Total Pounds Copper Applied            |                      |                                                  | 154.0                                    |        |
| N-OUTDR CONTAINER - Total Pounds Copper Applied |                      |                                                  | 3028.5                                   |        |
| NECTARINE - Total Pounds Copper Applied         |                      |                                                  | 1571.9                                   |        |
| PEACH - Total Pounds Copper Applied             |                      |                                                  | 4144.6                                   |        |
| PEPPERS - Total Pounds Copper Applied           |                      |                                                  | 165.9                                    |        |
| PISTACHIO - Total Pounds Copper Applied         |                      |                                                  | 8.3                                      |        |
| PLUM - Total Pounds Copper Applied              |                      |                                                  | 327.5                                    |        |
| PRUNE - Total Pounds Copper Applied             |                      |                                                  | 452.8                                    |        |
| RICE - Total Pounds Copper Applied              |                      |                                                  | 14584.7                                  |        |
| TOMATO - Total Pounds Copper Applied            |                      |                                                  | 5166.8                                   |        |
| WALNUT - Total Pounds Copper Applied            |                      |                                                  | 8482.7                                   |        |
| Total Pounds Copper Applied (2004-2011)         |                      |                                                  | 51733.5                                  |        |

The Coalition determined that outreach should focus on providing information to specific growers located adjacent to Duck Slough @ Gurr Rd to encourage the retention of irrigation water to prevent copper from entering the waterway through runoff. Storm water runoff management is also discussed to prevent winter exceedances. This coincides with the Coalition's Management Plan strategy outlined under the chlorpyrifos Source Identification and Outreach section above.



### *Priority D Constituents*

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The following priority D constituents listed under the Duck Slough @ Gurr Rd subwatershed management plan are water column toxicity to *S. capricornutum* and *C. dubia* and sediment toxicity to *H. azteca*.

#### ***C. dubia* toxicity**

Toxicity to *C. dubia* occurred in storm samples collected in February and March of 2006 (Table VI-5). The toxicity events were not associated with any other exceedances or the detection of pesticides or metals. The Coalition did not perform testing for *C. dubia* toxicity in 2009. Management Plan Monitoring for *C. dubia* began in 2011 (February and March) and will continue in 2012. The Coalition discussed toxicity to *C. dubia* and associated pesticides during individual grower meetings and conducted outreach regarding the retention of irrigation and storm water runoff on the property.

#### ***S. capricornutum* toxicity**

Toxicity to *S. capricornutum* only occurred twice at Duck Slough @ Gurr Rd, once in September 2004 and again in July 2007. The July toxicity occurred a month after a copper exceedance. The toxicity was not persistent in the July 2007 resample (Table VI-5).

The Coalition's strategy for eliminating *S. capricornutum* toxicity involves focusing on copper due to the potential association between copper WQTL exceedance and toxicity. If copper can be prevented from entering waterways throughout the irrigation season, the Coalition believes that *S. capricornutum* toxicity can also be eliminated. If copper is no longer detected in the slough but *S. capricornutum* toxicity persists, the Coalition will consider other herbicides as potential sources of the toxicity. The Coalition will conduct MPM in 2012 for *S. capricornutum* during months of past exceedances (July and September).

#### ***H. azteca* toxicity**

Sediment toxicity to *H. azteca* occurred in August 2004, July 2005, and in August 2008. Toxicity was persistent in the 2008 resample that occurred in October 2008. Sediment samples were not toxic during the 2009 sampling event. The Coalition initiated MPM for sediment toxicity in 2010. As of 2010, the Coalition now tests for total organic carbon and grain size in all sediments and pyrethroids and chlorpyrifos in sediment that exhibit 80% or less survival compared to the control. Duck Slough @ Gurr Rd MPM sediment samples collected in September 2010 resulted in toxicity to *H. azteca* with 70% survival compared to the control (Table VI-5). Chemical analysis indicated that the samples contained sediment bound pyrethroids and chlorpyrifos. Pyrethroids have a high sorption rate to sediment particles and can be carried with suspended particles in storm water runoff and irrigation tailwater to waterways. The Coalition believes that addressing storm water and irrigation tailwater management during outreach, movement of pyrethroids to waterways will also be addressed.

*H. azteca* toxicity occurred in September 2011, with 90% survival compared to the control. In 2012, MPM will take place for *H. azteca* toxicity during months of past exceedances (March and September).

### *Priority E Constituents*

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The following priority E constituents listed under the Duck Slough @ Gurr Road subwatershed management plan are DO, pH, SC, TDS, *E. coli* and lead.

The Coalition will continue to collect priority E constituent monitoring data for DO, pH and SC during each monitoring event. These constituents will remain low priority but will be discussed during individual contacts with growers and annual grower meetings. *E.coli* and lead will be monitored during Assessment Monitoring events. Assessment Monitoring took place at this site in 2011 and in 2012 Core Monitoring will resume. In addition, the Coalition plans to participate in a focus group along with other Coalitions and Regional Board staff to develop a joint Work Plan to address *E. coli* exceedances by determining the potential agricultural sources of *E. coli* and identifying management practices to prevent discharges to surface waters.

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### *Evaluation*

Duck Slough @ Gurr Rd is one of the four second high priority site subwatersheds within the ESJWQC and just completed its second year of focused outreach. Therefore, the Coalition focused its resources on identifying sources of agricultural discharge within this subwatershed that could result in water quality impairments by extending outreach to individual Coalition members, and setting evaluation goals based on the effectiveness of management practices (by considering changes in water quality over time).

The Coalition's strategy for the Duck Slough subwatershed is to target growers with parcels located along or adjacent to the waterway that have the potential to discharge into the waterway. The focus of the outreach is tailwater management and minimizing spray drift. Outreach includes grower notification, management practice outreach and education, tracking the implementation of management practices, and providing information on special studies of management practice efficacy.

Individual grower surveys documenting current management practices and assessing planned implementation were completed and returned representing 100% of targeted growers. The Second Priority Subwatershed Summary of Implemented Management Practices section of this report summarizes the results of these contacts.

During 2012, MPM will continue during months of past exceedances in the Duck Slough @ Gurr Rd subwatershed. In addition to chlorpyrifos, samples monitored for SC, TDS and toxicity to *S. capricornutum* experienced no exceedances/toxicities for two or more consecutive years of monitoring during months of past exceedances. A letter was submitted to the Regional Board on January 6, 2012 petitioning to remove these constituents from the Duck Slough @ Gurr Rd management plan.

## VII. HIGHLINE CANAL @ HWY 99

### Management Plan Constituents

#### Priority A/B

- Chlorpyrifos

#### Priority C

- Copper
- Diuron

#### Priority D

- *Ceriodaphnia dubia* water column toxicity
- *Selenastrum capricornutum* water column toxicity
- *Hyalella azteca* sediment toxicity

#### Priority E

- Ammonia
- *E. coli*
- Lead
- pH
- Specific Conductivity
- Total Dissolved Solids

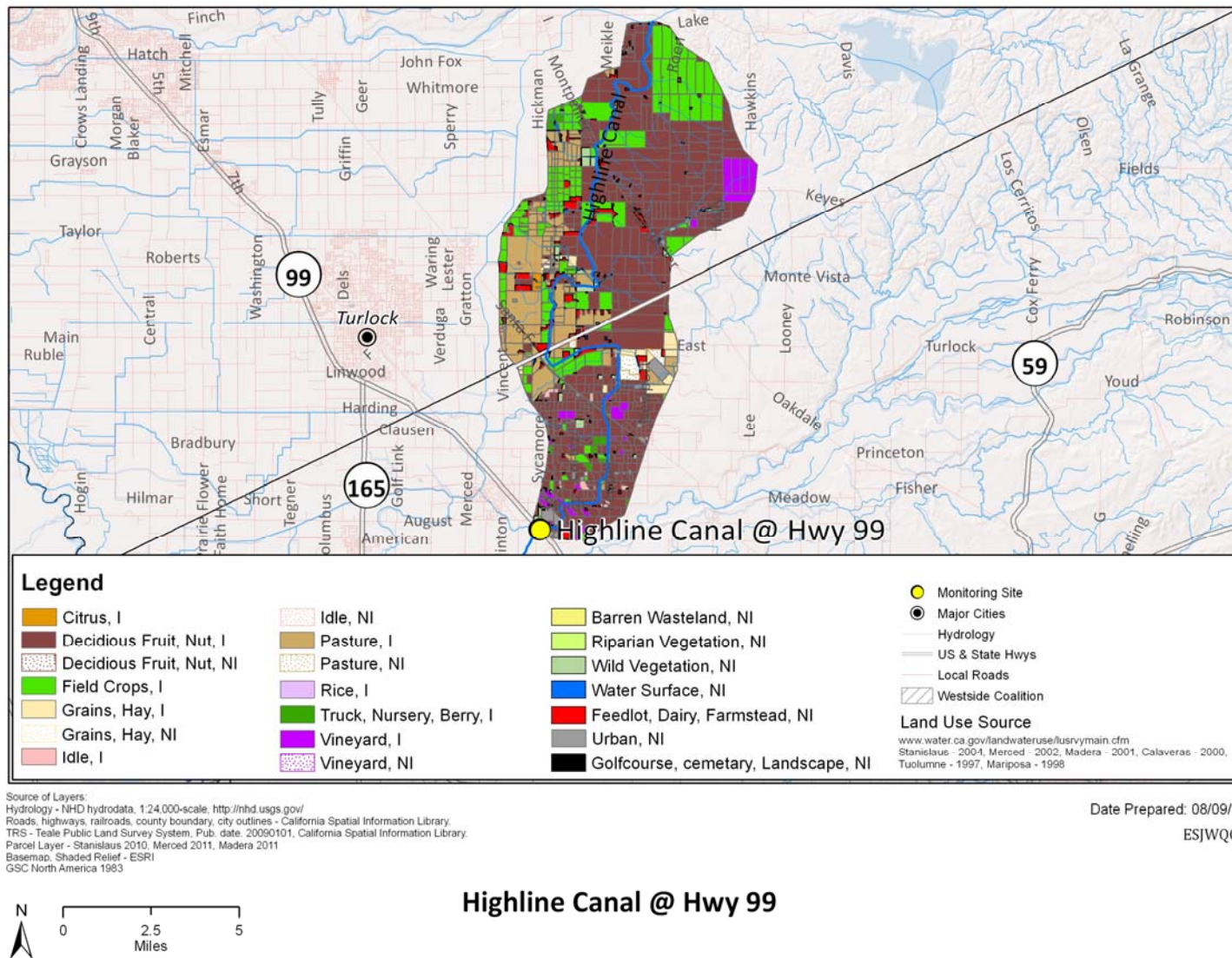
### Description of Highline Canal @ Hwy 99 Site Subwatershed

Highline Canal @ Highway 99 (35,476 irrigated acres) – The Highline Canal is a conveyance of the Turlock Irrigation District (TID) and carries both clean irrigation water and irrigation return flow during the summer, and storm water runoff during the winter. This site was selected as a downstream companion site to the Highline Canal @ Lombardy Road site. This site subwatershed is monitored to determine the relative contribution of the upstream and downstream site subwatersheds to water quality impairments. The sampling site is located just south of Delhi as the canal crosses the highway (Table VII-1). The irrigated agriculture is primarily deciduous nuts located at the lower end of the site subwatershed as well as small number of vineyards (Figure VII-1).

**Table VII-1. Highline Canal site subwatershed sampling location coordinates.**

| SITE NAME               | STATION CODE | TARGET LATITUDE | TARGET LONGITUDE |
|-------------------------|--------------|-----------------|------------------|
| Highline Canal @ Hwy 99 | 535XHCHNN    | 37.4153         | -120.7557        |

Figure VII-1. Highline Canal @ Hwy 99 site subwatershed land use map.



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### Subwatershed Monitoring History

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The Coalition initiated monitoring at Highline Canal @ Hwy 99 during the irrigation season of 2005 and has monitored continually through 2011 (Table VII-2). The Highline Canal @ Hwy 99 site subwatershed is the Core Monitoring location in Zone 3. Only Core Monitoring constituents were sampled at the site from October 2008 through 2010. Assessment Monitoring occurred at the site in 2011 and will occur again every third year (e.g. 2014, 2017). In addition, MPM occurred at the Highline Canal @ Hwy 99 site from 2007 through 2011. Additional MPM occurred at the site in 2007 and 2008, and MPM during months of past exceedances occurred in 2009, 2010, and 2011 (in 2011 Assessment Monitoring occurred). The constituents sampled at this location from 2005 through 2011 are listed in (Table VII-3).

Management Plan Monitoring occurred at Highline Canal for *C. dubia* toxicity only in 2007 then for *C. dubia* toxicity, chlorpyrifos, and copper in 2008 (Table VII-4). The site was also monitored for these constituents from April through September in 2007 and in 2008. Management Plan Monitoring in 2009 occurred for *S. capricornutum* toxicity and chlorpyrifos (Table VII-4). In 2010, MPM took place for chlorpyrifos, diuron, copper, *S. capricornutum* toxicity and sediment toxicity to *H. azteca* (Table VII-4). During 2011 Assessment Monitoring, MPM constituents were analyzed on a monthly basis.

The upstream location, Highline Canal @ Lombardy Rd, allows for an analysis of the contribution of each portion of the subwatershed to loads measured at Highline Canal @ Hwy 99. Highline Canal @ Lombardy Rd is sampled as a separate monitoring location and is not considered an upstream MPM location to Highline Canal @ Hwy 99.

Highline Canal @ Hwy 99 is currently on California's 2008-2010 303d List of Impaired Waterbodies for chlorpyrifos, simazine, sediment toxicity and unknown water column toxicity.

**Table VII-2. Highline Canal @ Hwy 99 site subwatershed sampling events per season and year (including MPM).**

| YEAR | SEASON     | EVENTS SAMPLED | EVENTS NOT SAMPLED <sup>1</sup> | TOTAL |
|------|------------|----------------|---------------------------------|-------|
| 2004 | Irrigation | NA             | NA                              | NA    |
| 2005 | Storm      | NA             | NA                              | NA    |
|      | Irrigation | 5              | 0                               | 5     |
| 2006 | Storm      | 2              | 0                               | 2     |
|      | Irrigation | 5              | 0                               | 5     |
| 2007 | Storm      | 1              | 1                               | 2     |
|      | Irrigation | 7              | 0                               | 7     |
| 2008 | Storm      | 2              | 1                               | 3     |
|      | Irrigation | 12             | 0                               | 12    |
|      | Fall       | 0              | 2                               | 2     |
| 2009 | Winter     | 0              | 2                               | 2     |
|      | Storm      | 2              | 0                               | 2     |
|      | Irrigation | 6              | 0                               | 6     |
|      | Fall       | 1              | 1                               | 2     |
| 2010 | Winter     | 1              | 0                               | 1     |
|      | Storm      | 3              | 0                               | 3     |
|      | Irrigation | 5              | 0                               | 5     |
|      | Fall       | 2              | 1                               | 3     |
| 2011 | Winter     | 1              | 1                               | 2     |
|      | Storm      | 0              | 1                               | 1     |
|      | Irrigation | 6              | 0                               | 6     |
|      | Fall       | 2              | 1                               | 3     |

<sup>1</sup>If an event was not sampled during scheduled monitoring, the site was dry.

NA – Not applicable. This site was not scheduled for sampling during this season/year.

**Table VII-3. Highline Canal @ Hwy 99 site subwatershed analyses per sampling season and year.**

Only environmental samples with a sample replicate and lab replicate number of one are shown.

| METHOD                        | ANALYTE                         | 2005       | 2006  |            | 2007  |            | 2008  |            |      | 2009   |       |            |      | 2010   |       |            |      | 2011   |       |            |      |
|-------------------------------|---------------------------------|------------|-------|------------|-------|------------|-------|------------|------|--------|-------|------------|------|--------|-------|------------|------|--------|-------|------------|------|
|                               |                                 | IRRIGATION | STORM | IRRIGATION | STORM | IRRIGATION | STORM | IRRIGATION | FALL | WINTER | STORM | IRRIGATION | FALL | WINTER | STORM | IRRIGATION | FALL | WINTER | STORM | IRRIGATION | FALL |
| Field and Physical Parameters |                                 |            |       |            |       |            |       |            |      |        |       |            |      |        |       |            |      |        |       |            |      |
| EPA 110.2                     | Color                           | 5          | 2     | 5          | 1     | 6          | 2     | 6          |      |        |       |            |      |        |       |            |      |        |       |            |      |
| EPA 160.1                     | Dissolved Solids                | 5          | 2     | 5          | 1     | 6          | 2     | 6          |      |        | 2     | 6          | 1    | 1      | 3     | 5          | 2    | 1      |       | 6          | 2    |
| EPA 160.2                     | Suspended Solids                |            |       |            |       |            |       |            |      |        | 2     | 6          | 1    | 1      | 3     | 5          | 2    | 1      |       | 6          | 2    |
| EPA 180.1                     | Turbidity                       | 5          | 2     | 5          | 1     | 6          | 2     | 6          |      |        | 2     | 6          | 1    | 1      | 3     | 5          | 2    | 1      |       | 6          | 2    |
| EPA 405.1                     | BOD                             |            |       | 1          | 1     | 2          |       |            |      |        |       |            |      |        |       |            |      |        |       |            |      |
| EPA 415.1                     | Total Organic Carbon            | 5          | 2     | 5          | 1     | 6          | 2     | 6          |      |        | 2     | 6          | 1    | 1      | 3     | 5          | 2    | 1      |       | 6          | 2    |
| SM 9223                       | <i>E. coli</i>                  | 5          | 2     | 5          | 1     | 6          | 2     | 6          |      |        | 2     | 6          | 1    | 1      | 3     | 5          | 2    | 1      |       | 6          | 2    |
| Walkley-Black                 | Total Organic Carbon (sediment) |            |       |            |       |            |       |            |      |        |       |            |      |        |       |            |      | 1      |       | 1          |      |
| ASTM D422 or ASTM D4464       | Grain size (sediment)           |            |       |            |       |            |       |            |      |        |       |            |      |        |       |            |      | 1      |       | 1          |      |
| NA                            | Dissolved Oxygen                | 6          | 5     | 5          | 1     | 8          | 4     | 13         |      |        | 2     | 6          | 1    | 1      | 3     | 5          | 2    | 2      |       | 7          | 2    |
| NA                            | Specific Conductivity           | 6          | 5     | 5          | 1     | 8          | 4     | 13         |      |        | 2     | 6          | 1    | 1      | 3     | 5          | 2    | 2      |       | 7          | 2    |
| NA                            | pH                              | 6          | 5     | 5          | 1     | 8          | 4     | 13         |      |        | 2     | 6          | 1    | 1      | 3     | 5          | 2    | 2      |       | 7          | 2    |
| Carbamates                    |                                 |            |       |            |       |            |       |            |      |        |       |            |      |        |       |            |      |        |       |            |      |
| EPA 8321A                     | Aldicarb                        |            |       | 5          | 1     | 6          | 2     | 6          |      |        |       |            |      |        |       |            |      | 1      |       | 6          | 2    |
| EPA 8321A                     | Carbaryl                        |            |       | 5          | 1     | 6          | 2     | 6          |      |        |       |            |      |        |       |            |      | 1      |       | 6          | 2    |
| EPA 8321A                     | Carbofuran                      |            |       | 5          | 1     | 6          | 2     | 6          |      |        |       |            |      |        |       |            |      | 1      |       | 6          | 2    |
| EPA 8321A                     | Diuron                          |            |       | 5          | 1     | 6          | 2     | 6          |      |        |       |            |      |        | 2     |            |      | 1      |       | 6          | 2    |
| EPA 8321A                     | Linuron                         |            |       | 5          | 1     | 6          | 2     | 6          |      |        |       |            |      |        |       |            |      | 1      |       | 6          | 2    |
| EPA 8321A                     | Methiocarb                      |            |       | 5          | 1     | 6          | 2     | 6          |      |        |       |            |      |        |       |            |      | 1      |       | 6          | 2    |
| EPA 8321A                     | Methomyl                        |            |       | 5          | 1     | 6          | 2     | 6          |      |        |       |            |      |        |       |            |      | 1      |       | 6          | 2    |
| EPA 8321A                     | Oxamyl                          |            |       | 5          | 1     | 6          | 2     | 6          |      |        |       |            |      |        |       |            |      | 1      |       | 6          | 2    |
| Organochlorines               |                                 |            |       |            |       |            |       |            |      |        |       |            |      |        |       |            |      |        |       |            |      |
| EPA 8081A                     | DDD(p,p')                       |            |       | 5          | 1     | 6          | 2     | 6          |      |        |       |            |      |        |       |            |      | 1      |       | 4          |      |
| EPA 8081A                     | DDE(p,p')                       |            |       | 5          | 1     | 6          | 2     | 6          |      |        |       |            |      |        |       |            |      | 1      |       | 4          |      |
| EPA 8081A                     | DDT(p,p')                       |            |       | 5          | 1     | 6          | 2     | 6          |      |        |       |            |      |        |       |            |      | 1      |       | 4          |      |
| EPA 8081A                     | Dicofol                         |            |       | 5          | 1     | 6          | 2     | 6          |      |        |       |            |      |        |       |            |      | 1      |       | 4          |      |
| EPA 8081A                     | Dieldrin                        |            |       | 5          | 1     | 6          | 2     | 6          |      |        |       |            |      |        |       |            |      | 1      |       | 4          |      |
| EPA 8081A                     | Endrin                          |            |       | 5          | 1     | 6          | 2     | 6          |      |        |       |            |      |        |       |            |      | 1      |       | 4          |      |



| METHOD             | ANALYTE            | 2005       | 2006  |            | 2007  |            | 2008  |            | 2009 |        |       |            |      | 2010   |       |            |      | 2011   |       |            |      |
|--------------------|--------------------|------------|-------|------------|-------|------------|-------|------------|------|--------|-------|------------|------|--------|-------|------------|------|--------|-------|------------|------|
|                    |                    | IRRIGATION | STORM | IRRIGATION | STORM | IRRIGATION | STORM | IRRIGATION | FALL | WINTER | STORM | IRRIGATION | FALL | WINTER | STORM | IRRIGATION | FALL | WINTER | STORM | IRRIGATION | FALL |
| EPA 8081A          | Methoxychlor       |            |       | 5          | 1     | 6          | 2     | 6          |      |        |       |            |      |        |       |            |      | 1      |       | 4          |      |
| Group A Pesticides |                    |            |       |            |       |            |       |            |      |        |       |            |      |        |       |            |      |        |       |            |      |
| EPA 8081A          | Aldrin             |            |       |            |       |            |       |            |      |        |       |            |      |        |       |            |      | 1      |       | 4          |      |
| EPA 8081A          | Chlordane          |            |       |            |       |            |       |            |      |        |       |            |      |        |       |            |      | 1      |       | 4          |      |
| EPA 8081A          | Endosulfan I       |            |       |            |       |            |       |            |      |        |       |            |      |        |       |            |      | 1      |       | 4          |      |
| EPA 8081A          | Endosulfan II      |            |       |            |       |            |       |            |      |        |       |            |      |        |       |            |      | 1      |       | 4          |      |
| EPA 8081A          | HCH, alpha         |            |       |            |       |            |       |            |      |        |       |            |      |        |       |            |      | 1      |       | 4          |      |
| EPA 8081A          | HCH, beta          |            |       |            |       |            |       |            |      |        |       |            |      |        |       |            |      | 1      |       | 4          |      |
| EPA 8081A          | HCH, delta         |            |       |            |       |            |       |            |      |        |       |            |      |        |       |            |      | 1      |       | 4          |      |
| EPA 8081A          | HCH, gamma         |            |       |            |       |            |       |            |      |        |       |            |      |        |       |            |      | 1      |       | 4          |      |
| EPA 8081A          | Heptachlor         |            |       |            |       |            |       |            |      |        |       |            |      |        |       |            |      | 1      |       | 4          |      |
| EPA 8081A          | Heptachlor epoxide |            |       |            |       |            |       |            |      |        |       |            |      |        |       |            |      | 1      |       | 4          |      |
| EPA 8081A          | Toxaphene          |            |       |            |       |            |       |            |      |        |       |            |      |        |       |            |      | 1      |       | 4          |      |
| Organophosphates   |                    |            |       |            |       |            |       |            |      |        |       |            |      |        |       |            |      |        |       |            |      |
| EPA 8141A          | Azinphos methyl    |            |       | 5          | 1     | 6          | 2     | 6          |      |        |       |            |      |        |       |            |      | 1      |       | 6          | 2    |
| EPA 8141A          | Chlorpyrifos       | 5          | 2     | 5          | 1     | 6          | 2     | 7          |      |        |       | 1          |      |        | 2     | 1          |      | 1      |       | 6          | 2    |
| EPA 8141A          | Demeton-s          |            |       |            |       |            |       |            |      |        |       |            |      |        |       |            |      | 1      |       | 6          | 2    |
| EPA 8141A          | Diazinon           | 5          | 2     | 5          | 1     | 6          | 2     | 6          |      |        |       |            |      |        |       |            |      | 1      |       | 6          | 2    |
| EPA 8141A          | Dimethoate         |            |       | 5          | 1     | 6          | 2     | 6          |      |        |       |            |      |        |       |            |      | 1      |       | 6          | 2    |
| EPA 8141A          | Disulfoton         |            |       | 5          | 1     | 6          | 2     | 6          |      |        |       |            |      |        |       |            |      | 1      |       | 6          | 2    |
| EPA 8141A          | Malathion          |            |       | 5          | 1     | 6          | 2     | 6          |      |        |       |            |      |        |       |            |      | 1      |       | 6          | 2    |
| EPA 8321A          | Methamidophos      |            |       | 5          | 1     | 6          | 2     | 6          |      |        |       |            |      |        | 2     |            |      | 1      |       | 6          | 2    |
| EPA 8141A          | Methidathion       |            |       | 5          | 1     | 6          | 2     | 6          |      |        |       |            |      |        |       |            |      | 1      |       | 6          | 2    |
| EPA 8141A          | Molinate           |            |       | 5          | 1     | 6          | 2     | 6          |      |        |       |            |      |        |       |            |      |        |       |            |      |
| EPA 8141A          | Parathion, Methyl  |            |       | 5          | 1     | 6          | 2     | 6          |      |        |       |            |      |        |       |            |      | 1      |       | 6          | 2    |
| EPA 8141A          | Phorate            |            |       | 5          | 1     | 6          | 2     | 6          |      |        |       |            |      |        |       |            |      | 1      |       | 6          | 2    |
| EPA 8141A          | Phosmet            |            |       | 5          | 1     | 6          | 2     | 6          |      |        |       |            |      |        |       |            |      | 1      |       | 6          | 2    |
| EPA 8141A          | Thiobencarb        |            |       | 5          | 1     | 6          | 2     | 6          |      |        |       |            |      |        |       |            |      |        |       |            |      |
| EPA 8141A          | Trifluralin        |            |       |            |       |            |       |            |      |        |       |            |      |        |       |            |      | 1      |       | 6          | 2    |
| Pyrethroids        |                    |            |       |            |       |            |       |            |      |        |       |            |      |        |       |            |      |        |       |            |      |
| EPA 8081A          | Bifenthrin         | 1          | 2     | 5          | 1     | 6          | 2     | 6          |      |        |       |            |      |        |       |            |      |        |       |            |      |



| METHOD            | ANALYTE                           | 2005       | 2006  |            | 2007  |            | 2008  |            |      | 2009   |       |            |      | 2010   |       |            |      | 2011   |       |            |      |
|-------------------|-----------------------------------|------------|-------|------------|-------|------------|-------|------------|------|--------|-------|------------|------|--------|-------|------------|------|--------|-------|------------|------|
|                   |                                   | IRRIGATION | STORM | IRRIGATION | STORM | IRRIGATION | STORM | IRRIGATION | FALL | WINTER | STORM | IRRIGATION | FALL | WINTER | STORM | IRRIGATION | FALL | WINTER | STORM | IRRIGATION | FALL |
| EPA 8081A         | Cyfluthrin, total                 | 1          | 2     | 5          | 1     | 6          | 2     | 6          |      |        |       |            |      |        |       |            |      |        |       |            |      |
| EPA 8081A         | Cyhalothrin, lambda, total        | 5          | 2     | 5          | 1     | 6          | 2     | 6          |      |        |       |            |      |        |       |            |      |        |       |            |      |
| EPA 8081A         | Cypermethrin, total               | 5          | 2     | 5          | 1     | 6          | 2     | 6          |      |        |       |            |      |        |       |            |      |        |       |            |      |
| EPA 8081A         | Esfenvalerate/ Fenvalerate, total | 5          | 2     | 5          | 1     | 6          | 2     | 6          |      |        |       |            |      |        |       |            |      |        |       |            |      |
| EPA 8081A         | Permethrin, total                 | 5          | 2     | 5          | 1     | 6          | 2     | 6          |      |        |       |            |      |        |       |            |      |        |       |            |      |
| Triazines         |                                   |            |       |            |       |            |       |            |      |        |       |            |      |        |       |            |      |        |       |            |      |
| EPA 547M          | Glyphosate                        |            |       | 5          | 1     | 6          | 2     | 6          |      |        |       |            |      |        |       |            |      | 1      |       | 4          |      |
| EPA 549.2M        | Paraquat dichloride               |            |       | 5          | 1     | 6          | 2     | 6          |      |        |       |            |      |        |       |            |      | 1      |       | 4          |      |
| EPA 619           | Atrazine                          |            |       | 5          | 1     | 6          | 2     | 6          |      |        |       |            |      |        |       |            |      | 1      |       | 6          | 2    |
| EPA 619           | Cyanazine                         |            |       | 5          | 1     | 6          | 2     | 6          |      |        |       |            |      |        |       |            |      | 1      |       | 6          | 2    |
| EPA 619           | Simazine                          |            |       | 5          | 1     | 6          | 2     | 6          |      |        |       |            |      |        |       |            |      | 1      |       | 6          | 2    |
| Metals (Total)    |                                   |            |       |            |       |            |       |            |      |        |       |            |      |        |       |            |      |        |       |            |      |
| EPA 200.8         | Arsenic                           |            |       | 5          | 1     | 6          | 2     | 6          |      |        |       |            |      |        |       |            |      | 1      |       | 5          |      |
| EPA 200.8         | Boron                             |            |       | 5          | 1     | 6          | 2     | 6          |      |        |       |            |      |        |       |            |      | 1      |       | 6          | 2    |
| EPA 200.8         | Cadmium                           |            |       | 5          | 1     | 6          | 2     | 6          |      |        |       |            |      |        |       |            |      | 1      |       | 5          |      |
| EPA 200.8         | Copper                            |            |       | 5          | 1     | 6          | 2     | 10         |      |        |       |            |      |        | 3     | 3          |      | 1      |       | 6          | 2    |
| EPA 200.8         | Lead                              |            |       | 5          | 1     | 6          | 2     | 6          |      |        |       |            |      |        |       |            |      | 1      |       | 5          |      |
| EPA 200.8         | Molybdenum                        |            |       |            |       |            |       |            |      |        |       |            |      |        |       |            |      | 1      |       | 5          |      |
| EPA 200.8         | Nickel                            |            |       | 5          | 1     | 6          | 2     | 6          |      |        |       |            |      |        |       |            |      | 1      |       | 6          | 2    |
| EPA 200.8         | Selenium                          |            |       | 5          | 1     | 2          | 2     | 6          |      |        |       |            |      |        |       |            |      | 1      |       | 6          | 2    |
| EPA 200.8         | Zinc                              |            |       | 5          | 1     | 6          | 2     | 6          |      |        |       |            |      |        |       |            |      | 1      |       | 6          | 2    |
| Metals(Dissolved) |                                   |            |       |            |       |            |       |            |      |        |       |            |      |        |       |            |      |        |       |            |      |
| EPA 200.8         | Cadmium                           |            |       |            |       |            |       |            |      |        |       |            |      |        |       |            |      | 1      |       | 5          |      |
| EPA 200.8         | Copper                            |            |       |            |       |            |       |            |      |        |       |            |      |        | 3     | 3          |      | 1      |       | 6          | 2    |
| EPA 200.8         | Lead                              |            |       |            |       |            |       |            |      |        |       |            |      |        |       |            |      | 1      |       | 5          |      |
| EPA 200.8         | Nickel                            |            |       |            |       |            |       |            |      |        |       |            |      |        |       |            |      | 1      |       | 6          | 2    |
| EPA 200.8         | Zinc                              |            |       |            |       |            |       |            |      |        |       |            |      |        |       |            |      | 1      |       | 6          | 2    |
| Nutrients         |                                   |            |       |            |       |            |       |            |      |        |       |            |      |        |       |            |      |        |       |            |      |
| SM 2340 C         | Hardness as CaCO3                 |            |       | 5          | 1     | 6          | 2     | 10         |      |        |       |            |      |        |       |            |      | 1      |       | 6          | 2    |
| EPA 300.0         | Nitrate as N                      |            |       | 5          | 1     | 6          | 2     | 6          |      |        |       |            |      |        | 3     | 3          |      |        |       |            |      |

| METHOD            | ANALYTE                          | 2005       | 2006  |            | 2007  |            | 2008  |            |      | 2009   |       |            |      | 2010   |       |            |      | 2011   |       |            |      |
|-------------------|----------------------------------|------------|-------|------------|-------|------------|-------|------------|------|--------|-------|------------|------|--------|-------|------------|------|--------|-------|------------|------|
|                   |                                  | IRRIGATION | STORM | IRRIGATION | STORM | IRRIGATION | STORM | IRRIGATION | FALL | WINTER | STORM | IRRIGATION | FALL | WINTER | STORM | IRRIGATION | FALL | WINTER | STORM | IRRIGATION | FALL |
| EPA 350.2         | Ammonia as N                     |            |       | 5          | 1     | 6          | 2     | 6          |      |        | 2     | 6          | 1    | 1      | 3     | 5          | 2    | 1      |       | 6          | 2    |
| EPA 351.3         | Nitrogen, Total Kjeldahl         |            |       | 5          | 1     | 6          | 2     | 6          |      |        | 1     | 1          |      |        |       | 3          | 2    | 1      |       | 6          | 2    |
| EPA 353.2         | Nitrate + Nitrite as N           |            |       |            |       |            |       |            |      |        | 2     | 6          | 1    | 1      | 3     | 5          | 2    | 1      |       | 6          | 2    |
| EPA 354.1         | Nitrite as N                     |            |       | 5          | 1     | 6          | 2     | 6          |      |        |       |            |      |        |       |            |      |        |       |            |      |
| EPA 365.2         | OrthoPhosphate as P              |            |       | 5          | 1     | 6          | 2     | 6          |      |        | 1     | 1          |      |        |       | 3          | 2    | 1      |       | 6          | 2    |
| EPA 365.2         | Phosphate as P                   |            |       | 5          | 1     | 6          | 2     | 6          |      |        | 2     | 6          | 1    | 1      | 3     | 5          | 2    | 1      |       | 6          | 2    |
| Toxicity          |                                  |            |       |            |       |            |       |            |      |        |       |            |      |        |       |            |      |        |       |            |      |
| EPA 0821/R-02-012 | <i>Ceriodaphnia dubia</i>        | 6          | 3     | 6          | 1     | 8          | 2     | 7          |      |        |       |            |      |        |       |            |      | 1      |       | 6          | 2    |
| EPA 0821/R-02-012 | <i>Pimephales promelas</i>       | 5          | 2     | 5          | 1     | 7          | 2     | 7          |      |        |       |            |      |        |       |            |      | 1      |       | 6          | 2    |
| EPA 0821/R-02-013 | <i>Selenastrum capricornutum</i> | 5          | 3     | 5          | 1     | 7          | 2     | 7          |      |        |       | 1          |      |        | 3     | 1          |      | 1      |       | 6          | 2    |
| EPA 600/R-99-064  | <i>Hyalella azteca</i>           | 5          | 1     | 2          |       | 1          | 1     | 2          |      |        |       |            |      |        |       | 1          |      | 1      |       | 1          |      |

**Table VII-4. Highline Canal @ Hwy 99 site subwatershed Management Plan Monitoring schedule (2007-2011).**

| SITE NAME               | SAMPLE DATE | MONITORING TYPE | COPPER | CHLORPYRIFOS | DIURON | C. DUBIA | S. CAPRICORNUTUM | H. AZTECA |
|-------------------------|-------------|-----------------|--------|--------------|--------|----------|------------------|-----------|
| Highline Canal @ Hwy 99 | 25-Sep-07   | A               |        |              |        | X        |                  |           |
| Highline Canal @ Hwy 99 | 29-Apr-08   | A               | X      |              |        |          |                  |           |
| Highline Canal @ Hwy 99 | 7-May-08    | A               |        |              |        | X        |                  |           |
| Highline Canal @ Hwy 99 | 3-Jun-08    | A               | X      |              |        |          |                  |           |
| Highline Canal @ Hwy 99 | 8-Jul-08    | A               | X      | X            |        |          |                  |           |
| Highline Canal @ Hwy 99 | 5-Aug-08    | A               | X      |              |        |          |                  |           |
| Highline Canal @ Hwy 99 | 9-Sep-08    | A               |        |              |        | X        |                  |           |
| Highline Canal @ Hwy 99 | 21-Apr-09   | MPM             |        |              |        |          | X                |           |
| Highline Canal @ Hwy 99 | 19-May-09   | MPM             |        |              |        |          | X                |           |
| Highline Canal @ Hwy 99 | 21-Jul-09   | MPM             |        | X            |        |          |                  |           |
| Highline Canal @ Hwy 99 | 19-Jan-10   | MPM             | X      | X            | X      |          | X                |           |
| Highline Canal @ Hwy 99 | 23-Feb-10   | MPM             | X      | X            | X      |          | X                |           |
| Highline Canal @ Hwy 99 | 20-Apr-10   | MPM             | X      |              |        |          | X                |           |
| Highline Canal @ Hwy 99 | 18-May-10   | MPM             |        |              |        |          | X                |           |
| Highline Canal @ Hwy 99 | 15-Jun-10   | MPM             | X      |              |        |          |                  |           |
| Highline Canal @ Hwy 99 | 20-Jul-10   | MPM             | X      | X            |        |          |                  |           |
| Highline Canal @ Hwy 99 | 17-Aug-10   | MPM             | X      |              |        |          |                  |           |
| Highline Canal @ Hwy 99 | 14-Sep-10   | MPM             |        |              |        |          |                  | X         |
| Highline Canal @ Hwy 99 | 18-Jan-11   | MPM             | X      | X            | X      |          |                  |           |
| Highline Canal @ Hwy 99 | 17-Feb-11   | MPM             | X      | X            | X      |          | X                |           |
| Highline Canal @ Hwy 99 | 15-Mar-11   | MPM             |        |              |        | X        | X                |           |
| Highline Canal @ Hwy 99 | 17-Mar-11   | MPM             |        |              |        |          |                  | X         |
| Highline Canal @ Hwy 99 | 19-Apr-11   | MPM             | X      |              |        |          | X                |           |
| Highline Canal @ Hwy 99 | 10-May-11   | MPM             |        |              |        | X        | X                |           |
| Highline Canal @ Hwy 99 | 14-Jun-11   | MPM             | X      |              |        |          |                  |           |
| Highline Canal @ Hwy 99 | 12-Jul-11   | MPM             | X      | X            |        |          |                  |           |
| Highline Canal @ Hwy 99 | 9-Aug-11    | MPM             | X      |              |        |          |                  |           |
| Highline Canal @ Hwy 99 | 6-Sep-11    | MPM             |        |              |        | X        |                  | X         |

A – Additional sampling

U – Upstream sampling

X – Constituent sampled for Management Plan Monitoring (MPM)

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### Exceedance History

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Samples collected from the Highline Canal @ Hwy 99 subwatershed from 2005 through 2011 resulted in exceedances of the WQTLs for field and physical parameters, *E. coli*, nutrients, metals, pesticides, and water column and sediment toxicity (Table VII-5). During ambient water monitoring several exceedances occurred during Normal Monitoring and MPM, including DO (1), pH (15), SC (1), TDS (2), *E. coli* (11), ammonia (2), copper (7), lead (7), DDT (1), chlorpyrifos (5), and diuron (2). Toxicity to *C. dubia* (4), *S. capricornutum* (4), and *H. azteca* sediment (6) occurred (Table VII-5).

During 2011, the WQTL exceedances that occurred were for pH (1), *E. coli* (1), and DDT (1) (Table VII-8).

All exceedances are listed in Table VII-5 by season and date and are based on WQTLs listed in the introduction to the ESJWQC Management Plan. Constituents that are the highest priority in the Highline Canal @ Highway 99 subwatershed are chlorpyrifos (A/B), copper (C), diuron (C), and toxicity to *S. capricornutum*, *C. dubia*, and *H. azteca* (D).

**Table VII-5. Highline Canal @ Hwy 99 site subwatershed exceedances (2005-2010).**

The WQTL used to evaluate the data are listed in the header after the analyte.

| SITE NAME               | SEASON     | SAMPLE DATE | OXYGEN, DISSOLVED, <7 MG/L | pH, <6.5 AND > 8.5 UNITS | SPECIFIC CONDUCTIVITY, >700 µS/cm | E. COLI, >235 MPN/100 ML | DISSOLVED SOLIDS, >450 MG/L | AMMONIA <sup>1</sup> , >1.5 MG/L | COPPER, TOTAL <sup>2</sup> , >1,300 µG/L | LEAD, TOTAL <sup>2</sup> , >15µG/L | DDT, (P,P'), >0.00059 µG/L | CHLORPYRIFOS, >0.015 µG/L | DIURON, >2 µG/L | C. DUBIA, (% CONTROL) | S. CAPRICORNUTUM, (% CONTROL) | H. AZTECA, (% CONTROL) |
|-------------------------|------------|-------------|----------------------------|--------------------------|-----------------------------------|--------------------------|-----------------------------|----------------------------------|------------------------------------------|------------------------------------|----------------------------|---------------------------|-----------------|-----------------------|-------------------------------|------------------------|
| Highline Canal @ Hwy 99 | Irrigation | 5/10/2005   |                            |                          |                                   |                          |                             |                                  |                                          |                                    |                            |                           |                 | 47                    |                               |                        |
| Highline Canal @ Hwy 99 | Irrigation | 5/19/2005   |                            |                          |                                   |                          |                             |                                  |                                          |                                    |                            |                           |                 | 0                     |                               |                        |
| Highline Canal @ Hwy 99 | Irrigation | 9/20/2005   |                            |                          |                                   |                          |                             |                                  |                                          |                                    |                            |                           |                 |                       |                               | 90                     |
| Highline Canal @ Hwy 99 | Storm      | 3/1/2006    | 5.6                        |                          |                                   |                          |                             |                                  |                                          |                                    |                            | 0.021                     |                 |                       | 2                             |                        |
| Highline Canal @ Hwy 99 | Storm      | 3/16/2006   |                            |                          |                                   | 300                      |                             |                                  |                                          |                                    |                            |                           |                 | 0                     |                               |                        |
| Highline Canal @ Hwy 99 | Storm      | 5/2/2006    |                            | 8.73                     |                                   |                          |                             |                                  |                                          |                                    |                            |                           |                 |                       |                               |                        |
| Highline Canal @ Hwy 99 | Irrigation | 5/17/2006   |                            |                          |                                   |                          |                             |                                  |                                          | 0.42 (0.36)                        |                            |                           |                 |                       |                               |                        |
| Highline Canal @ Hwy 99 | Irrigation | 8/9/2006    |                            |                          |                                   |                          |                             |                                  |                                          | 0.39 (0.31)                        |                            |                           |                 |                       |                               | 90                     |
| Highline Canal @ Hwy 99 | Irrigation | 9/5/2006    |                            |                          |                                   |                          |                             |                                  |                                          |                                    |                            |                           |                 |                       |                               | 80                     |
| Highline Canal @ Hwy 99 | Irrigation | 9/13/2006   |                            |                          |                                   |                          |                             |                                  |                                          |                                    |                            |                           |                 | 67                    |                               |                        |
| Highline Canal @ Hwy 99 | Storm      | 2/11/2007   |                            |                          |                                   |                          |                             |                                  | 3 (2.2)                                  | 0.52 (0.36)                        |                            |                           | 25              |                       |                               |                        |
| Highline Canal @ Hwy 99 | Irrigation | 4/17/2007   |                            |                          |                                   |                          |                             |                                  | 11 (10.1)                                | 5.1 (3.59)                         |                            |                           |                 |                       |                               |                        |
| Highline Canal @ Hwy 99 | Irrigation | 5/15/2007   |                            | 8.56                     |                                   | 250                      |                             |                                  |                                          |                                    |                            |                           |                 |                       |                               |                        |
| Highline Canal @ Hwy 99 | Irrigation | 6/19/2007   |                            |                          |                                   | 320                      |                             |                                  | 2.4 (1.9)                                | 0.5 (0.31)                         |                            |                           |                 |                       |                               |                        |
| Highline Canal @ Hwy 99 | Irrigation | 7/17/2007   |                            |                          |                                   | 440                      |                             |                                  | 3.2 (2.2)                                | 1 (0.36)                           |                            | 0.017                     |                 |                       |                               |                        |
| Highline Canal @ Hwy 99 | Irrigation | 8/14/2007   |                            | 8.62                     |                                   |                          |                             |                                  | 1.9 (1.7)                                | 0.44 (0.26)                        |                            |                           |                 |                       |                               |                        |
| Highline Canal @ Hwy 99 | Irrigation | 9/25/2007   |                            | 8.73                     |                                   |                          |                             |                                  |                                          |                                    |                            |                           |                 |                       |                               |                        |

| SITE NAME               | SEASON     | SAMPLE DATE | OXYGEN, DISSOLVED, <7 MG/L | PH, <6.5 AND > 8.5 UNITS | SPECIFIC CONDUCTIVITY, >700 µS/CM | E. COLI, >235 MPN/100 ML | DISSOLVED SOLIDS, >450 MG/L | AMMONIA <sup>1</sup> , >1.5 MG/L | COPPER, TOTAL <sup>2</sup> , >1,300 µG/L | LEAD, TOTAL <sup>2</sup> , >15µG/L | DDT, (P,P'), >0.00059 µG/L | CHLORPYRIFOS, >0.015 µG/L | DIURON, >2 µG/L | C. DUBIA, (% CONTROL) | S. CAPRICORNUTUM, (% CONTROL) | H. AZTECA, (% CONTROL) |
|-------------------------|------------|-------------|----------------------------|--------------------------|-----------------------------------|--------------------------|-----------------------------|----------------------------------|------------------------------------------|------------------------------------|----------------------------|---------------------------|-----------------|-----------------------|-------------------------------|------------------------|
| Highline Canal @ Hwy 99 | Storm      | 1/24/2008   |                            |                          |                                   | >2400                    | 500                         | 3.3                              | 37 (14.7)                                |                                    |                            | 0.019                     | 3.2             |                       |                               |                        |
| Highline Canal @ Hwy 99 | Storm      | 2/26/2008   |                            |                          | 747                               | >2400                    | 520                         | 8.3                              | 81 (81)                                  |                                    |                            |                           |                 |                       | 72                            |                        |
| Highline Canal @ Hwy 99 | Sediment   | 3/4/2008    |                            |                          |                                   |                          |                             |                                  |                                          |                                    |                            |                           |                 |                       |                               | 90                     |
| Highline Canal @ Hwy 99 | Storm      | 3/4/2008    |                            | 9.32                     |                                   |                          |                             |                                  |                                          |                                    |                            |                           |                 |                       |                               |                        |
| Highline Canal @ Hwy 99 | Irrigation | 4/22/2008   |                            |                          |                                   |                          |                             |                                  |                                          |                                    |                            |                           |                 |                       | 63                            |                        |
| Highline Canal @ Hwy 99 | Irrigation | 5/7/2008    |                            | 8.69                     |                                   |                          |                             |                                  |                                          |                                    |                            |                           |                 |                       |                               |                        |
| Highline Canal @ Hwy 99 | Irrigation | 5/20/2008   |                            |                          |                                   | 240                      |                             |                                  |                                          |                                    |                            |                           |                 |                       | 76                            |                        |
| Highline Canal @ Hwy 99 | Irrigation | 6/3/2008    |                            | 8.61                     |                                   |                          |                             |                                  |                                          |                                    |                            |                           |                 |                       |                               |                        |
| Highline Canal @ Hwy 99 | Irrigation | 7/22/2008   |                            |                          |                                   |                          |                             |                                  |                                          |                                    |                            | 0.021                     |                 |                       |                               |                        |
| Highline Canal @ Hwy 99 | Irrigation | 8/19/2008   |                            | 9.24                     |                                   |                          |                             |                                  |                                          |                                    |                            |                           |                 |                       |                               |                        |
| Highline Canal @ Hwy 99 | Sediment   | 8/28/2008   |                            |                          |                                   |                          |                             |                                  |                                          |                                    |                            |                           |                 |                       |                               | 94                     |
| Highline Canal @ Hwy 99 | Irrigation | 9/9/2008    |                            | 8.54                     |                                   |                          |                             |                                  |                                          |                                    |                            |                           |                 |                       |                               |                        |
| Highline Canal @ Hwy 99 | Sediment   | 10/2/2008   |                            |                          |                                   |                          |                             |                                  |                                          |                                    |                            |                           |                 |                       |                               | 92                     |
| Highline Canal @ Hwy 99 | Storm      | 2/7/2009    |                            | 8.86                     |                                   |                          |                             |                                  |                                          |                                    |                            |                           |                 |                       |                               |                        |
| Highline Canal @ Hwy 99 | Irrigation | 5/19/2009   |                            |                          |                                   | 340                      |                             |                                  |                                          |                                    |                            |                           |                 |                       |                               |                        |
| Highline Canal @ Hwy 99 | Irrigation | 6/16/2009   |                            | 8.95                     |                                   |                          |                             |                                  |                                          |                                    |                            |                           |                 |                       |                               |                        |
| Highline Canal @ Hwy 99 | Irrigation | 7/21/2009   |                            |                          |                                   |                          |                             |                                  |                                          |                                    |                            | 0.093                     |                 |                       |                               |                        |
| Highline Canal @ Hwy 99 | Irrigation | 8/18/2009   |                            | 9.03                     |                                   |                          |                             |                                  |                                          |                                    |                            |                           |                 |                       |                               |                        |

| SITE NAME               | SEASON     | SAMPLE DATE | OXYGEN, DISSOLVED, <7 MG/L | PH, <6.5 AND > 8.5 UNITS | SPECIFIC CONDUCTIVITY, >700 µS/CM | E. COLI, >235 MPN/100 ML | DISSOLVED SOLIDS, >450 MG/L | AMMONIA <sup>1</sup> , >1.5 MG/L | COPPER, TOTAL <sup>2</sup> , >1,300 µG/L | LEAD, TOTAL <sup>2</sup> , >15µG/L | DDT, (P,P'), >0.00059 µG/L | CHLORPYRIFOS, >0.015 µG/L | DIURON, >2 µG/L | C. DUBIA, (% CONTROL) | S. CAPRICORNUTUM, (% CONTROL) | H. AZTECA, (% CONTROL) |
|-------------------------|------------|-------------|----------------------------|--------------------------|-----------------------------------|--------------------------|-----------------------------|----------------------------------|------------------------------------------|------------------------------------|----------------------------|---------------------------|-----------------|-----------------------|-------------------------------|------------------------|
| Highline Canal @ Hwy 99 | Irrigation | 9/22/2009   |                            | 8.61                     |                                   |                          |                             |                                  |                                          |                                    |                            |                           |                 |                       |                               |                        |
| Highline Canal @ Hwy 99 | Storm      | 12/15/2009  |                            | 8.61                     |                                   |                          |                             |                                  |                                          |                                    |                            |                           |                 |                       |                               |                        |
| Highline Canal @ Hwy 99 | Storm      | 1/19/2010   |                            |                          |                                   | 1700                     |                             |                                  |                                          |                                    |                            |                           |                 |                       |                               |                        |
| Highline Canal @ Hwy 99 | Storm      | 2/23/2010   |                            |                          |                                   | 790                      |                             |                                  |                                          |                                    |                            |                           |                 |                       |                               |                        |
| Highline Canal @ Hwy 99 | Winter     | 3/15/2011   |                            |                          |                                   | >2400                    |                             |                                  |                                          |                                    |                            |                           |                 |                       |                               |                        |
| Highline Canal @ Hwy 99 | Irrigation | 6/14/2011   |                            |                          |                                   |                          |                             |                                  |                                          |                                    | 0.013                      |                           |                 |                       |                               |                        |
| Highline Canal @ Hwy 99 | Fall       | 11/8/2011   |                            | 8.77                     |                                   |                          |                             |                                  |                                          |                                    |                            |                           |                 |                       |                               |                        |
| Constituent Priority    |            |             | NP                         | E                        | E                                 | E                        | E                           | E                                | C                                        | E                                  | NP                         | A/B                       | C               | D                     | D                             | D                      |

<sup>1</sup>Ammonia WQTL variable based on pH and temperature.

<sup>2</sup>Total metal WQTL variable based on hardness.

NP – Not Prioritized; less than two exceedances within three consecutive monitoring years and currently no TMDL.

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## 2007-2011 Management Plan Monitoring Results

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All monitoring results for high priority management plan constituents in the Highline Canal @ Hwy 99 subwatershed are listed in Table VII-6. These constituents include chlorpyrifos, diuron, copper, water column toxicity to *C. dubia* and *S. capricornutum* and sediment toxicity to *H. azteca*.

Chlorpyrifos exceeded the WQTL five times (Table VII-5) at the Highline Canal @ Hwy 99 monitoring site during both the irrigation season (July 2007, 2008 and 2009) and storm events (two day, single storm event on February 28 and March 1, 2006 and January 2008). However, since the exceedance in July 2009, there were no detections of chlorpyrifos in samples collected from Highline Canal @ Hwy 99. The Coalition conducted MPM during months of past chlorpyrifos exceedances in 2010 and Assessment Monitoring in 2011. In 2012, MPM for chlorpyrifos is scheduled to occur during months of past exceedances (January, February and July).

Diuron exceeded the WQTL twice during two separate storm events (February 2007 and January 2008) at Highline Canal @ Hwy 99 (Table VII-5). Since the exceedance, the Coalition monitored diuron through December 2011. Monitoring for diuron was included in Normal Monitoring during the 2008 storm and irrigation seasons, MPM during 2010 and Assessment Monitoring during 2011. Since the most recent exceedance, there were no other diuron WQTL exceedances (Table VII-6).

Copper exceedances occurred seven times (Table VII-5) in samples collected from Highline Canal @ Hwy 99 in 2007 (February, April, June and August) and 2008 (January and February). However, all copper exceedances were of the total fraction and occurred before the Coalition conducted monitoring for both the total and dissolved fractions of the constituent. The Coalition monitored for copper at Highline Canal @ Hwy 99 since February 2008 and no copper exceedances occurred (the site was dry in January, February and December 2011). Sampling for copper was included in Normal Monitoring during the 2008 irrigation season, MPM during 2010 and Assessment Monitoring during 2011 (Table VII-6). In 2012, the Coalition will continue MPM for copper during months of past exceedances (January, February, April and June-August).

Water column toxicity to *C. dubia* occurred in samples collected during 2005 (May) and 2006 (March and September) at Highline Canal @ Hwy 99 (Table VII-5). The site was monitored monthly for toxicity to *C. dubia* and twice in September as a part of additional MPM in 2007. No toxicity occurred in any sample (Table VII-6). In 2008, Normal Monitoring occurred for all constituents from April through September and MPM for *C. dubia* toxicity took place. None of the samples collected in 2008 resulted in toxicity (Table VII-6). In 2009 and 2010, MPM for *C. dubia* did not take place but resumed in 2011 during Assessment Monitoring when MPM constituents were analyzed monthly. There are no instances of toxicity to *C. dubia* since September 2006. In 2012, MPM for *C. dubia* toxicity will continue during months of past exceedances (March, May and September).



Toxicity to *S. capricornutum* occurred in 2006 (March) and 2008 (February, April, and May), all toxic samples were associated with copper detections. Highline Canal @ Hwy 99 was a Core Monitoring site during 2009, *S. capricornutum* MPM was scheduled in April and May and neither sample resulted in toxicity (Table VII-6). Management Plan Monitoring for *S. capricornutum* toxicity took place in January and February 2010 and during the 2010 irrigation season. The 2010 MPM samples were not toxic (Table VII-6). During 2011 Highline Canal @ Hwy 99 was scheduled for Assessment Monitoring where all high priority constituents were analyzed monthly. In 2011, MPM for *S. capricornutum* toxicity (January and March-May) took place. There are no instances of *S. capricornutum* toxicity in any Normal Monitoring, Assessment Monitoring or MPM samples collected from Highline Canal @ Hwy 99 since May 2008. In 2012, this site will return to Core Monitoring and MPM is scheduled to occur for *S. capricornutum* during months of past exceedances (February-May).

Sediment toxicity to *H. azteca* occurred during the irrigation events of 2005, 2006 and 2008; storm samples from 2008 were also toxic. Management Plan Monitoring for *H. azteca* toxicity took place during the 2010 irrigation season, samples were not toxic. During 2011 Highline Canal @ Hwy 99 was monitored monthly for Assessment Monitoring and sediment samples were collected for MPM for *H. azteca* toxicity (March and September) and did not result in toxicity (Table VII-6). There have been no instances of sediment toxicity at Highline Canal @ Hwy 99 since the irrigation event in 2008 (Table VII-6). In 2012, MPM for *H. azteca* toxicity is scheduled to occur during months of past exceedances (March and September).

**Table VII-6. Highline Canal @ Hwy 99 site subwatershed monitoring results for high priority constituents (2007-2011).**

Exceedance values are in bold. Resampling (RS) due to toxicity not included in table.

|                                | MONTH:                                       | JAN          | FEB       | MAR | APR     | MAY     | JUN     | JUL          | AUG     | SEP     | NOV | OCT | DEC |
|--------------------------------|----------------------------------------------|--------------|-----------|-----|---------|---------|---------|--------------|---------|---------|-----|-----|-----|
| <b>2007 NM<br/>(@ Hwy 99)</b>  | Date                                         | NA           | NA        | NA  | 4/17/07 | 5/15/07 | 6/19/07 | 7/17/07      | 8/14/07 | 9/11/07 | NA  | NA  | NA  |
|                                | <i>C. dubia</i> toxicity (% Control)         | NA           | NA        | NA  | 90      | 100     | 100     | 95           | 100     | 100     | NA  | NA  | NA  |
| <b>2007 MPM<br/>(@ Hwy 99)</b> | Date                                         | NA           | NA        | NA  | NA      | NA      | NA      | NA           | NA      | 9/25/07 | NA  | NA  | NA  |
|                                | <i>C. dubia</i> toxicity (% Control)         | NA           | NA        | NA  | NA      | NA      | NA      | NA           | NA      | 100     | NA  | NA  | NA  |
| <b>2008 NM<br/>(@ Hwy 99)</b>  | Date                                         | 1/24/08      | 2/26/08   | NA  | 4/22/08 | 5/20/08 | 6/17/08 | 7/22/08      | 8/19/08 | 9/23/08 | NA  | NA  | NA  |
|                                | Copper (µg/L)                                | <b>37</b>    | <b>81</b> | NA  | 1.8     | 1.6     | 1.2     | 1.2          | 1.0     | 1.1     | NA  | NA  | NA  |
|                                | Chlorpyrifos (µg/L)                          | <b>0.019</b> | 0.0076    | NA  | <0.003  | <0.003  | <0.003  | <b>0.021</b> | <0.003  | <0.003  | NA  | NA  | NA  |
|                                | <i>C. dubia</i> toxicity (% Control)         | 100          | 100       | NA  | 100     | 100     | 100     | 100          | 100     | 100     | NA  | NA  | NA  |
| <b>2008 MPM<br/>(@ Hwy 99)</b> | Date                                         | NA           | NA        | NA  | 4/29/08 | 5/7/08  | 6/3/08  | 7/8/08       | 8/5/08  | 9/9/08  | NA  | NA  | NA  |
|                                | Copper (µg/L)                                | NA           | NA        | NA  | 1.4     | NA      | 1.5     | 1.7          | 1.6     | NA      | NA  | NA  | NA  |
|                                | Chlorpyrifos (µg/L)                          | NA           | NA        | NA  | NA      | NA      | NA      | <0.003       | NA      | NA      | NA  | NA  | NA  |
|                                | <i>C. dubia</i> toxicity (% Control)         | NA           | NA        | NA  | NA      | 100     | NA      | NA           | NA      | 100     | NA  | NA  | NA  |
| <b>2009 MPM<br/>(@ Hwy 99)</b> | Date                                         | NA           | NA        | NA  | 4/21/09 | 5/19/09 | NA      | 7/21/09      | NA      | NA      | NA  | NA  | NA  |
|                                | Chlorpyrifos (µg/L)                          | NA           | NA        | NA  | NA      | NA      | NA      | <b>0.093</b> | NA      | NA      | NA  | NA  | NA  |
|                                | <i>S. capricornutum</i> toxicity (% Control) | NA           | NA        | NA  | 428     | 222     | NA      | NA           | NA      | NA      | NA  | NA  | NA  |
| <b>2010 MPM<br/>(@ Hwy 99)</b> | Date                                         | 1/19/10      | 2/23/10   | NA  | 4/20/10 | 5/18/10 | 6/15/10 | 7/20/10      | 8/17/10 | 9/14/10 | NA  | NA  | NA  |
|                                | Copper, dissolved (µg/L)                     | 2.5          | 6.3       | NA  | 0.89    | NA      | 0.65    | 0.48         | 0.52    | NA      | NA  | NA  | NA  |
|                                | Copper, total (µg/L)                         | 5.7          | 7.8       | NA  | 2.2     | NA      | 1.2     | 1.3          | 1.2     | NA      | NA  | NA  | NA  |
|                                | Chlorpyrifos (µg/L)                          | <0.003       | <0.003    | NA  | NA      | NA      | NA      | <0.003       | NA      | NA      | NA  | NA  | NA  |
|                                | Diuron (µg/L)                                | 0.86         | 1.7       | NA  | NA      | NA      | NA      | NA           | NA      | NA      | NA  | NA  | NA  |
|                                | <i>S. capricornutum</i> toxicity (% Control) | 661          | 543       | NA  | 526     | 255     | NA      | NA           | NA      | NA      | NA  | NA  | NA  |
|                                | <i>H. azteca</i> toxicity (% Control)        | NA           | NA        | NA  | NA      | NA      | NA      | NA           | NA      | 108     | NA  | NA  | NA  |

| MONTH:                      |                                                 | JAN     | FEB     | MAR     |         | APR     | MAY     | JUN     | JUL     | AUG    | SEP    | NOV      | OCT     | DEC     |
|-----------------------------|-------------------------------------------------|---------|---------|---------|---------|---------|---------|---------|---------|--------|--------|----------|---------|---------|
| 2011 NM & MPM<br>(@ Hwy 99) | Date                                            | 1/18/11 | 2/17/11 | 3/15/11 | 3/17/11 | 4/19/11 | 5/10/11 | 6/14/11 | 7/12/11 | 8/9/11 | 9/6/11 | 10/11/11 | 11/8/11 | 12/6/11 |
|                             | Copper, dissolved (µg/L)                        | Dry*    | Dry*    | 1.1     | NA      | 0.97*   | 0.3     | 0.58*   | 0.53*   | 0.30*  | 0.51   | 0.11     | 1.4     | Dry     |
|                             | Copper, total (µg/L)                            | Dry*    | Dry*    | 2.1     | NA      | 1.3     | 0.89    | 1.1     | 1.4     | 0.82   | 5.2    | 0.88     | 2.2     | Dry     |
|                             | Chlorpyrifos (µg/L)                             | Dry*    | Dry*    | <0.003  | NA      | <0.003  | <0.003  | <0.003  | <0.003* | <0.003 | <0.003 | <0.003   | <0.003  | Dry     |
|                             | Diuron (µg/L)                                   | Dry*    | Dry*    | <0.2    | NA      | <0.2    | <0.2    | <0.2    | <0.2    | <0.2   | <0.2   | <0.2     | <0.2    | Dry     |
|                             | <i>C. dubia</i> toxicity<br>(% Control)         | Dry     | Dry     | 100*    | NA      | 100     | 100*    | 100     | 100     | 100    | 100*   | 100      | 100     | Dry     |
|                             | <i>S. capricornutum</i> toxicity<br>(% Control) | Dry     | Dry*    | 687*    | NA      | 393*    | 375*    | 363     | 195     | 320    | 355    | 450      | 2296    | Dry     |
|                             | <i>H. azteca</i> toxicity<br>(% Control)        | NA      | NA      | NA      | 102*    | NA      | NA      | NA      | NA      | NA     | 109*   | NA       | NA      | NA      |

MPM – Management Plan Monitoring (see Table 4 for MPM schedule)

NA – Not applicable. No monitoring occurred on this date for this constituent.

NM – Normal Monitoring

\*NM & MPM occurred during this date for this constituent.

## Load Calculations

Loads have been calculated for all chlorpyrifos, copper, and diuron detections in the site subwatershed (Table VII-7) based on the following formula:

$$\text{Load} = \text{Discharge (cfs)} \times 28.317\text{L/ft}^3 \times \text{Concentration (mg/L} \times 1000 \text{ or } \mu\text{g/L)}.$$

The load values for constituents in this report represent instantaneous loads only. These values should not be used to extrapolate loading over any period of time (e.g. weekly, monthly, seasonal or annual). The primary purpose for reporting instantaneous loads is to provide a normalization of the concentrations by flow for various constituents at the time the samples were collected.

**Table VII-7. Highline Canal @ Hwy 99 site subwatershed instantaneous load calculations for chlorpyrifos, copper, and diuron.**

Sorted by analyte and date.

| SITE NAME                | ANALYTE NAME | SAMPLE DATE | DISCHARGE CFS | CONCENTRATION $\mu\text{G/L}$ | LOADING RATE $\mu\text{G/SEC}$ |
|--------------------------|--------------|-------------|---------------|-------------------------------|--------------------------------|
| Highline Canal @ Hwy 99  | Chlorpyrifos | 03/01/06    | 0             | 0.021                         | 0                              |
| Highline Canal @ Hwy 99  | Chlorpyrifos | 07/12/06    | 111.81        | 0.012                         | 37.99                          |
| Highline Canal @ Hwy 99* | Chlorpyrifos | 07/17/07    | 56.81         | 0.015                         | 24.13                          |
| Highline Canal @ Hwy 99  | Chlorpyrifos | 07/17/07    | 56.81         | 0.017                         | 27.35                          |
| Highline Canal @ Hwy 99  | Chlorpyrifos | 01/24/08    | 55.88         | 0.019                         | 30.06                          |
| Highline Canal @ Hwy 99  | Chlorpyrifos | 02/26/08    | 6.91          | 0.0076                        | 1.49                           |
| Highline Canal @ Hwy 99  | Chlorpyrifos | 07/21/09    | 118.93        | 0.093                         | 313.20                         |
| Highline Canal @ Hwy 99  | Copper       | 05/17/06    | 82.45         | 1.8                           | 4202.53                        |
| Highline Canal @ Hwy 99  | Copper       | 06/14/06    | 90.82         | 1.7                           | 4371.97                        |
| Highline Canal @ Hwy 99  | Copper       | 07/12/06    | 111.81        | 1.6                           | 5065.80                        |
| Highline Canal @ Hwy 99  | Copper       | 08/09/06    | 162.04        | 1.3                           | 5965.03                        |
| Highline Canal @ Hwy 99  | Copper       | 09/13/06    | 72.64         | 1.3                           | 2674.03                        |
| Highline Canal @ Hwy 99  | Copper       | 02/11/07    | 55.43         | 3                             | 4708.83                        |
| Highline Canal @ Hwy 99  | Copper       | 04/17/07    | 22.54         | 11                            | 7020.92                        |
| Highline Canal @ Hwy 99  | Copper       | 05/15/07    | 60.6          | 1.4                           | 2402.41                        |
| Highline Canal @ Hwy 99  | Copper       | 06/19/07    | 84.28         | 2.4                           | 5727.74                        |
| Highline Canal @ Hwy 99* | Copper       | 07/17/07    | 56.81         | 3.1                           | 4986.94                        |
| Highline Canal @ Hwy 99  | Copper       | 07/17/07    | 56.81         | 3.2                           | 5147.80                        |
| Highline Canal @ Hwy 99  | Copper       | 08/14/07    | 81.98         | 1.9                           | 4410.71                        |
| Highline Canal @ Hwy 99  | Copper       | 09/11/07    | 33.38         | 1.5                           | 1417.83                        |
| Highline Canal @ Hwy 99  | Copper       | 01/24/08    | 55.88         | 37                            | 58547.10                       |
| Highline Canal @ Hwy 99  | Copper       | 02/26/08    | 6.91          | 81                            | 15849.31                       |
| Highline Canal @ Hwy 99  | Copper       | 04/29/08    | 34.66         | 1.4                           | 1374.05                        |
| Highline Canal @ Hwy 99  | Copper       | 05/20/08    | 81.42         | 1.6                           | 3688.91                        |
| Highline Canal @ Hwy 99  | Copper       | 06/03/08    | 57.91         | 1.5                           | 2459.76                        |
| Highline Canal @ Hwy 99  | Copper       | 08/19/08    | 37.45         | 1                             | 1060.47                        |
| Highline Canal @ Hwy 99  | Copper       | 01/19/10    | 0             | 5.7                           | 0                              |
| Highline Canal @ Hwy 99  | Copper       | 02/23/10    | 0             | 7.8                           | 0                              |
| Highline Canal @ Hwy 99  | Copper       | 11/08/11    | 0.57          | 2.2                           | 35.51                          |
| Highline Canal @ Hwy 99  | Copper (D)   | 01/19/10    | 0             | 2.5                           | 0                              |
| Highline Canal @ Hwy 99  | Copper (D)   | 02/23/10    | 0             | 6.3                           | 0                              |
| Highline Canal @ Hwy 99  | Copper (D)   | 11/08/11    | 0.57          | 1.4                           | 22.60                          |

| SITE NAME               | ANALYTE NAME | SAMPLE DATE | DISCHARGE CFS | CONCENTRATION µG/L | LOADING RATE µG/SEC |
|-------------------------|--------------|-------------|---------------|--------------------|---------------------|
| Highline Canal @ Hwy 99 | Diuron       | 02/11/07    | 55.43         | 25                 | 39240.28            |
| Highline Canal @ Hwy 99 | Diuron       | 01/24/08    | 55.88         | 3.2                | 5063.53             |
| Highline Canal @ Hwy 99 | Diuron       | 02/26/08    | 6.91          | 0.43               | 84.14               |
| Highline Canal @ Hwy 99 | Diuron       | 01/19/10    | 0             | 0.86               | 0                   |
| Highline Canal @ Hwy 99 | Diuron       | 02/23/10    | 0             | 1.7                | 0                   |

Copper (D)-Dissolved Copper

\*Field Duplicate

### Source Identification and Outreach

The Coalition addressed source identification in the 2011 MPUR and, in the following sections, considers 2011 monitoring results and PUR data as it expands upon that discussion. The Coalition focuses its efforts on applied pesticides. During 2007 and 2008, the Coalition conducted additional MPM and upstream monitoring during the months when exceedances occurred in previous years to better characterize water quality in the subwatershed. From 2009 through 2011, MPM continued at Highline Canal @ Hwy 99 to assess water quality in the subwatershed as outreach in the area progressed. Assessment Monitoring occurred at this site during 2011. The PUR data are reviewed to determine the most frequent crop type and timing associated with applications. Highline Canal @ Hwy 99 subwatershed PUR data are available only through June 2011.

Focused outreach to document current management practices and track implementation of additional management practices in the Highline Canal subwatershed began in 2010 and continued through 2011. The Coalition organized grower meetings and mailings to educate growers about management practices and their importance in achieving acceptable water quality. The Coalition contacted 100% of targeted growers (10) representing 368 acres within the Highline Canal @ Hwy 99 subwatershed. Eight growers participated in follow up contacts to determine if additional management practices were implemented and if any are planned to be implemented, excluding two growers who either dropped their Coalition membership or no longer farmed parcels enrolled within the Highline Canal subwatershed. Management Plan Monitoring will continue in the Highline Canal @ Hwy 99 subwatershed during 2012 to assess water quality improvements that have occurred since the subwatershed became high priority.

### Priority A/B Constituents

Chlorpyrifos is the only priority A/B constituent listed in the Highline Canal @ Hwy 99 subwatershed management plan.

#### Chlorpyrifos

Chlorpyrifos exceeded the WQTL of 0.015µg/L five times in this subwatershed; March 2006, July 2007, 2008, and 2009, and January 2008. In 2011, MPM for chlorpyrifos occurred in January, February and July. There were no exceedances of chlorpyrifos during 2011. The Coalition evaluates monitoring and PUR data to identify possible sources of exceedances of constituents of concern.

All PUR data are reviewed for the number of monthly applications, pounds of active ingredient applied, and acres treated (Table VII-8, Figure VII-2). The PUR data from Highline Canal @ Hwy 99 subwatershed

area were reviewed for chlorpyrifos use. The amount of chlorpyrifos applied within the subwatershed decreased significantly from 2007 (18,201 lbs AI) to 2011 (3,290 lbs AI June 2011). The greatest amount of chlorpyrifos applied in 2005 was during May, while July received the most chlorpyrifos in 2006, 2007, 2008 and 2010 (Table VII-8, Figure VII-2). Exceedances did not always occur during months of the greatest amount of use (Figure VII-2).

The Coalition also uses PUR data to assess which crops received the most applications (Table VII-9). The largest amount of chlorpyrifos applied from 2005 through 2011 was to almonds (52,205 lbs AI), followed by grapes (10,786 lbs AI) and walnuts (8,012 lbs AI). The most common product containing chlorpyrifos applied within the subwatershed was Lorsban (Table VII-9).

**Table VII-8. Highline Canal @ Hwy 99 site subwatershed chlorpyrifos applications, lbs AI applied, and acres treated by month (2005-2011).**

PUR data available through October 2011 for Merced County. If month is not included in table, no applications were made.

| MONTH/YEAR      | NUMBER OF CHLORPYRIFOS APPLICATIONS | POUNDS OF AI APPLIED | ACRES TREATED |
|-----------------|-------------------------------------|----------------------|---------------|
| January, 2005   | 16                                  | 892.4                | 608.2         |
| March, 2005     | 7                                   | 261.8                | 552.2         |
| April, 2005     | 2                                   | 360.2                | 360.0         |
| May, 2005       | 15                                  | 6077.2               | 1618.0        |
| June, 2005      | 17                                  | 1184.0               | 713.0         |
| July, 2005      | 41                                  | 3106.5               | 1835.0        |
| August, 2005    | 19                                  | 2784.3               | 2229.0        |
| September, 2005 | 2                                   | 33.9                 | 17.0          |
| November, 2005  | 4                                   | 1444.7               | 724.6         |
| January, 2006   | 8                                   | 2076.5               | 1054.0        |
| May, 2006       | 13                                  | 2535.4               | 2007.0        |
| June, 2006      | 10                                  | 1558.4               | 1433.9        |
| July, 2006      | 29                                  | 6263.8               | 3669.2        |
| August, 2006    | 31                                  | 2608.2               | 2502.5        |
| September, 2006 | 2                                   | 85.1                 | 42.0          |
| January, 2007   | 1                                   | 37.5                 | 19.0          |
| March, 2007     | 2                                   | 114.3                | 225.4         |
| April, 2007     | 1                                   | 6.2                  | 20.0          |
| May, 2007       | 19                                  | 2056.9               | 1742.0        |
| June, 2007      | 8                                   | 3971.9               | 1435.0        |
| July, 2007      | 43                                  | 9411.9               | 5802.3        |
| August, 2007    | 12                                  | 769.6                | 667.4         |
| October, 2007   | 3                                   | 1832.5               | 915.3         |
| January, 2008   | 1                                   | 18.8                 | 10.0          |
| March, 2008     | 1                                   | 4.0                  | 8.0           |
| May, 2008       | 9                                   | 672.4                | 454.0         |
| June, 2008      | 2                                   | 10.3                 | 15.0          |
| July, 2008      | 21                                  | 1922.0               | 1565.8        |
| August, 2008    | 17                                  | 1652.5               | 925.0         |
| September, 2008 | 2                                   | 335.0                | 170.0         |
| October, 2008   | 3                                   | 1395.9               | 699.8         |
| January, 2009   | 6                                   | 3831.1               | 2040.0        |
| February, 2009  | 1                                   | 620.3                | 306.0         |

| MONTH/YEAR               | NUMBER OF CHLORPYRIFOS APPLICATIONS | POUNDS OF AI APPLIED | ACRES TREATED  |
|--------------------------|-------------------------------------|----------------------|----------------|
| March, 2009              | 4                                   | 174.9                | 300.4          |
| May, 2009                | 13                                  | 606.6                | 370.0          |
| June, 2009               | 5                                   | 267.0                | 254.0          |
| July, 2009               | 22                                  | 1738.8               | 1576.4         |
| August, 2009             | 14                                  | 1664.4               | 958.0          |
| September, 2009          | 2                                   | 59.6                 | 65.0           |
| October, 2009            | 4                                   | 1778.5               | 947.0          |
| March, 2010              | 3                                   | 203.8                | 413.2          |
| May, 2010                | 6                                   | 528.5                | 375.0          |
| June, 2010               | 11                                  | 909.8                | 811.0          |
| July, 2010               | 41                                  | 3907.1               | 2618.5         |
| August, 2010             | 14                                  | 1633.4               | 1055.0         |
| September, 2010          | 3                                   | 57.1                 | 36.0           |
| October, 2010            | 1                                   | 398.1                | 212.0          |
| November, 2010           | 4                                   | 1955.0               | 1041.0         |
| January, 2011            | 1                                   | 42.3                 | 30.0           |
| June, 2011               | 6                                   | 359.5                | 247.0          |
| July, 2011               | 15                                  | 1040.7               | 799.0          |
| August, 2011             | 13                                  | 561.7                | 407.0          |
| September, 2011          | 6                                   | 168.5                | 101.0          |
| October, 2011            | 3                                   | 1117.5               | 630.0          |
| <b>Summaries by Year</b> |                                     |                      |                |
| 2005 Total               | 123                                 | 16145.0              | 8657.0         |
| 2006 Total               | 93                                  | 15127.4              | 10708.6        |
| 2007 Total               | 89                                  | 18200.8              | 10826.4        |
| 2008 Total               | 56                                  | 6010.8               | 3847.6         |
| 2009 Total               | 71                                  | 10741.2              | 6816.8         |
| 2010 Total               | 83                                  | 9592.9               | 6561.7         |
| 2011 Total               | 44                                  | 3290.1               | 2214.0         |
| <b>Total</b>             | <b>559</b>                          | <b>79108.1</b>       | <b>49632.1</b> |

**Figure VII-2. Highline Canal @ Hwy 99 site subwatershed lbs chlorpyrifos applied by month (2005-2011).**

Asterisk (\*) denotes months with exceedances. PUR data available through October 2011 for Merced County.

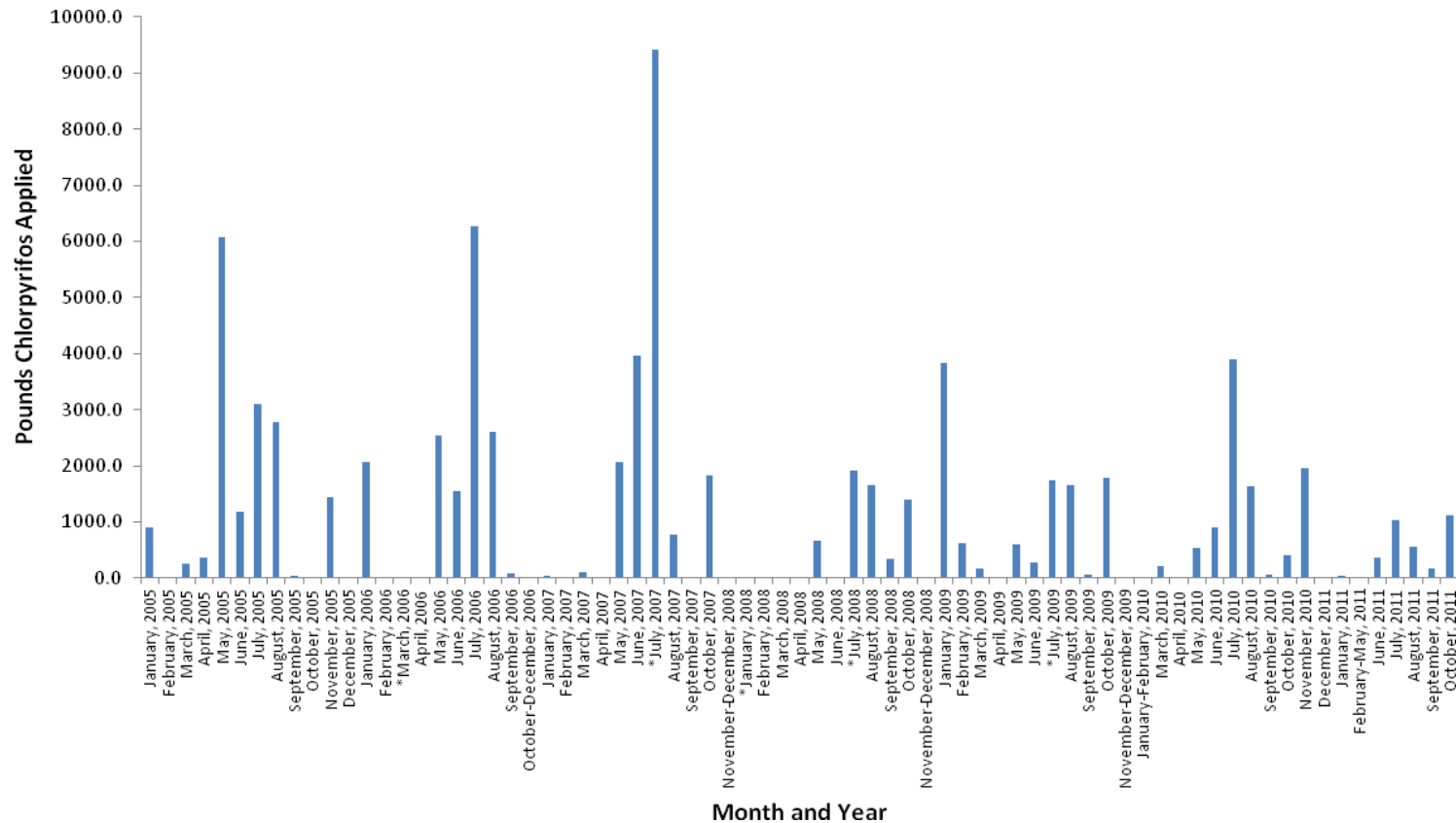




**Table VII-9. Highline Canal @ Hwy 99 site subwatershed chlorpyrifos PUR data (2005-2011).**

PUR data available through October 2011 for Merced County.

| CHEMICAL NAME                               | COMMODITY                               | PRODUCT NAME                            | LBS AI APPLIED |
|---------------------------------------------|-----------------------------------------|-----------------------------------------|----------------|
| CHLORPYRIFOS                                | ALFALFA (FORAGE - FODDER) (ALFALFA HAY) | CHLORPYRIFOS 4E AG                      | 7.5            |
|                                             |                                         | COBALT                                  | 93.2           |
|                                             |                                         | GOVERN 4E INSECTICIDE                   | 14.7           |
|                                             |                                         | LOCK-ON INSECTICIDE                     | 138.2          |
|                                             |                                         | LORSBAN 4E-HF                           | 105.2          |
|                                             |                                         | LORSBAN-4E                              | 3.7            |
|                                             |                                         | NUFOS 4E                                | 553.8          |
|                                             | ALMOND                                  | CHLORPYRIFOS 4E AG                      | 967.5          |
|                                             |                                         | DURSBAN 4E INSECTICIDE                  | 20.2           |
|                                             |                                         | GOVERN 4E INSECTICIDE                   | 8732.7         |
|                                             |                                         | LORSBAN 4E INSECTICIDE                  | 408.6          |
|                                             |                                         | LORSBAN 4E-HF                           | 4211.2         |
|                                             |                                         | LORSBAN 50W WETTABLE POWDER INSECTICIDE | 30.0           |
|                                             |                                         | LORSBAN ADVANCED                        | 4538.7         |
|                                             |                                         | LORSBAN-4E                              | 29863.4        |
|                                             |                                         | NUFOS 4E                                | 2821.3         |
|                                             |                                         | WARHAWK                                 | 121.2          |
|                                             |                                         | WHIRLWIND                               | 489.9          |
|                                             | CORN (FORAGE - FODDER)                  | CHLORPYRIFOS 4E AG                      | 200.3          |
|                                             |                                         | DREXEL CHLORPYRIFOS 4E-AG               | 75.2           |
|                                             |                                         | GOVERN 4E INSECTICIDE                   | 267.7          |
|                                             |                                         | LORSBAN 15G GRANULAR INSECTICIDE        | 113.5          |
|                                             |                                         | LORSBAN 4E INSECTICIDE                  | 120.0          |
|                                             |                                         | LORSBAN 4E-HF                           | 1109.4         |
|                                             |                                         | LORSBAN ADVANCED                        | 1077.4         |
|                                             |                                         | LORSBAN-4E                              | 1364.8         |
|                                             |                                         | NUFOS 4E                                | 1572.3         |
|                                             |                                         | WARHAWK                                 | 757.1          |
|                                             | GRAPES                                  | LORSBAN 4E-HF                           | 5612.5         |
|                                             |                                         | LORSBAN ADVANCED                        | 5173.9         |
|                                             | PEACH                                   | CHLORPYRIFOS 4E AG                      | 114.5          |
|                                             |                                         | LORSBAN 4E-HF                           | 139.4          |
|                                             |                                         | LORSBAN ADVANCED                        | 42.3           |
|                                             |                                         | LORSBAN-4E                              | 36.0           |
|                                             | SORGHUM/MILO GENERAL                    | NUFOS 4E                                | 4.3            |
|                                             | SWEET POTATO                            | LORSBAN 15G GRANULAR INSECTICIDE        | 194.4          |
|                                             | WALNUT                                  | CHLORPYRIFOS 4E AG                      | 270.2          |
|                                             |                                         | GOVERN 4E INSECTICIDE                   | 426.2          |
|                                             |                                         | LORSBAN 4E-HF                           | 679.9          |
|                                             |                                         | LORSBAN ADVANCED                        | 1378.5         |
|                                             |                                         | LORSBAN-4E                              | 3547.0         |
|                                             |                                         | NUFOS 4E                                | 1458.8         |
|                                             |                                         | WARHAWK                                 | 171.7          |
|                                             | WHIRLWIND                               | 80.0                                    |                |
| ALFALFA - Total Pounds Chlorpyrifos Applied |                                         |                                         | 916.3          |
| ALMOND - Total Pounds Chlorpyrifos Applied  |                                         |                                         | 52204.7        |
| CORN - Total Pounds Chlorpyrifos Applied    |                                         |                                         | 6657.6         |

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| CHEMICAL NAME | COMMODITY | PRODUCT NAME                                     | LBS AI APPLIED |
|---------------|-----------|--------------------------------------------------|----------------|
|               |           | GRAPES - Total Pounds Chlorpyrifos Applied       | 10786.4        |
|               |           | PEACH - Total Pounds Chlorpyrifos Applied        | 332.2          |
|               |           | SORGHUM- Total Pounds Chlorpyrifos Applied       | 4.3            |
|               |           | SWEET POTATO - Total Pounds Chlorpyrifos Applied | 194.4          |
|               |           | WALNUT - Total Pounds Chlorpyrifos Applied       | 8012.3         |
|               |           | Total Pounds Chlorpyrifos Applied (2005 - 2011)  | 79108.1        |

The Coalition determined the most probable source of chlorpyrifos in the Highline Canal @ Hwy 99 waterway to be spray drift and irrigation drainage from adjacent fields. In this subwatershed, chlorpyrifos exceedances often occurred in July (2007-2009), but also occurred during storm monitoring (January 2008 and March 2006; Table VII-5). Consequently, outreach efforts focused both on encouraging management practices aimed at reducing spray drift and improving drainage water management. The Coalition targeted growers applying chlorpyrifos and also those owning parcels with the potential to drain to the canal. Growers were encouraged to review their farming operations to determine if irrigation return flows were managed properly. Owners operating orchards were encouraged to evaluate their aerial applications to minimize spray drift.

Coalition outreach since 2007 has included grower meetings and the mailing/distribution of information such as available funding for management practice implementation. A complete list of coalition outreach during 2011 is provided in the Actions Taken to Address Water Quality Exceedances section of the 2012 AMR (Table 46, page 142).

In accordance with the Coalition's Management Plan strategy, individual contacts with targeted growers began in November 2009. Targeted growers were selected based on the potential to drain or drift to the canal and those applying chlorpyrifos. Using these criteria, 10 targeted growers, representing 368 acres, were contacted. Coalition representatives met with growers on their property to discuss the Highline Canal management plan and offer recommendations specific to the parcel and land owner/operator. This gave the Coalition a chance to better assess currently used management practices as well as planned management practice implementation. Individual contacts focused mainly on chlorpyrifos exceedances, however, all water quality results were reviewed and discussed including copper, diuron, ammonia, pH, SC, TDS, *E. coli*, and lead WQTLs exceedances as well as toxicity to *C. dubia*, *S. capricornutum* and *H. azteca*.

To date, the Coalition contacted all 10 targeted members representing 33% of the total subwatershed direct drainage acreage. During initial contacts all growers indicated no irrigation drainage took place on their parcels, but in 2010 a single grower reported irrigation drainage. The Coalition representatives recommended three spray-drift management practices: spraying areas close to waterbodies when the wind is blowing away from them, using air blast applications when wind is between three and 10 mph, and using nozzles that provide the largest effective droplet size to minimize drift.

The Coalition followed up with growers in April of 2011 to determine if any practices were implemented during the first irrigation year of high priority monitoring. Of the acres with irrigation drainage, 50% were reported to have reduced surface water use and the other 50% had implemented nozzles that provide the largest effective droplet size to minimize drift. Of the parcels without drainage, 60% reported using less water during surface irrigation, 20% sprayed areas close to waterbodies when the wind was blowing away from them, and the other 20% implemented using air blast applications when the wind was between three and 10 mph. The Coalition's Assessment of implemented management practices is included in the Summary of Implemented Management Practices section of this report.

The Coalition will continue to assess water quality at Highline Canal @ Hwy 99 through MPM during months of past exceedances, and will update its evaluation of management practice effectiveness to including monitoring results from 2012 in the 2013 MPUR.

There have been no exceedances of chlorpyrifos for two or more consecutive years of monitoring during the months of past exceedances in the Highline Canal subwatershed. A letter was submitted to the Regional Board on January 6, 2012, petitioning to remove chlorpyrifos from the Highline Canal @ Hwy 99 management plan.

### *Priority C Constituents*

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Copper and diuron are listed as priority C constituents for the Highline Canal @ Hwy 99 subwatershed.

#### **Copper**

Copper exceeded the hardness based WQTL seven times in this subwatershed from 2005 through 2011. Copper exceedances occurred five times during 2007 (February, April, and June-August), and twice in 2008 (January and February) (Table VII-5). The Coalition began monitoring for both the total and dissolved copper fractions in October 2008 to better characterize copper contamination in the subwatershed.

Samples collected from Highline Canal @ Lombardy Rd (located upstream) exceeded the WQTL for copper numerous times in the past indicating that copper is a water quality concern throughout the canal. Both Highline Canal @ Hwy 99 and Highline Canal @ Lombardy Rd underwent Assessment Monitoring during 2011 and no copper exceedances occurred.

PUR data are reviewed for the number of monthly copper applications, pounds of active ingredient applied, and acres treated (Table VII-10, Figure VII-3). The amount of copper applied within the subwatershed decreased annually from 2006 through 2008 and then increased in 2009 through 2010 (2011 data through June only). The month of January consistently receives the greatest amount of copper applied. Not all exceedances occurred during months of the greatest amount of use (Figure VII-3).

The Coalition also uses PUR data to assess which crops receive the greatest quantity of copper. The largest amount of copper applied from 2005 through 2011 by far was associated with almonds (270,596 lbs AI). Peach and walnut orchards had the next largest amounts of copper applied in the subwatershed (Table VII-11). The most common product containing copper used within this subwatershed is Kocide (Table VII-11).

**Table VII-10. Highline Canal @ Hwy 99 site subwatershed copper applications, lbs AI applied, and acres treated by month (2005-2011).**

PUR data available through October 2011 for Merced County. If month is not included in table, no applications were made.

| MONTH/YEAR      | NUMBER OF COPPER APPLICATIONS | POUNDS OF AI APPLIED | ACRES TREATED |
|-----------------|-------------------------------|----------------------|---------------|
| January, 2005   | 69                            | 19418.0              | 4479.3        |
| February, 2005  | 107                           | 5206.6               | 4526.7        |
| March, 2005     | 37                            | 3760.8               | 1647.0        |
| April, 2005     | 43                            | 5415.4               | 2325.7        |
| May, 2005       | 18                            | 1909.5               | 605.0         |
| June, 2005      | 3                             | 112.4                | 47.0          |
| August, 2005    | 2                             | 176.3                | 63.0          |
| September, 2005 | 1                             | 8.6                  | 4.0           |
| October, 2005   | 2                             | 9.1                  | 8.0           |
| November, 2005  | 12                            | 5791.3               | 1393.1        |
| December, 2005  | 59                            | 14037.9              | 1423.1        |
| January, 2006   | 75                            | 62305.7              | 9641.4        |
| February, 2006  | 96                            | 9520.6               | 4473.0        |
| March, 2006     | 25                            | 1378.9               | 1453.1        |
| April, 2006     | 26                            | 2649.9               | 683.0         |
| May, 2006       | 23                            | 2807.0               | 1563.4        |
| June, 2006      | 1                             | 144.2                | 67.0          |
| August, 2006    | 2                             | 191.1                | 63.0          |
| November, 2006  | 8                             | 4308.1               | 1039.6        |
| December, 2006  | 19                            | 3360.8               | 304.6         |
| January, 2007   | 71                            | 28336.1              | 5252.2        |
| February, 2007  | 52                            | 4981.1               | 2356.1        |
| March, 2007     | 58                            | 4207.2               | 2553.5        |
| April, 2007     | 59                            | 5846.8               | 1362.1        |
| May, 2007       | 14                            | 1581.7               | 416.1         |
| July, 2007      | 2                             | 210.0                | 63.0          |
| September, 2007 | 1                             | 18.5                 | 6.0           |
| November, 2007  | 12                            | 8678.6               | 2313.0        |
| December, 2007  | 26                            | 3182.7               | 432.1         |
| January, 2008   | 44                            | 19684.3              | 3792.4        |
| February, 2008  | 62                            | 5479.1               | 2818.1        |
| March, 2008     | 47                            | 2908.5               | 2021.0        |
| April, 2008     | 19                            | 2538.9               | 1460.2        |
| May, 2008       | 1                             | 9.2                  | 5.0           |
| July, 2008      | 2                             | 135.0                | 63.0          |
| November, 2008  | 3                             | 1025.6               | 111.0         |
| December, 2008  | 13                            | 3475.8               | 1363.5        |
| January, 2009   | 42                            | 26062.8              | 5186.6        |
| February, 2009  | 77                            | 5671.1               | 2736.5        |

| MONTH/YEAR               | NUMBER OF COPPER APPLICATIONS | POUNDS OF AI APPLIED | ACRES TREATED   |
|--------------------------|-------------------------------|----------------------|-----------------|
| March, 2009              | 27                            | 1339.8               | 1003.0          |
| April, 2009              | 42                            | 5404.7               | 2351.0          |
| May, 2009                | 11                            | 984.4                | 282.0           |
| June, 2009               | 3                             | 467.1                | 139.0           |
| August, 2009             | 2                             | 162.1                | 39.8            |
| September, 2009          | 4                             | 252.3                | 109.2           |
| October, 2009            | 1                             | 63.1                 | 27.3            |
| November, 2009           | 5                             | 1265.2               | 1081.9          |
| December, 2009           | 7                             | 2732.3               | 809.5           |
| January, 2010            | 47                            | 22280.9              | 5073.7          |
| February, 2010           | 140                           | 11829.6              | 7244.0          |
| March, 2010              | 62                            | 4568.0               | 5198.1          |
| April, 2010              | 56                            | 6644.7               | 2607.5          |
| May, 2010                | 19                            | 2612.8               | 1040.0          |
| June, 2010               | 5                             | 385.3                | 188.4           |
| July, 2010               | 5                             | 366.0                | 146.0           |
| August, 2010             | 3                             | 237.0                | 65.0            |
| October, 2010            | 1                             | 26.9                 | 25.0            |
| November, 2010           | 5                             | 1710.4               | 1560.0          |
| December, 2010           | 17                            | 13110.0              | 3478.0          |
| January, 2011            | 47                            | 22810.4              | 5547.0          |
| February, 2011           | 69                            | 6551.8               | 5078.9          |
| March, 2011              | 102                           | 4048.6               | 3326.6          |
| April, 2011              | 44                            | 6589.5               | 4585.3          |
| May, 2011                | 22                            | 3463.6               | 823.7           |
| June, 2011               | 10                            | 1488.1               | 419.1           |
| July, 2011               | 41                            | 3499.6               | 1238.2          |
| September, 2011          | 1                             | 56.4                 | 24.4            |
| October, 2011            | 1                             | 56.4                 | 24.4            |
| <b>Summaries by Year</b> |                               |                      |                 |
| 2005 Total               | 353                           | 55845.9              | 16521.9         |
| 2006 Total               | 275                           | 86666.3              | 19288.1         |
| 2007 Total               | 295                           | 57042.7              | 14754.1         |
| 2008 Total               | 191                           | 35256.6              | 11634.2         |
| 2009 Total               | 221                           | 44404.7              | 13765.8         |
| 2010 Total               | 360                           | 63771.5              | 26625.6         |
| 2011 Total               | 337                           | 48564.4              | 21067.6         |
| <b>Total</b>             | <b>2032</b>                   | <b>391551.9</b>      | <b>123657.4</b> |

**Figure VII-3. Highline Canal @ Hwy 99 site subwatershed lbs copper applied by month (2005-2011).**

Asterisk (\*) denotes months with exceedances. PUR data available through October 2011 for Merced County.

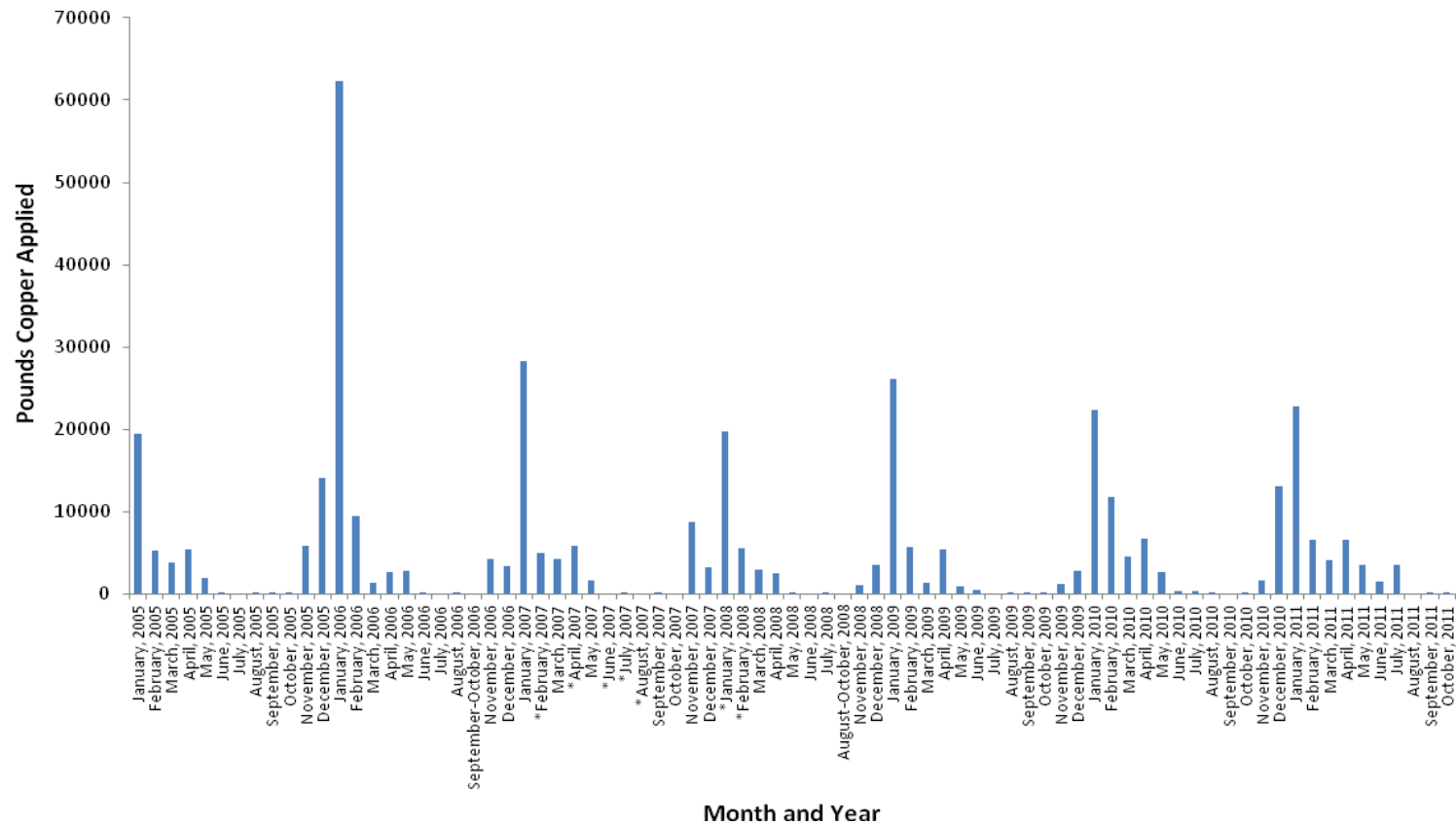


**Table VII-11. Highline Canal @ Hwy 99 site subwatershed copper PUR data (2005-2011).**

PUR data available through October 2011 for Merced County.

| CHEMICAL NAME | COMMODITY                         | PRODUCT NAME                                  | LBS AI APPLIED |
|---------------|-----------------------------------|-----------------------------------------------|----------------|
| COPPER        | ALMOND                            | BASIC COPPER 53                               | 63644.1        |
|               |                                   | BASICOP                                       | 1229.1         |
|               |                                   | CHAMP DRY PRILL                               | 1352.2         |
|               |                                   | CHAMP FORMULA 2 FLOWABLE                      | 13109.7        |
|               |                                   | CHAMP WG                                      | 492.8          |
|               |                                   | CHAMPION WETTABLE POWDER                      | 1486.9         |
|               |                                   | COPPER SULFATE CRYSTAL                        | 148.5          |
|               |                                   | CUPROFIX DISPERS                              | 7.4            |
|               |                                   | CUPROFIX ULTRA 40 DISPERS                     | 34537.8        |
|               |                                   | DUPONT KOCIDE 2000 FUNGICIDE/BACTERICIDE      | 18305.8        |
|               |                                   | DUPONT KOCIDE 3000 FUNGICIDE/BACTERICIDE      | 180.3          |
|               |                                   | DUPONT KOCIDE DF FUNGICIDE/BACTERICIDE        | 73.7           |
|               |                                   | HYDROX                                        | 6098.4         |
|               |                                   | KENTAN DF                                     | 2535.3         |
|               |                                   | KOCIDE 101                                    | 12749.3        |
|               |                                   | KOCIDE 2000                                   | 4156.9         |
|               |                                   | KOCIDE DF                                     | 8304.6         |
|               |                                   | NORDOX                                        | 56.4           |
|               |                                   | NORDOX 75 WG                                  | 20156.6        |
|               |                                   | NU-COP 50 WP                                  | 6923.8         |
|               |                                   | NU-COP 50DF                                   | 74622.8        |
|               |                                   | NU-COP 50WP                                   | 374.2          |
|               |                                   | QUIMAG QUIMICOS AGUILA COPPER SULFATE CRYSTAL | 49.5           |
|               | APRICOT                           | DUPONT KOCIDE 3000 FUNGICIDE/BACTERICIDE      | 8.8            |
|               |                                   | KOCIDE DF                                     | 310.1          |
|               |                                   | NORDOX 75 WG                                  | 427.9          |
|               | BLUEBERRY                         | NORDOX 75 WG                                  | 109.1          |
|               | CHERRY                            | BASIC COPPER 53                               | 9.8            |
|               |                                   | CHAMPION WETTABLE POWDER                      | 46.2           |
|               | GRAPES                            | BASIC COPPER 53                               | 230.3          |
|               |                                   | CHAMP FORMULA 2 FLOWABLE                      | 2351.9         |
|               |                                   | CHAMPION WETTABLE POWDER                      | 10.8           |
|               |                                   | CLEAN CROP C-O-C-S 15 SULFUR 25 DUST          | 712.4          |
|               |                                   | COCS 15 SULFUR 25 DUST                        | 82.5           |
|               |                                   | DUPONT GX-569 FUNGICIDE/BACTERICIDE           | 412.3          |
|               |                                   | DUPONT KOCIDE 2000 FUNGICIDE/BACTERICIDE      | 30.1           |
|               |                                   | DUPONT KOCIDE 3000 FUNGICIDE/BACTERICIDE      | 453.8          |
|               |                                   | IAP COPPER SULFUR 15-25 DUST                  | 636.7          |
|               |                                   | KENTAN DF                                     | 2041.3         |
|               |                                   | KOCIDE 4.5 LF                                 | 318.4          |
|               |                                   | KOCIDE 606 FLOWABLE AGRICULTURAL FUNGICIDE    | 713.8          |
|               |                                   | NU-COP 50DF                                   | 854.7          |
|               |                                   | WIL-DRY                                       | 3488.8         |
|               | N-OUTDR CONTAINER/FLD GRWN PLANTS | CHAMPION WETTABLE POWDER                      | 5389.2         |
|               |                                   | KOCIDE 2000                                   | 242.6          |
|               |                                   | NU-COP 50 WP                                  | 139.4          |
|               |                                   | NU-COP 50DF                                   | 46.2           |
|               | N-OUTDR GRWN TRNSPLNT/PRPGTV MTRL | CHAMPION WETTABLE POWDER                      | 156.5          |

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| CHEMICAL NAME                                       | COMMODITY                                | PRODUCT NAME                             | LBS AI APPLIED             |        |
|-----------------------------------------------------|------------------------------------------|------------------------------------------|----------------------------|--------|
| COPPER                                              | N-OUTDR GRWN TRNSPLNT/PRPGTV MTRL        | DUPONT KOCIDE 2000 FUNGICIDE/BACTERICIDE | 26.9                       |        |
|                                                     |                                          | NORDOX 75 WG                             | 60.9                       |        |
|                                                     |                                          | NU-COP 50 WP                             | 567.6                      |        |
|                                                     | PEACH                                    | BASIC COPPER 53                          | 32710.1                    |        |
|                                                     |                                          | CHAMPION WETTABLE POWDER                 | 735.4                      |        |
|                                                     |                                          | CUPROFIX ULTRA 40 DISPERSS               | 792.9                      |        |
|                                                     |                                          | DUPONT KOCIDE 2000 FUNGICIDE/BACTERICIDE | 796.8                      |        |
|                                                     |                                          | DUPONT KOCIDE 3000 FUNGICIDE/BACTERICIDE | 368.9                      |        |
|                                                     |                                          | KOCIDE 101                               | 2459.4                     |        |
|                                                     |                                          | KOCIDE 2000                              | 164.8                      |        |
|                                                     |                                          | KOCIDE DF                                | 2246.6                     |        |
|                                                     |                                          | NORDOX 75 WG                             | 10333.0                    |        |
|                                                     |                                          | NU-COP 50 WP                             | 80.1                       |        |
|                                                     |                                          | NU-COP 50DF                              | 2313.1                     |        |
|                                                     |                                          | PISTACHIO (PISTACHE NUT)                 | CUPROFIX ULTRA 40 DISPERSS | 81.1   |
|                                                     |                                          | WALNUT                                   | BASIC COPPER 53            | 1215.2 |
|                                                     | CHAMP FORMULA 2 FLOWABLE                 |                                          | 2445.5                     |        |
|                                                     | CHAMPION WETTABLE POWDER                 |                                          | 386.5                      |        |
|                                                     | CUPROFIX ULTRA 40 DISPERSS               |                                          | 4075.3                     |        |
|                                                     | DUPONT GX-569 FUNGICIDE/BACTERICIDE      |                                          | 18.4                       |        |
|                                                     | DUPONT KOCIDE 101 FUNGICIDE/BACTERICIDE  |                                          | 78.5                       |        |
|                                                     | DUPONT KOCIDE 2000 FUNGICIDE/BACTERICIDE |                                          | 8058.6                     |        |
|                                                     | DUPONT KOCIDE 3000 FUNGICIDE/BACTERICIDE |                                          | 965.7                      |        |
|                                                     | DUPONT KOCIDE DF FUNGICIDE/BACTERICIDE   |                                          | 1101.5                     |        |
|                                                     | KENTAN DF                                |                                          | 2306.1                     |        |
|                                                     | KOCIDE 101                               |                                          | 5889.1                     |        |
|                                                     | KOCIDE 2000                              |                                          | 6832.6                     |        |
|                                                     | KOCIDE DF                                |                                          | 2069.8                     |        |
|                                                     | NORDOX 75 WG                             |                                          | 7998.2                     |        |
|                                                     | NU-COP 50 WP                             |                                          | 708.4                      |        |
|                                                     | NU-COP 50DF                              | 3845.4                                   |                            |        |
|                                                     |                                          |                                          |                            |        |
| ALMOND - Total Pounds Copper Applied                |                                          |                                          | 270596.1                   |        |
| APRICOT - Total Pounds Copper Applied               |                                          |                                          | 746.7                      |        |
| BLUEBERRY - Total Pounds Copper Applied             |                                          |                                          | 109.1                      |        |
| CHERRY - Total Pounds Copper Applied                |                                          |                                          | 56.0                       |        |
| GRAPES - Total Pounds Copper Applied                |                                          |                                          | 12337.8                    |        |
| N-OUTDR CONTAINER - Total Pounds Copper Applied     |                                          |                                          | 5817.4                     |        |
| N-OUTDR GRWN TRNSPLNT - Total Pounds Copper Applied |                                          |                                          | 811.8                      |        |
| PEACH - Total Pounds Copper Applied                 |                                          |                                          | 53001.0                    |        |
| PISTACHIO - Total Pounds Copper Applied             |                                          |                                          | 81.1                       |        |
| WALNUT - Total Pounds Copper Applied                |                                          |                                          | 47995.0                    |        |
| Total Pounds Copper Applied (2005-2011)             |                                          |                                          | 391551.9                   |        |

Outreach efforts focused both on encouraging management practices aimed at reducing spray drift and improving water management, and is consistent with the chlorpyrifos outreach efforts described above. Future outreach will provide information to specific growers located adjacent to Highline Canal and those with the potential for drift to the canal. Orchard and vineyard operators are advised to consider management practices to prevent copper from entering the waterway when applicable. This coincides



with the Coalition's Management Plan strategy outlined in the 2012 MPUR copper outreach section. Individual contacts with growers within this subwatershed are described under the copper outreach, as are discussions of copper exceedances and relevant management practices. The Coalition believes that its outreach strategy and management practice implementation has led to improvements in water quality since no additional copper exceedances occurred since February 2008.

### Diuron

Concentrations of diuron exceeded the WQTL twice in this subwatershed (February 2007 and January 2008), see Table VII-6. Core Monitoring took place at Highline Canal @ Hwy 99 during 2009; diuron was not monitored as a part of 2009 MPM. Diuron was monitored during January and February 2010 MPM and monthly during 2011 Assessment Monitoring and was not detected. Highline Canal will return to Core Monitoring in 2012, and diuron MPM will occur during January and February 2012.

PUR data are reviewed for the number of monthly diuron applications, pounds active ingredient applied, and acres treated (Table VII-12, Figure VII-4). Between 2005 and 2010 there was a sharp decline in applications of diuron in the Highline Canal subwatershed (551 lbs AI applied in 2005 and 67 lbs AI applied in 2010), but in 2011 the pounds of diuron applied rose again to 412 lbs AI. The months with the largest amount of pounds applied have consistently been January and December, (Table VII-12, Figure VII-4). Neither diuron exceedance coincided with a month of greatest diuron use.

The Coalition also uses PUR data to determine which crops receive the most applications of diuron (Table VII-13). The highest application rates of diuron in the Highline Canal subwatershed are associated with alfalfa and walnuts (Table VII-13). The largest amount of diuron applied from 2005 through 2011 was to alfalfa (1,780 lbs AI). The most common products containing diuron used within this subwatershed are DuPont Direx and Direx.

**Table VII-12. Highline Canal @ Hwy 99 site subwatershed diuron applications, lbs AI applied, and acres treated by month (2005-2011).**

PUR data available through October 2011 for Merced County. If month is not included in table, no applications were made.

| MONTH/YEAR               | NUMBER OF DIURON APPLICATIONS | POUNDS OF AI APPLIED | ACRES TREATED |
|--------------------------|-------------------------------|----------------------|---------------|
| January, 2005            | 4                             | 106.0                | 151.0         |
| October, 2005            | 2                             | 59.1                 | 40.0          |
| November, 2005           | 2                             | 44.5                 | 73.0          |
| December, 2005           | 4                             | 341.1                | 242.4         |
| January, 2006            | 2                             | 67.2                 | 46.0          |
| October, 2006            | 1                             | 30.0                 | 20.0          |
| November, 2006           | 2                             | 27.1                 | 65.0          |
| December, 2006           | 1                             | 318.8                | 217.4         |
| January, 2007            | 3                             | 122.6                | 104.4         |
| February, 2007           | 2                             | 66.3                 | 46.0          |
| March, 2007              | 1                             | 17.8                 | 40.0          |
| April, 2007              | 2                             | 33.4                 | 75.0          |
| June, 2007               | 1                             | 0.5                  | 14.0          |
| November, 2007           | 2                             | 12.6                 | 63.0          |
| December, 2007           | 1                             | 320.7                | 217.4         |
| February, 2008           | 4                             | 73.6                 | 101.0         |
| November, 2008           | 2                             | 46.1                 | 31.5          |
| December, 2008           | 1                             | 130.4                | 217.4         |
| January, 2009            | 6                             | 152.5                | 368.9         |
| April, 2009              | 2                             | 15.3                 | 104.9         |
| June, 2009               | 1                             | 4.8                  | 1.0           |
| December, 2009           | 2                             | 146.4                | 222.4         |
| February, 2010           | 2                             | 66.9                 | 170.0         |
| January, 2011            | 4                             | 380.6                | 539.9         |
| February, 2011           | 2                             | 31.5                 | 31.5          |
| <b>Summaries by Year</b> |                               |                      |               |
| 2005 Total               | 12                            | 550.7                | 506.4         |
| 2006 Total               | 6                             | 443.1                | 348.4         |
| 2007 Total               | 12                            | 573.8                | 559.8         |
| 2008 Total               | 7                             | 250.0                | 349.9         |
| 2009 Total               | 11                            | 319.0                | 697.2         |
| 2010 Total               | 2                             | 66.9                 | 170.0         |
| 2011 Total               | 6                             | 412.1                | 571.4         |
| <b>Total</b>             | <b>56</b>                     | <b>2615.6</b>        | <b>3203.1</b> |

**Figure VII-4. Highline Canal @ Hwy 99 site subwatershed lbs diuron applied by month (2005-2011).**

Asterisk (\*) denotes months with exceedances. PUR data available through October 2011 for Merced County.

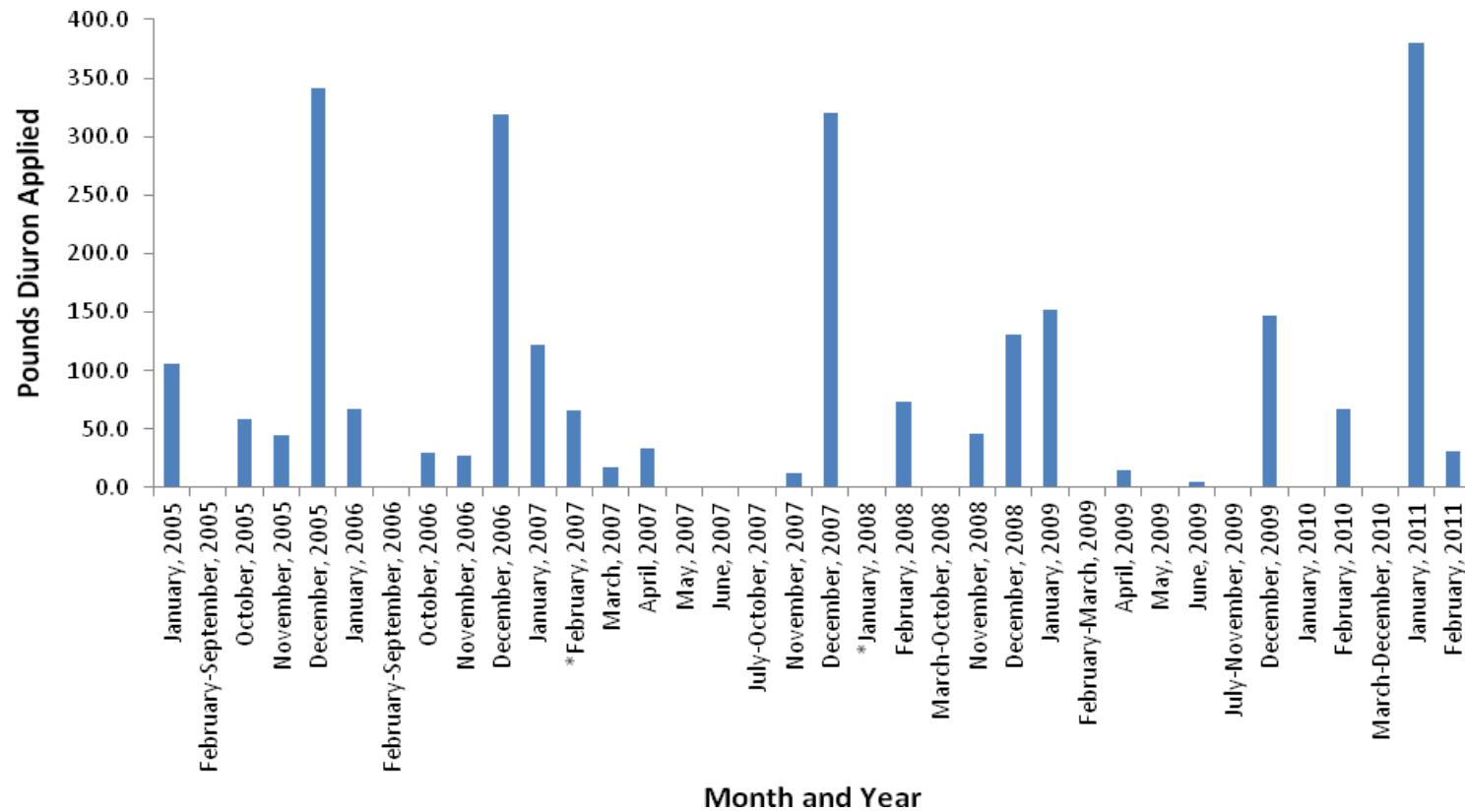


**Table VII-13. Highline Canal @ Hwy 99 site subwatershed diuron PUR data (2005-2011).**

PUR data available through October 2011 for Merced County.

| CHEMICAL NAME                                           | COMMODITY                                 | PRODUCT NAME                  | LBS AI APPLIED |
|---------------------------------------------------------|-------------------------------------------|-------------------------------|----------------|
| DIURON                                                  | ALFALFA (FORAGE - FODDER) (ALFALFA HAY)   | DIREX 4L                      | 1300.3         |
|                                                         |                                           | DUPONT DIREX 4L HERBICIDE     | 479.9          |
|                                                         | CORN (FORAGE - FODDER)                    | DU PONT KARMEX DF HERBICIDE   | 0.5            |
|                                                         | RIGHTS OF WAY                             | DU PONT KROVAR I DF HERBICIDE | 16.0           |
|                                                         | UNCULTIVATED NON-AG AREAS (ALL OR UNSPEC) | DU PONT KROVAR I DF HERBICIDE | 20.8           |
|                                                         | WALNUT                                    | DIREX 4L                      | 386.7          |
|                                                         |                                           | DIURON 4L HERBICIDE           | 165.3          |
|                                                         |                                           | DREXEL DIURON 4L HERBICIDE    | 136.5          |
|                                                         |                                           | DUPONT DIREX 4L HERBICIDE     | 109.6          |
| ALFALFA - Total Pounds Diuron Applied                   |                                           |                               | 1780.2         |
| CORN - Total Pounds Diuron Applied                      |                                           |                               | 0.5            |
| RIGHTS OF WAY - Total Pounds Diuron Applied             |                                           |                               | 16.0           |
| UNCULTIVATED NON-AG AREAS - Total Pounds Diuron Applied |                                           |                               | 20.8           |
| WALNUT - Total Pounds Diuron Applied                    |                                           |                               | 798.0          |
| Total Pounds Diuron Applied (2005-2011)                 |                                           |                               | 2615.6         |

Management of diuron in this subwatershed focuses on providing information to the small number of growers whose applications could be associated with the exceedances. The Coalition's Management Plan strategy for addressing diuron exceedances is to include diuron in discussions with individual growers relevant to preventing storm and irrigation discharge to waterways. The Coalition believes that the implementation of improved and additional water management practices have eliminated diuron exceedances in the Highline Canal subwatershed.

### *Priority D Constituents*

The priority D constituents in the Highline Canal @ Hwy 99 subwatershed are water column toxicity to *C. dubia* and *S. capricornutum* and sediment toxicity to *H. azteca*.

#### ***C. dubia* toxicity**

Toxicity to *C. dubia* occurred in May 2005 and in March and September 2006 (Table VII-5). The 2005 toxicity was persistent in the resample a week later; however, this was not the case in any of the 2006 toxicities which were both associated with exceedances of the chlorpyrifos WQTL. Toxicity to *C. dubia* did not occur during 2007 and 2008 during additional MPM and upstream monitoring. There was no MPM for *C. dubia* toxicity scheduled during 2010, but was added in March, May and September 2011 MPM.

The Coalition discussed toxicity to *C. dubia* and associated chlorpyrifos during individual grower meetings, and conducted outreach regarding reducing and/or eliminating spray drift in the subwatershed. If chlorpyrifos can be prevented from entering waterways throughout the irrigation season, the Coalition believes that *C. dubia* toxicity will also be eliminated. The Coalition will conduct MPM in 2012 for *C. dubia* toxicity (March, May, and September).

### *S. capricornutum* toxicity

Water column toxicity to *S. capricornutum* occurred March 2006 and February, April, and May 2008 (Table VII-5). The February 2008 storm toxicity coincided with an exceedance of the copper WQTL.

The Coalition's strategy for eliminating *S. capricornutum* toxicity involves focusing on copper. If copper can be prevented from entering storm water during the winter rainy season and early irrigation season, the Coalition believes that *S. capricornutum* toxicity can also be eliminated. There were no exceedances of the copper WQTL and also no water column toxicity to *S. capricornutum* during 2011 monthly Assessment Monitoring.

### *H. azteca* toxicity

Sediment toxicity to *H. azteca* occurred in the late irrigation months in of 2005 and 2006, and during both the storm and late irrigation seasons of 2008 (Table VII-5). Both the August 2006 and 2008 toxicities were persistent as determined by resampling. Sediment toxicity was monitored as part of MPM during September 2010 and March and September 2011 and no toxicity occurred. In 2012, Highline Canal @ Hwy 99 is scheduled for MPM where sediment will be analyzed during both the March and September sampling events.

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### *Priority E Constituents*

The priority E constituents listed under the Highline Canal @ Hwy 99 subwatershed management plan are ammonia, pH, SC, TDS, *E. coli*, and lead.

One *E. coli* exceedance occurred during 2011 monitoring (March). The Coalition plans to participate in a focus group along with other Coalitions and Regional Board staff to develop a joint Work Plan to address *E. coli* exceedances by determining the potential agricultural sources of *E. coli* and identifying management practices to prevent discharges to surface waters.

The Coalition will continue to collect priority E constituent monitoring data for pH and SC during each monitoring event. Total Dissolved Solids, *E.coli* and lead are monitored only during Assessment Monitoring events. Highline Canal @ Hwy 99 is scheduled for Core Monitoring in 2012. These constituents will remain low priority but have been discussed during individual contacts with growers and at annual grower meetings.

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### *Evaluation*

Highline Canal @ Hwy 99 is one of the four second high priority site subwatersheds within the ESJWQC and has just completed its second year of focused outreach. The Coalition focused its resources on identifying sources of agricultural discharge within this subwatershed that could result in water quality impairments by extending outreach to individual Coalition members, and setting evaluation goals based on the effectiveness of management practices (by considering changes in water quality over time).

The Coalition's strategy for the Highline Canal subwatershed is to target growers with parcels located adjacent to the waterway and who may discharge or drift into the canal. The Coalition's outreach message continues to be on water retention management practices and minimizing spray drift. Outreach includes grower notification, management practice outreach and education, tracking of management practices, and providing information on special studies of management practice efficacy.

Individual grower surveys documenting current management practice implementations and assessing future planned implementations have been completed and returned representing 100% of targeted growers. The Summary of Implemented Management Practice section of this report summarizes the results of these surveys.

During 2012, Highline Canal @ Hwy 99 is scheduled for Core Monitoring and MPM will continue to take place during months of past exceedances in order to assess water quality improvements that have occurred since the subwatershed became high priority.

In addition to chlorpyrifos, monitoring for copper, diuron, ammonia, SC and TDS resulted in zero exceedances for two or more consecutive years of monitoring during months of past exceedances. A letter was submitted to the Regional Board on January 6, 2012, petitioning to remove these constituents from the Highline Canal @ Hwy 99 management plan.

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## HIGH PRIORITY SITE SUBWATERSHEDS (2011-2013)

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## VIII. BERENDA SLOUGH ALONG AVE 18 ½

### Management Plan Constituents

#### Priority A/B

- Chlorpyrifos

#### Priority C

- Copper

#### Priority D

- *Selenastrum capricornutum* water column toxicity

#### Priority E

- DO
- *E. coli*

### Description of Berenda Slough along Ave 18 ½ Site Subwatershed

Berenda Slough along Ave 18 ½ (24,452 irrigated acres) –This site subwatershed flows from Berenda Reservoir south and west through northern Madera County and, when flows are sufficient, empties into the Eastside Bypass. However, Berenda Slough typically does not confluence with the Bypass due to insufficient flow. The sampling site is located directly south of the city of Chowchilla. This sampling location also has an upstream site, Berenda Slough @ Rd 19 (Table VIII-1). Primary agriculture in the site subwatershed is orchards and vineyards with small amounts of pasture and field crops (Figure VIII-1).

**Table VIII-1. Berenda Slough site subwatershed sampling locations coordinates.**

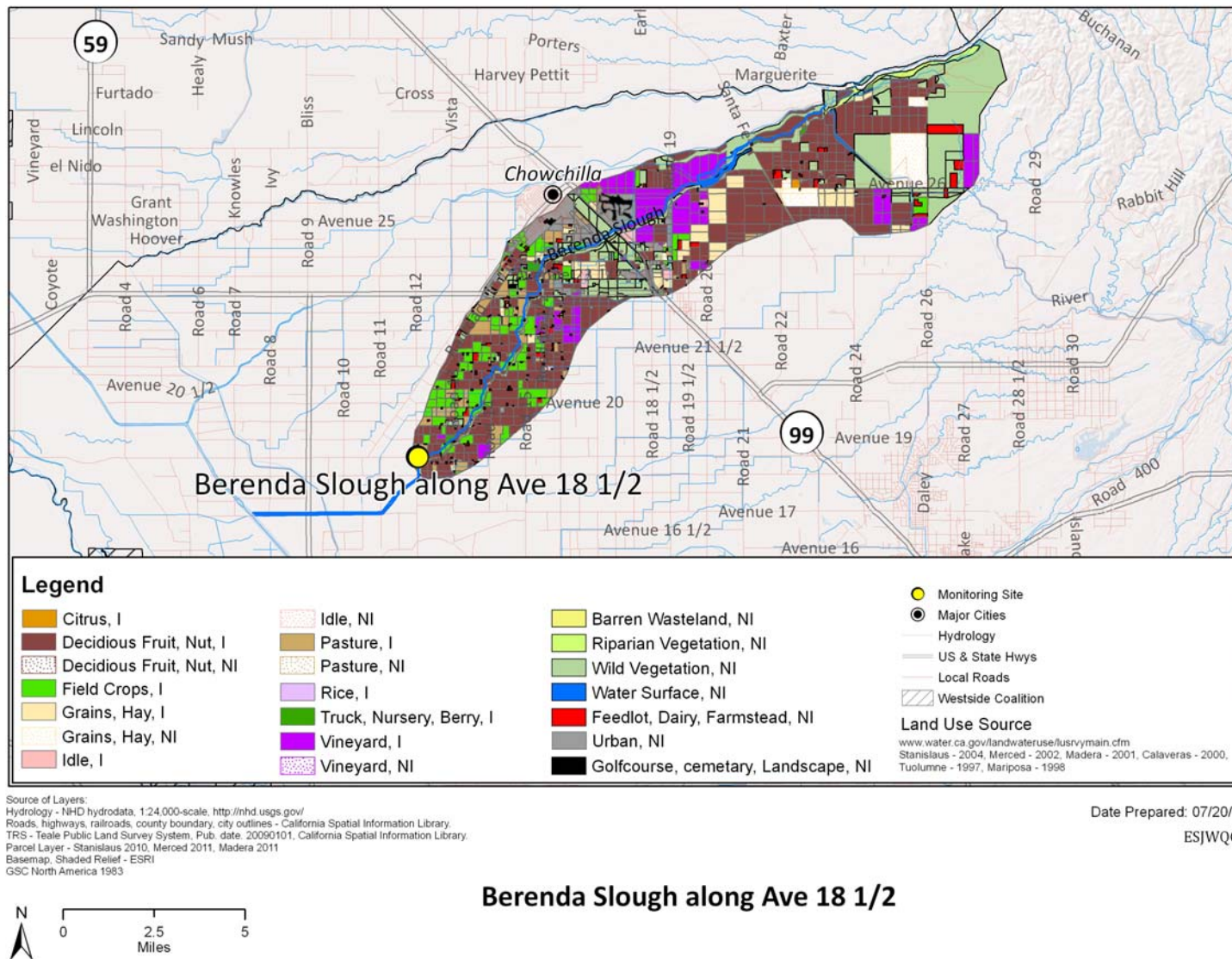
| SITE NAME                           | STATION CODE | TARGET LATITUDE | TARGET LONGITUDE |
|-------------------------------------|--------------|-----------------|------------------|
| Berenda Slough along Ave 18 1/2*    | 545XBSAAE    | 37.0182         | -120.3265        |
| Berenda Slough @ Rd 19 <sup>U</sup> | 545XBSARN    | 37.1214         | -120.2021        |

<sup>U</sup>Upstream sites

\*Original ESJWQC sampling site



Figure VIII-1. Berenda Slough along Ave 18 ½ site subwatershed land use map.



## Subwatershed Monitoring History

Monitoring at Berenda Slough along Ave 18 ½ first began in May 2006 and continued through the 2008 irrigation season (Table VIII-2). During this period, the site was not sampled for twelve events due to insufficient flows (two 2007 storm events, two 2007 irrigation events, and all 2008 events, Table VIII-2). Under the 2008 MRPP, Berenda Slough along Ave 18 ½ is an Assessment Monitoring location in the Cottonwood Creek @ Rd 20 Zone (Zone 6). The site was not scheduled for Normal Monitoring in 2009 and 2010, but rotated into Assessment Monitoring in 2011 and will continue to be sampled for Assessment Monitoring constituents through 2012. The constituents sampled at this location from 2006 through 2011 are listed in Table VIII-3.

Management Plan Monitoring was scheduled for 2007, 2008, and 2011 (Table VIII-4). Additional MPM occurred in 2007 at Berenda Slough along Ave 18 ½ for chlorpyrifos (July and September) and upstream MPM occurred in 2008 at Berenda Slough @ Rd 19 for chlorpyrifos (July and September) and *S. capricornutum* toxicity (May and July). Berenda Slough became a high priority subwatershed in 2011 and MPM occurred for chlorpyrifos (July and September) and *S. capricornutum* toxicity (May and July).

Berenda Slough is currently on California's 2008-2010 303d List of Impaired Waterbodies for chlorpyrifos.

**Table VIII-2. Berenda Slough along Ave 18 ½ site subwatershed sampling events per season and year (including MPM).**

| YEAR | SEASON     | EVENTS SAMPLED | EVENTS NOT SAMPLED <sup>1</sup> | TOTAL |
|------|------------|----------------|---------------------------------|-------|
| 2004 | Irrigation | NA             | NA                              | NA    |
| 2005 | Storm      | NA             | NA                              | NA    |
|      | Irrigation | NA             | NA                              | NA    |
| 2006 | Storm      | NA             | NA                              | NA    |
|      | Irrigation | 5              | 0                               | 5     |
| 2007 | Storm      | 0              | 2                               | 2     |
|      | Irrigation | 5              | 3                               | 8     |
| 2008 | Storm      | 0              | 2                               | 2     |
|      | Irrigation | 0              | 6                               | 6     |
|      | Fall       | NA             | NA                              | NA    |
| 2009 | Winter     | NA             | NA                              | NA    |
|      | Storm      | NA             | NA                              | NA    |
|      | Irrigation | NA             | NA                              | NA    |
|      | Fall       | NA             | NA                              | NA    |
| 2010 | Winter     | NA             | NA                              | NA    |
|      | Storm      | NA             | NA                              | NA    |
|      | Irrigation | NA             | NA                              | NA    |
|      | Fall       | NA             | NA                              | NA    |
| 2011 | Winter     | 2              | 0                               | 2     |
|      | Storm      | 1              | 0                               | 1     |
|      | Irrigation | 6              | 0                               | 6     |
|      | Fall       | 3              | 0                               | 3     |

<sup>1</sup>If an event was not sampled during scheduled monitoring, the site was dry.  
NA – Not applicable. This site was not scheduled for sampling during this season/year.

**Table VIII-3. Berenda Slough along Ave 18 ½ site subwatershed analyses per sampling season and year.**

Only environmental samples with a sample replicate and lab replicate of one are listed.

| METHOD                        | ANALYTE                         | 2006       | 2007  |            | 2008  |            |       | 2009          | 2010          | 2011   |       |            |      |
|-------------------------------|---------------------------------|------------|-------|------------|-------|------------|-------|---------------|---------------|--------|-------|------------|------|
|                               |                                 | IRRIGATION | STORM | IRRIGATION | STORM | IRRIGATION | FALL* | WINTER-FALL * | WINTER-FALL * | WINTER | STORM | IRRIGATION | FALL |
| Field and Physical Parameters |                                 |            |       |            |       |            |       |               |               |        |       |            |      |
| EPA 110.2                     | Color                           | 5          |       | 4          |       |            |       |               |               |        |       |            |      |
| EPA 160.1                     | Dissolved Solids                | 5          |       | 4          |       |            |       |               |               | 2      | 1     | 6          | 3    |
| EPA 160.2                     | Suspended Solids                |            |       |            |       |            |       |               |               | 2      | 1     | 6          | 3    |
| EPA 180.1                     | Turbidity                       | 5          |       | 4          |       |            |       |               |               | 2      | 1     | 6          | 3    |
| EPA 405.1                     | BOD                             | 1          |       | 1          |       |            |       |               |               |        |       |            |      |
| EPA 415.1                     | Total Organic Carbon            | 5          |       | 4          |       |            |       |               |               | 2      | 1     | 6          | 3    |
| SM 9223                       | <i>E. coli</i>                  | 5          |       | 4          |       |            |       |               |               | 2      | 1     | 6          | 3    |
| Walkley-Black                 | Total Organic Carbon (sediment) |            |       |            |       |            |       |               |               | 1      |       | 1          |      |
| ASTM D422 or ASTM D4464       | Grain size (sediment)           |            |       |            |       |            |       |               |               | 1      |       | 1          |      |
| NA                            | Dissolved Oxygen                | 5          |       | 7          |       |            |       |               |               | 3      | 1     | 6          | 3    |
| NA                            | Specific Conductivity           | 5          |       | 7          |       |            |       |               |               | 3      | 1     | 6          | 3    |
| NA                            | pH                              | 5          |       | 7          |       |            |       |               |               | 3      | 1     | 6          | 3    |
| Carbamates                    |                                 |            |       |            |       |            |       |               |               |        |       |            |      |
| EPA 8321A                     | Aldicarb                        | 5          |       | 4          |       |            |       |               |               | 2      | 1     | 6          | 3    |
| EPA 8321A                     | Carbaryl                        | 5          |       | 4          |       |            |       |               |               | 2      | 1     | 6          | 3    |
| EPA 8321A                     | Carbofuran                      | 5          |       | 4          |       |            |       |               |               | 2      | 1     | 6          | 3    |
| EPA 8321A                     | Diuron                          | 5          |       | 4          |       |            |       |               |               | 2      | 1     | 6          | 3    |
| EPA 8321A                     | Linuron                         | 5          |       | 4          |       |            |       |               |               | 2      | 1     | 6          | 3    |
| EPA 8321A                     | Methiocarb                      | 5          |       | 4          |       |            |       |               |               | 2      | 1     | 6          | 3    |
| EPA 8321A                     | Methomyl                        | 5          |       | 4          |       |            |       |               |               | 2      | 1     | 6          | 3    |
| EPA 8321A                     | Oxamyl                          | 5          |       | 4          |       |            |       |               |               | 2      | 1     | 6          | 3    |
| Organochlorines               |                                 |            |       |            |       |            |       |               |               |        |       |            |      |
| EPA 8081A                     | DDD(p,p')                       | 5          |       | 4          |       |            |       |               |               | 2      | 1     | 4          |      |
| EPA 8081A                     | DDE(p,p')                       | 5          |       | 4          |       |            |       |               |               | 2      | 1     | 4          |      |
| EPA 8081A                     | DDT(p,p')                       | 5          |       | 4          |       |            |       |               |               | 2      | 1     | 4          |      |
| EPA 8081A                     | Dicofol                         | 5          |       | 4          |       |            |       |               |               | 2      | 1     | 4          |      |
| EPA 8081A                     | Dieldrin                        | 5          |       | 4          |       |            |       |               |               | 2      | 1     | 4          |      |
| EPA 8081A                     | Endrin                          | 5          |       | 4          |       |            |       |               |               | 2      | 1     | 4          |      |
| EPA 8081A                     | Methoxychlor                    | 5          |       | 4          |       |            |       |               |               | 2      | 1     | 4          |      |
| Group A Pesticides            |                                 |            |       |            |       |            |       |               |               |        |       |            |      |
| EPA 8081A                     | Aldrin                          |            |       |            |       |            |       |               |               | 2      | 1     | 4          |      |
| EPA 8081A                     | Chlordane                       |            |       |            |       |            |       |               |               | 2      | 1     | 4          |      |
| EPA 8081A                     | Endosulfan I                    |            |       |            |       |            |       |               |               | 2      | 1     | 4          |      |
| EPA 8081A                     | Endosulfan II                   |            |       |            |       |            |       |               |               | 2      | 1     | 4          |      |
| EPA 8081A                     | HCH, alpha                      |            |       |            |       |            |       |               |               | 2      | 1     | 4          |      |
| EPA 8081A                     | HCH, beta                       |            |       |            |       |            |       |               |               | 2      | 1     | 4          |      |
| EPA 8081A                     | HCH, delta                      |            |       |            |       |            |       |               |               | 2      | 1     | 4          |      |
| EPA 8081A                     | HCH, gamma                      |            |       |            |       |            |       |               |               | 2      | 1     | 4          |      |
| EPA 8081A                     | Heptachlor                      |            |       |            |       |            |       |               |               | 2      | 1     | 4          |      |
| EPA 8081A                     | Heptachlor epoxide              |            |       |            |       |            |       |               |               | 2      | 1     | 4          |      |
| EPA 8081A                     | Toxaphene                       |            |       |            |       |            |       |               |               | 2      | 1     | 4          |      |

| METHOD             | ANALYTE                           | 2006       | 2007  |            | 2008  |            |       | 2009         | 2010         | 2011   |       |            |      |
|--------------------|-----------------------------------|------------|-------|------------|-------|------------|-------|--------------|--------------|--------|-------|------------|------|
|                    |                                   | IRRIGATION | STORM | IRRIGATION | STORM | IRRIGATION | FALL* | WINTER-FALL* | WINTER-FALL* | WINTER | STORM | IRRIGATION | FALL |
| Organophosphates   |                                   |            |       |            |       |            |       |              |              |        |       |            |      |
| EPA 8141A          | Azinphos methyl                   | 5          |       | 5          |       |            |       |              |              | 2      | 1     | 6          | 3    |
| EPA 8141A          | Chlorpyrifos                      | 5          |       | 5          |       |            |       |              |              | 2      | 1     | 6          | 3    |
| EPA 8141A          | Demeton-s                         |            |       |            |       |            |       |              |              | 2      | 1     | 6          | 3    |
| EPA 8141A          | Diazinon                          | 5          |       | 5          |       |            |       |              |              | 2      | 1     | 6          | 3    |
| EPA 8141A          | Dichlorvos                        |            |       |            |       |            |       |              |              | 2      | 1     | 6          | 3    |
| EPA 8141A          | Dimethoate                        | 5          |       | 5          |       |            |       |              |              | 2      | 1     | 6          | 3    |
| EPA 8141A          | Disulfoton                        | 5          |       | 5          |       |            |       |              |              | 2      | 1     | 6          | 3    |
| EPA 8141A          | Malathion                         | 5          |       | 5          |       |            |       |              |              | 2      | 1     | 6          | 3    |
| EPA 8321A          | Methamidophos                     | 5          |       | 4          |       |            |       |              |              | 2      | 1     | 6          | 3    |
| EPA 8141A          | Methidathion                      | 5          |       | 5          |       |            |       |              |              | 2      | 1     | 6          | 3    |
| EPA 8141A          | Molinate                          | 5          |       | 5          |       |            |       |              |              |        |       |            |      |
| EPA 8141A          | Parathion, Methyl                 | 5          |       | 5          |       |            |       |              |              | 2      | 1     | 6          | 3    |
| EPA 8141A          | Phorate                           | 5          |       | 5          |       |            |       |              |              | 2      | 1     | 6          | 3    |
| EPA 8141A          | Phosmet                           | 5          |       | 5          |       |            |       |              |              | 2      | 1     | 6          | 3    |
| EPA 8141A          | Thiobencarb                       | 5          |       | 5          |       |            |       |              |              |        |       |            |      |
| EPA 8141A          | Trifluralin                       |            |       |            |       |            |       |              |              | 2      | 1     | 6          | 3    |
| Pyrethroids        |                                   |            |       |            |       |            |       |              |              |        |       |            |      |
| EPA 8081A          | Bifenthrin                        | 5          |       | 4          |       |            |       |              |              |        |       |            |      |
| EPA 8081A          | Cyfluthrin, total                 | 5          |       | 4          |       |            |       |              |              |        |       |            |      |
| EPA 8081A          | Cyhalothrin, lambda, total        | 5          |       | 4          |       |            |       |              |              |        |       |            |      |
| EPA 8081A          | Cypermethrin, total               | 5          |       | 4          |       |            |       |              |              |        |       |            |      |
| EPA 8081A          | Esfenvalerate/ Fenvalerate, total | 5          |       | 4          |       |            |       |              |              |        |       |            |      |
| EPA 8081A          | Permethrin, total                 | 5          |       | 4          |       |            |       |              |              |        |       |            |      |
| Triazines          |                                   |            |       |            |       |            |       |              |              |        |       |            |      |
| EPA 547M           | Glyphosate                        | 5          |       | 4          |       |            |       |              |              | 2      |       | 4          |      |
| EPA 549.2M         | Paraquat dichloride               | 5          |       | 4          |       |            |       |              |              | 2      |       | 4          |      |
| EPA 619            | Atrazine                          | 5          |       | 4          |       |            |       |              |              | 2      | 1     | 6          | 3    |
| EPA 619            | Cyanazine                         | 5          |       | 4          |       |            |       |              |              | 2      | 1     | 6          | 3    |
| EPA 619            | Simazine                          | 5          |       | 4          |       |            |       |              |              | 2      | 1     | 6          | 3    |
| Metals (Total)     |                                   |            |       |            |       |            |       |              |              |        |       |            |      |
| EPA 200.8          | Arsenic                           |            |       |            |       |            |       |              |              | 2      | 1     | 5          |      |
| EPA 200.8          | Boron                             |            |       |            |       |            |       |              |              | 2      | 1     | 6          | 3    |
| EPA 200.8          | Cadmium                           |            |       |            |       |            |       |              |              | 2      | 1     | 5          |      |
| EPA 200.8          | Copper                            |            |       |            |       |            |       |              |              | 2      | 1     | 6          | 3    |
| EPA 200.8          | Lead                              |            |       |            |       |            |       |              |              | 2      | 1     | 5          |      |
| EPA 200.8          | Molybdenum                        |            |       |            |       |            |       |              |              | 2      | 1     | 5          |      |
| EPA 200.8          | Nickel                            |            |       |            |       |            |       |              |              | 2      | 1     | 6          | 3    |
| EPA 200.8          | Selenium                          |            |       |            |       |            |       |              |              | 2      | 1     | 6          | 3    |
| EPA 200.8          | Zinc                              |            |       |            |       |            |       |              |              | 2      | 1     | 6          | 3    |
| Metals (Dissolved) |                                   |            |       |            |       |            |       |              |              |        |       |            |      |
| EPA 200.8          | Cadmium                           |            |       |            |       |            |       |              |              | 2      | 1     | 5          |      |
| EPA 200.8          | Copper                            |            |       |            |       |            |       |              |              | 2      | 1     | 6          | 3    |
| EPA 200.8          | Lead                              |            |       |            |       |            |       |              |              | 2      | 1     | 5          |      |

| METHOD           | ANALYTE                          | 2006       | 2007  |            | 2008  |            |       | 2009         | 2010         | 2011   |       |            |      |
|------------------|----------------------------------|------------|-------|------------|-------|------------|-------|--------------|--------------|--------|-------|------------|------|
|                  |                                  | IRRIGATION | STORM | IRRIGATION | STORM | IRRIGATION | FALL* | WINTER-FALL* | WINTER-FALL* | WINTER | STORM | IRRIGATION | FALL |
| EPA 200.8        | Nickel                           |            |       |            |       |            |       |              |              | 2      | 1     | 6          | 3    |
| EPA 200.8        | Zinc                             |            |       |            |       |            |       |              |              | 2      | 1     | 6          | 3    |
| <b>Nutrients</b> |                                  |            |       |            |       |            |       |              |              |        |       |            |      |
| SM 2340 C        | Hardness as CaCO3                |            |       |            |       |            |       |              |              | 2      | 1     | 6          | 3    |
| EPA 350.2        | Ammonia as N                     |            |       |            |       |            |       |              |              | 2      | 1     | 6          | 3    |
| EPA 351.3        | Nitrogen, Total Kjeldahl         |            |       |            |       |            |       |              |              | 2      | 1     | 6          | 3    |
| EPA 353.2        | Nitrate + Nitrite as N           |            |       |            |       |            |       |              |              | 2      | 1     | 6          | 3    |
| EPA 365.2        | OrthoPhosphate as P              |            |       |            |       |            |       |              |              | 2      | 1     | 6          | 3    |
| EPA 365.2        | Phosphate as P                   |            |       |            |       |            |       |              |              | 2      | 1     | 6          | 3    |
| <b>Toxicity</b>  |                                  |            |       |            |       |            |       |              |              |        |       |            |      |
| EPA 821/R-02-012 | <i>Ceriodaphnia dubia</i>        | 6          |       | 4          |       |            |       |              |              | 2      | 1     | 6          | 3    |
| EPA 821/R-02-012 | <i>Pimephales promelas</i>       | 5          |       | 4          |       |            |       |              |              | 2      | 1     | 6          | 3    |
| EPA 821/R-02-013 | <i>Selenastrum capricornutum</i> | 5          |       | 6          |       |            |       |              |              | 2      | 1     | 6          | 3    |
| EPA 600/R-99-064 | <i>Hyalella azteca</i>           | 1          |       | 1          |       |            |       |              |              | 1      |       | 1          |      |

\*Site not sampled during the 2008 fall season, and 2009 and 2010 sampling years.

**Table VIII-4. Berenda Slough site subwatershed Management Plan Monitoring schedule (2007-2011).**

| SITE NAME                     | SAMPLE DATE | MONITORING TYPE | CHLORPYRIFOS | S. CAPRICORNUTUM |
|-------------------------------|-------------|-----------------|--------------|------------------|
| Berenda Slough along Ave 18 ½ | 24-Jul-07   | A               | X            |                  |
| Berenda Slough along Ave 18 ½ | 18-Sep-07   | A               | X            |                  |
| Berenda Slough at Rd 19       | 27-May-08   | U               |              | X                |
| Berenda Slough at Rd 19       | 29-July-08  | U               | X            | X                |
| Berenda Slough at Rd 19       | 30-Sep-08   | U               | X            |                  |
| Berenda Slough along Ave 18 ½ | 17-May-11   | MPM             |              | X                |
| Berenda Slough along Ave 18 ½ | 19-Jul-11   | MPM             | X            | X                |
| Berenda Slough along Ave 18 ½ | 13-Sep-11   | MPM             | X            |                  |

A – Additional sampling

U – Upstream sampling

X – Constituent sampled for Management Plan Monitoring (MPM)

## Exceedance History

Samples collected from Berenda Slough from 2006 through 2011 have exceeded the WQTLs for field parameters, *E. coli*, and pesticides as well as water column and sediment toxicity. Exceedances of WQTLs include DO (11), *E. coli* (seven), copper (11), azinphos methyl (1), chlorpyrifos 4), and diuron (1). Toxicity to *C. dubia* (1) and to *S. capricornutum* (2) have occurred (Table VIII-5). During 2011, there were exceedances of DO (2), *E. coli* (5), copper (11), azinphos methyl (1), and chlorpyrifos (1).

Exceedances are based on WQTLs listed in the introduction to the ESJWQC Management Plan. The highest priority constituents in the Berenda Slough site subwatershed are chlorpyrifos (A/B), copper (C) and *S. capricornutum* toxicity (D).

**Table VIII-5. Berenda Slough site subwatershed exceedances (2006-2011).**

The WQTL used to evaluate the data are listed in the header after the analyte. Upstream site is italicized.

| SITE NAME                       | SEASON            | SAMPLE DATE      | OXYGEN, DISSOLVED,<br><7 MG/L | <i>E. COLI</i> , >235<br>MPN/100 mL | COPPER DISSOLVED <sup>1</sup> ,<br>µG/L | AZINPHOS METHYL,<br>>0.01 µG/L | CHLORPYRIFOS,<br>>0.015 µG/L | DIURON, >2 µG/L | <i>C. DUBIA</i> , (%<br>CONTROL) | <i>S. CAPRICORNUTUM</i> ,<br>(% CONTROL) |
|---------------------------------|-------------------|------------------|-------------------------------|-------------------------------------|-----------------------------------------|--------------------------------|------------------------------|-----------------|----------------------------------|------------------------------------------|
| Berenda Slough along Ave 18 1/2 | Irrigation        | 5/16/2006        |                               | 460                                 |                                         |                                |                              |                 |                                  |                                          |
| Berenda Slough along Ave 18 1/2 | Irrigation        | 6/13/2006        | 5.49                          |                                     |                                         |                                |                              |                 |                                  |                                          |
| Berenda Slough along Ave 18 1/2 | Irrigation        | 7/11/2006        | 6.54                          |                                     |                                         |                                | 0.043                        |                 |                                  |                                          |
| Berenda Slough along Ave 18 1/2 | Irrigation        | 8/8/2006         |                               |                                     |                                         |                                |                              |                 |                                  |                                          |
| Berenda Slough along Ave 18 1/2 | Irrigation        | 9/12/2006        |                               |                                     |                                         |                                | 0.14                         |                 | 40                               |                                          |
| Berenda Slough along Ave 18 1/2 | Irrigation        | 5/29/2007        | 1.75                          |                                     |                                         |                                |                              | 3.4             |                                  | 78                                       |
| Berenda Slough along Ave 18 1/2 | Irrigation        | 6/5/2007         | 3.07                          |                                     |                                         |                                |                              |                 |                                  |                                          |
| Berenda Slough along Ave 18 1/2 | Irrigation        | 6/26/2007        | 5.20                          | 390                                 |                                         |                                |                              |                 |                                  |                                          |
| Berenda Slough along Ave 18 1/2 | Irrigation        | 7/24/2007        | 6.37                          |                                     |                                         |                                | 0.028                        |                 |                                  | 12                                       |
| Berenda Slough along Ave 18 1/2 | Irrigation        | 7/31/2007        | 4.72                          |                                     |                                         |                                |                              |                 |                                  | 70                                       |
| Berenda Slough along Ave 18 1/2 | Irrigation        | 8/21/2007        | 6.13                          |                                     |                                         |                                |                              |                 |                                  |                                          |
| <i>Berenda Slough @ Rd 19</i>   | <i>Irrigation</i> | <i>7/29/2008</i> | <i>1.10</i>                   |                                     |                                         |                                |                              |                 |                                  |                                          |
| Berenda Slough along Ave 18 1/2 | Winter            | 1/18/2011        |                               | 520                                 | 6.8 (2.65)                              |                                |                              |                 |                                  |                                          |
| Berenda Slough along Ave 18 1/2 | Storm             | 2/17/2011        |                               | 400                                 | 3.6 (1.87)                              |                                |                              |                 |                                  |                                          |
| Berenda Slough along Ave 18 1/2 | Winter            | 3/17/2011        | 6.72                          |                                     |                                         |                                |                              |                 |                                  |                                          |
| Berenda Slough along Ave 18 1/2 | Irrigation        | 4/19/2011        |                               |                                     | 3.3 (1.36)                              | 0.19                           | 0.021                        |                 |                                  |                                          |
| Berenda Slough along Ave 18 1/2 | Irrigation        | 5/17/2011        |                               |                                     | 3.8 (1.57)                              |                                |                              |                 |                                  |                                          |
| Berenda Slough along Ave 18 1/2 | Irrigation        | 6/21/2011        |                               |                                     | 3.6 (1.46)                              |                                |                              |                 |                                  |                                          |
| Berenda Slough along Ave 18 1/2 | Irrigation        | 7/19/2011        |                               |                                     | 2.6 (1.03)                              |                                |                              |                 |                                  |                                          |
| Berenda Slough along Ave 18 1/2 | Irrigation        | 8/16/2011        |                               | 290                                 | 2.3 (1.25)                              |                                |                              |                 |                                  |                                          |
| Berenda Slough along Ave 18 1/2 | Irrigation        | 9/13/2011        |                               | 370                                 | 2.1 (1.46)                              |                                |                              |                 |                                  |                                          |
| Berenda Slough along Ave 18 1/2 | Fall              | 10/11/2011       | 5.69                          | 1600                                | 4.2 (1.03)                              |                                |                              |                 |                                  |                                          |
| Berenda Slough along Ave 18 1/2 | Fall              | 11/8/2011        |                               |                                     | 3.1 (2.46)                              |                                |                              |                 |                                  |                                          |
| Berenda Slough along Ave 18 1/2 | Fall              | 12/6/2011        |                               |                                     | 3.7 (3.38)                              |                                |                              |                 |                                  |                                          |
| Constituent Priority            |                   |                  | E                             | E                                   | C                                       | NP                             | A/B                          | NP              | NP                               | D                                        |

<sup>1</sup>Dissolved metals not analyzed until October 2008; WQTL variable based on hardness.

NP – Not Prioritized; less than two exceedances within three consecutive monitoring years and currently no TMDL.

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## 2007-2011 Management Plan Monitoring Results

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Table VIII-6 lists all monitoring results for high priority management plan constituents in the Berenda Slough along Ave 18 ½ subwatershed, which includes chlorpyrifos, copper, and *S. capricornutum* toxicity.

Chlorpyrifos exceeded the WQTL twice during Normal Monitoring in 2006 (July and September) and was listed on the Berenda Slough management plan. Additional MPM for chlorpyrifos (July and September) as well as Normal Monitoring occurred in 2007; chlorpyrifos exceeded the WQTL during July Normal Monitoring but was not detected a week later during additional MPM. Upstream MPM for chlorpyrifos occurred during 2008 (July and September) at Berenda Slough @ Rd 19, and the pesticide was not detected. The Berenda Slough along Ave 18 ½ site was dry during all 2008 Normal Monitoring events. The subwatershed was not sampled again until Assessment Monitoring in 2011, during which chlorpyrifos exceedances occurred during April (Table VIII-6).

Metals were not sampled at Berenda Slough until Assessment Monitoring in 2011. Copper has exceeded the WQTL 11 times during 2011 (every month except March, Table VIII-5). Consequently, copper has been added to the Berenda Slough management plan.

Toxicity to *S. capricornutum* was added to the Berenda Slough management plan following two toxicities in 2007. Upstream MPM in 2008 (May and July) resulted in no toxicity, and the Berenda Slough along Ave 18 ½ site was dry during 2008 events (Table VIII-6). Assessment Monitoring during 2011 also resulted in no *S. capricornutum* toxicity.

Since Berenda Slough along Ave 18 ½ is scheduled for Assessment Monitoring during 2012, all high priority management plan constituents will be sampled monthly in 2012.



**Table VIII-6. Berenda Slough site subwatershed monitoring results for high priority constituents (2007-2011).**

Exceedance values are in bold. Resampling (RS) due to toxicity not included in table.

| MONTH:                                       |                                              | JAN     | FEB     | MAR     | APR          | MAY       | JUN       | JUL          | AUG       | SEP       | OCT      | NOV     | DEC     |
|----------------------------------------------|----------------------------------------------|---------|---------|---------|--------------|-----------|-----------|--------------|-----------|-----------|----------|---------|---------|
| <b>2007 NM</b><br>(along Ave 18 ½)           | Date                                         | NA      | NA      | NA      | 4/24/2007    | 5/29/2007 | 6/26/2007 | 7/24/2007    | 8/21/2007 | 9/18/2007 | NA       | NA      | NA      |
|                                              | Chlorpyrifos (µg/L)                          | NA      | NA      | NA      | Dry          | <0.003    | <0.003    | <b>0.028</b> | <0.003    | Dry       | NA       | NA      | NA      |
| <b>2007 MPM A</b><br>(along Ave 18 ½)        | Date                                         | NA      | NA      | NA      | NA           | NA        | NA        | 7/31/2007    | NA        | 9/25/2007 | NA       | NA      | NA      |
|                                              | Chlorpyrifos (µg/L)                          | NA      | NA      | NA      | NA           | NA        | NA        | <0.003       | NA        | Dry       | NA       | NA      | NA      |
| <b>2008 NM</b><br>(along Ave 18 ½)           | Date                                         | NA      | NA      | NA      | 4/29/2008    | 5/27/2008 | 6/24/2008 | 7/29/2008    | 8/26/2008 | 9/30/2008 | NA       | NA      | NA      |
|                                              | Chlorpyrifos (µg/L)                          | NA      | NA      | NA      | Dry          | Dry       | Dry       | Dry          | Dry       | Dry       | NA       | NA      | NA      |
|                                              | <i>S. capricornutum</i> toxicity (% Control) | NA      | NA      | NA      | Dry          | Dry       | Dry       | Dry          | Dry       | Dry       | NA       | NA      | NA      |
| <b>2008 MPM US</b><br>(@ Rd 19)              | Date                                         | NA      | NA      | NA      | NA           | 5/27/2008 | NA        | 7/29/2008    | NA        | 9/30/2008 | NA       | NA      | NA      |
|                                              | Chlorpyrifos (µg/L)                          | NA      | NA      | NA      | NA           | NA        | NA        | <0.003       | NA        | Dry       | NA       | NA      | NA      |
|                                              | <i>S. capricornutum</i> toxicity (% Control) | NA      | NA      | NA      | NA           | Dry       | NA        | 283          | NA        | NA        | NA       | NA      | NA      |
| <b>2011 NM &amp; MPM</b><br>(along Ave 18 ½) | Date                                         | 1/18/11 | 2/17/11 | 3/15/11 | 4/19/11      | 5/17/11   | 6/21/11   | 7/19/11      | 8/16/11   | 9/13/11   | 10/11/11 | 11/8/11 | 12/6/11 |
|                                              | Chlorpyrifos (µg/L)                          | <0.003  | <0.003  | <0.003  | <b>0.021</b> | <0.003    | <0.003    | <0.003*      | <0.003    | <0.003*   | <0.003   | <0.003  | <0.003  |
|                                              | <i>S. capricornutum</i> toxicity (% Control) | 526     | 307     | 914     | 530          | 794*      | 788       | 443*         | 917       | 651       | 566      | 3796    | 442     |

A – Additional MPM conducted in 2007 only.

MPM – Management Plan Monitoring (see Table 4 for MPM schedule)

NA – Not applicable. No monitoring occurred on this date for this constituent.

NM – Normal Monitoring

US – Upstream MPM conducted in 2008 only.

\*NM & MPM occurred during this date for this constituent.



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## Load Calculations

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Loads have been calculated for all chlorpyrifos and copper detections in the site subwatershed based on the following formula (Table VIII-7):

$$\text{Load} = \text{Discharge (cfs)} \times 28.317\text{L/ft}^3 \times \text{Concentration (mg/L} \times 1000 \text{ or } \mu\text{g/L)}.$$

The load values for constituents in this report represent instantaneous loads only. These values should not be used to extrapolate loading over any period of time (e.g. weekly, monthly, seasonal or annual). The primary purpose for reporting instantaneous loads is to provide a normalization of the concentrations by flow for various constituents at the time the samples were collected.

**Table VIII-7. Berenda Slough site subwatershed instantaneous load calculations for chlorpyrifos and copper.**

Sorted by analyte and date.

| SAMPLE SITE                      | ANALYTE NAME | SAMPLE DATE | DISCHARGE CFS | CONCENTRATION $\mu\text{g/L}$ | LOADING RATE $\mu\text{g/SEC}$ |
|----------------------------------|--------------|-------------|---------------|-------------------------------|--------------------------------|
| Berenda Slough along Ave 18 1/2  | Chlorpyrifos | 07/11/06    | 0             | 0.043                         | 0                              |
| Berenda Slough along Ave 18 1/2  | Chlorpyrifos | 09/12/06    | 18.54         | 0.14                          | 73.50                          |
| Berenda Slough along Ave 18 1/2  | Chlorpyrifos | 07/24/07    | 0             | 0.028                         | 0                              |
| Berenda Slough along Ave 18 1/2  | Copper       | 12/06/11    | 0             | 4.1                           | 0                              |
| Berenda Slough along Ave 18 1/2* | Copper       | 12/06/11    | 0             | 4.3                           | 0                              |
| Berenda Slough along Ave 18 1/2* | Copper (D)   | 12/06/11    | 0             | 3.6                           | 0                              |
| Berenda Slough along Ave 18 1/2  | Copper (D)   | 12/06/11    | 0             | 3.7                           | 0                              |

\*Field duplicate

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## Source Identification and Outreach

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The Coalition focuses its efforts on applied pesticides and considers past monitoring results and associated PUR data to address source identification and determine an outreach strategy. During 2007 and 2008, the Coalition conducted additional and upstream MPM during the months when exceedances historically occurred to better characterize water quality in the subwatershed. Assessment Monitoring occurred at the site during 2011. The Coalition also reviews PUR data to determine the most frequent crop type and timing associated with pesticide applications. From these actions, the Coalition derived an outreach strategy, which is detailed in the following sections.

In the Coalition's approved Management Plan, the Berenda Slough along Ave 18 ½ subwatershed is a high priority subwatershed as of 2011 and will remain so through 2013. The Coalition will actively engage in grower outreach and education to address the Berenda Slough management plan's highest priority constituents. The Coalition organized grower meetings and mailings to educate growers about management practices and their importance in achieving acceptable water quality. Grower meetings with targeted members began in early 2011 and continued throughout the 2011 irrigation season to inform growers about management practices as well as to assess current and expected future implementation of additional management practices. Follow up with the targeted members is scheduled to occur during 2012 to determine if additional management practices were implemented

and if any are planned to be implemented in 2013. Management Plan Monitoring will continue through 2013 as necessary to assess the effect of outreach on water quality.

### *Priority A/B Constituents*

Chlorpyrifos is the only A/B constituent for the Berenda Slough subwatershed.

#### **Chlorpyrifos**

The WQTL for chlorpyrifos (0.015 µg/L) was exceeded four times in the Berenda Slough subwatershed during 2006 (July and September), 2007 (July) and 2011 (April). The September 2006 chlorpyrifos exceedance was associated with toxicity to *C. dubia*.

Orchards and vineyards are the primary crops in the Berenda Slough subwatershed. Chlorpyrifos can be applied throughout the irrigation season to orchards and vineyards, but use often peaks during the latter summer months when chlorpyrifos is applied to almond orchards during the hull split period.

To determine the most appropriate strategy for outreach, the Coalition reviewed PUR data for the number of monthly chlorpyrifos applications, pounds of active ingredient applied, and the acres treated within the subwatershed. The greatest amount of chlorpyrifos use occurred in 2006 (17,521 lbs AI) and use in the subwatershed has significantly decreased since; 3,150 lbs AI were applied in 2010 and PUR data available to date indicate applications in 2011 will most likely total to a similar amount (complete 2011 PUR data only available through June 2011). The greatest chlorpyrifos use consistently occurs during the irrigation season, particularly in the months of May through August, which coincides with the months of past exceedances (Table VIII-8, Figure VIII-2).

The Coalition also uses PUR data to determine which crops received the most chlorpyrifos applications. The largest amount of chlorpyrifos applied from 2006 through 2010 was to almonds (38,690 lbs AI) followed by grapes (1,238 lbs AI). The most common product containing chlorpyrifos used within this subwatershed was Lorsban (Table VIII-9).

**Table VIII-8. Berenda Slough along Ave 18 ½ site subwatershed chlorpyrifos applications, lbs AI applied, and acres treated by month (2006-2011).**

PUR data available through June 2011 for Madera County. If month is not included in table, no applications were made.

| MONTH/YEAR      | NUMBER OF CHLORPYRIFOS APPLICATIONS | POUNDS OF AI APPLIED | ACRES TREATED |
|-----------------|-------------------------------------|----------------------|---------------|
| January, 2006   | 1                                   | 109.7                | 55.0          |
| April, 2006     | 4                                   | 529.7                | 290.0         |
| May, 2006       | 20                                  | 4291.0               | 2326.6        |
| June, 2006      | 12                                  | 765.2                | 469.5         |
| July, 2006      | 62                                  | 7314.2               | 3736.0        |
| August, 2006    | 18                                  | 4411.6               | 2240.0        |
| September, 2006 | 4                                   | 99.8                 | 145.0         |
| January, 2007   | 1                                   | 562.9                | 320.0         |
| March, 2007     | 8                                   | 55.5                 | 253.6         |

| MONTH/YEAR               | NUMBER OF CHLORPYRIFOS APPLICATIONS | POUNDS OF AI APPLIED | ACRES TREATED  |
|--------------------------|-------------------------------------|----------------------|----------------|
| May, 2007                | 9                                   | 2305.1               | 1144.0         |
| July, 2007               | 30                                  | 3392.5               | 1750.7         |
| August, 2007             | 3                                   | 589.0                | 298.0          |
| September, 2007          | 1                                   | 38.4                 | 38.0           |
| March, 2008              | 4                                   | 889.0                | 477.8          |
| April, 2008              | 3                                   | 320.8                | 160.0          |
| May, 2008                | 6                                   | 1619.8               | 852.0          |
| June, 2008               | 4                                   | 343.5                | 347.1          |
| July, 2008               | 15                                  | 533.1                | 448.0          |
| August, 2008             | 1                                   | 37.4                 | 37.0           |
| March, 2009              | 1                                   | 13.7                 | 6.8            |
| April, 2009              | 2                                   | 24.0                 | 10.0           |
| May, 2009                | 6                                   | 1616.8               | 801.0          |
| June, 2009               | 11                                  | 694.9                | 344.0          |
| July, 2009               | 17                                  | 2406.2               | 1546.9         |
| August, 2009             | 16                                  | 2598.4               | 1436.8         |
| September, 2009          | 5                                   | 57.6                 | 228.0          |
| October, 2009            | 3                                   | 437.6                | 233.0          |
| February, 2010           | 1                                   | 223.7                | 119.1          |
| March, 2010              | 8                                   | 94.4                 | 272.7          |
| April, 2010              | 3                                   | 26.2                 | 44.0           |
| May, 2010                | 6                                   | 2080.8               | 1064.0         |
| June, 2010               | 4                                   | 672.6                | 367.5          |
| July, 2010               | 8                                   | 674.9                | 856.0          |
| August, 2010             | 4                                   | 210.5                | 238.5          |
| October, 2010            | 2                                   | 283.6                | 151.0          |
| November, 2010           | 1                                   | 69.5                 | 37.0           |
| February, 2011           | 1                                   | 223.7                | 119.1          |
| March, 2011              | 3                                   | 30.0                 | 145.0          |
| April, 2011              | 1                                   | 7.8                  | 30.8           |
| May, 2011                | 5                                   | 1057.3               | 542.0          |
| June, 2011               | 2                                   | 464.6                | 230.0          |
| <b>Summaries by Year</b> |                                     |                      |                |
| 2006 Total               | 121                                 | 17521.2              | 9262.1         |
| 2007 Total               | 52                                  | 6943.3               | 3804.3         |
| 2008 Total               | 33                                  | 3743.6               | 2321.9         |
| 2009 Total               | 61                                  | 7849.2               | 4606.5         |
| 2010 Total               | 37                                  | 4336.1               | 3149.9         |
| 2011 Total               | 12                                  | 1783.4               | 1066.9         |
| <b>Total</b>             | <b>316</b>                          | <b>42176.8</b>       | <b>24211.5</b> |

**Figure VIII-2. Berenda Slough along Ave 18 ½ site subwatershed lbs chlorpyrifos applied by month (2006-2011).**

Asterisk (\*) denotes months with exceedances. PUR data available through June 2011 for Madera County.

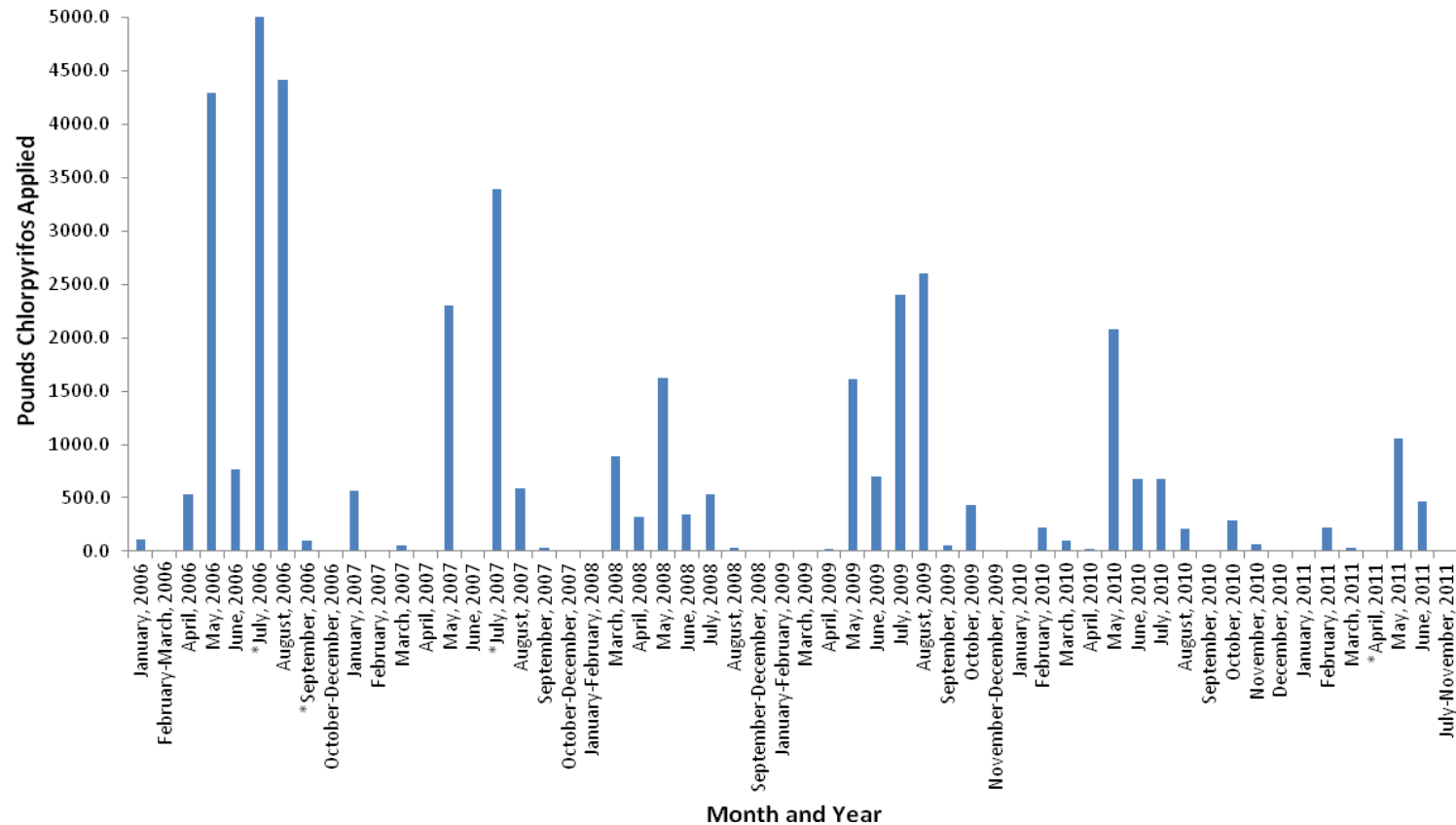


**Table VIII-9. Berenda Slough along Ave 18 ½ site subwatershed chlorpyrifos PUR data (2006-2011).**

PUR data available through June 2011 for Madera County.

| CHEMICAL NAME                                 | COMMODITY                               | PRODUCT NAME           | LBS AL APPLIED        |
|-----------------------------------------------|-----------------------------------------|------------------------|-----------------------|
| CHLORPYRIFOS                                  | ALFALFA (FORAGE - FODDER) (ALFALFA HAY) | GOVERN 4E INSECTICIDE  | 91.9                  |
|                                               |                                         | LOCK-ON INSECTICIDE    | 290.8                 |
|                                               |                                         | NUFOS 4E               | 44.7                  |
|                                               |                                         | WARHAWK                | 141.9                 |
|                                               | ALMOND                                  | CHLORPYRIFOS 4E AG     | 703.6                 |
|                                               |                                         | GOVERN 4E INSECTICIDE  | 21150.5               |
|                                               |                                         | LORSBAN 4E INSECTICIDE | 224.6                 |
|                                               |                                         | LORSBAN 4E-HF          | 2714.8                |
|                                               |                                         | LORSBAN ADVANCED       | 149.5                 |
|                                               |                                         | LORSBAN-4E             | 6757.4                |
|                                               |                                         | NUFOS 4E               | 2764.5                |
|                                               |                                         | WARHAWK                | 2593.2                |
|                                               |                                         | WHIRLWIND              | 1631.7                |
|                                               |                                         | CORN (FORAGE - FODDER) | GOVERN 4E INSECTICIDE |
|                                               | HATCHET                                 |                        | 37.4                  |
|                                               | LORSBAN 15G GRANULAR INSECTICIDE        |                        | 214.3                 |
|                                               | LORSBAN-4E                              |                        | 122.1                 |
|                                               | COTTON (GENERAL)                        | GOVERN 4E INSECTICIDE  | 65.7                  |
|                                               | GRAPES (WINE)                           | LORSBAN ADVANCED       | 1238.1                |
|                                               | PRUNE                                   | NUFOS 4E               | 27.5                  |
|                                               |                                         | WHIRLWIND              | 10.7                  |
|                                               | WALNUT (ENGLISH WALNUT, PERSIAN WALNUT) | LORSBAN 4E-HF          | 1036.8                |
|                                               |                                         | LORSBAN ADVANCED       | 16.9                  |
| ALFALFA-Total Pounds Chlorpyrifos Applied     |                                         |                        | 569.3                 |
| ALMOND-Total Pounds Chlorpyrifos Applied      |                                         |                        | 38690.0               |
| CORN-Total Pounds Chlorpyrifos Applied        |                                         |                        | 521.8                 |
| COTTON-Total Pounds Chlorpyrifos Applied      |                                         |                        | 65.7                  |
| GRAPES -Total Pounds Chlorpyrifos Applied     |                                         |                        | 1238.1                |
| PRUNE-Total Pounds Chlorpyrifos Applied       |                                         |                        | 38.2                  |
| WALNUT-Total Pounds Chlorpyrifos Applied      |                                         |                        | 1053.7                |
| Total Pounds Chlorpyrifos Applied (2006-2011) |                                         |                        | 42176.8               |

The Coalition noted in the 2008 Management Plan that the chlorpyrifos concentrations found in Berenda Slough were most likely the result of tailwater transporting chlorpyrifos to the slough. Because the chlorpyrifos concentrations were well above the WQTL, it is unlikely the exceedances were the result of spray drift. Furthermore, as discussed above, PUR data indicated large numbers of applications and large amounts of active ingredient were applied throughout the subwatershed prior to the 2006 and 2007 exceedances. Most likely, several growers contributed to the exceedances in the slough; therefore, the Coalition should focus outreach to growers applying or who have previously applied chlorpyrifos.

Monitoring results and PUR data indicate that management of chlorpyrifos in this subwatershed should direct focused outreach to determine if irrigation return flows are managed properly, especially growers

with direct drainage. The Coalition advised row crop farmers of methods to better manage their irrigation tailwater and storm water runoff, whereas outreach efforts to orchard and vineyard growers has focused mainly on encouraging management practices to reduce spray drift and improve orchard and vineyard water management.

Since 2007, general Coalition outreach included grower meetings and the mailing/distribution of information. A complete list of coalition outreach during 2011 is provided in the Actions Taken to Address Water Quality Exceedances section of the 2012 AMR (Table 46, page 142). Focused outreach is directed at growers whose parcels are in the direct drainage area of the subwatershed and who have applied chlorpyrifos. From these criteria, the Coalition compiled a targeted list of growers.

The Coalition completed individual meetings with targeted growers in the third priority subwatersheds during the fall of 2011. Although meetings focused mainly on chlorpyrifos exceedances, all water quality results are reviewed and discussed including copper, *S. capricornutum* toxicity, *E. coli* and DO. The Coalition contacted 19 members accounting for 4,103 acres of targeted direct drainage.

Grower surveys completed at the meetings documenting members' current practices and indicating which recommended practices growers anticipate implementing in the upcoming years were compiled and assessed by the Coalition in the Summary of Implemented Management Practices section of this report. The Coalition is hopeful growers contacted during the winter of 2011 were able to implement recommended practices during the 2011 irrigation season, and growers contacted during or after the 2011 irrigation season will be able to implement recommended practices during the 2012 irrigation season. Follow up meetings with targeted growers will occur in the winter and/or spring of 2012 (depending on the timing of the initial contact with the grower) to determine what additional management practices were implemented in the subwatershed.

Assessment Monitoring is scheduled to continue at Berenda Slough along Ave 18 ½ through 2012 and MPM during months when exceedances occurred historically will be scheduled for 2013. These data will enable the Coalition evaluate improvements in water quality as recommended management practice implementation occurs.

### *Priority C Constituents*

Copper is the only priority C constituent under the Berenda Slough along Ave 18 ½ management plan.

#### **Copper**

Eleven exceedances of the copper WQTL occurred in Berenda Slough during 2011 Assessment Monitoring.

Copper is an algaecide and fungicide often applied to orchards and vineyards. Copper can be applied throughout the year but its peak application periods are prior to and during the dormant season and early in the irrigation season.

The Coalition reviewed PUR data for the number of monthly copper applications, pounds of active ingredient applied, and acres treated (Table VIII -10, Figure VIII-3). The greatest amount of copper applied was in 2007 (24,485 lbs AI) and copper use in the subwatershed has since declined and fewer acres have been treated. Peak use of copper in the subwatershed is typically in January with numerous applications occurring and no or very few applications typically occur after April. However, 2011 was an exception and relatively modest amounts of copper were also applied in June. Copper was monitored for the first time in Berenda Slough during 2011 and according to PUR data available to date, an exceedance occurred in every month copper was applied (no applications nor exceedance in May 2011; complete PUR data only available through June 2011). Yet, the Coalition believes copper use in 2011 will be relatively similar during the summer and fall months as use in years past and anticipates copper exceedances that occurred during July through December 2011 will not coincide with copper applications during the same month. Therefore, copper exceedances are not necessarily related to copper applications.

The Coalition also uses PUR data to assess which crops received the most applications of copper from 2004 to 2011. By far, the most copper applications occur to almond orchards in Berenda Slough (64,966 lbs AI), followed by to grapes (11,105 lbs AI) and walnuts (8,805 lbs AI; Table VIII-11). The most common product used within this subwatershed containing copper was Kocide (Table VIII-11).

**Table VIII-10. Berenda Slough along Ave 18 ½ site subwatershed copper applications, lbs AI applied, and acres treated by month (2006-2011).**

PUR data available through June 2011 for Madera County. If month is not included in table, no applications were made.

| MONTH/YEAR     | NUMBER OF COPPER APPLICATIONS | POUNDS OF AI APPLIED | ACRES TREATED |
|----------------|-------------------------------|----------------------|---------------|
| January, 2006  | 61                            | 16187.1              | 4871.0        |
| February, 2006 | 2                             | 249.8                | 49.0          |
| March, 2006    | 9                             | 3267.1               | 1964.2        |
| April, 2006    | 25                            | 3661.7               | 3009.6        |
| June, 2006     | 1                             | 28.5                 | 9.5           |
| November, 2006 | 1                             | 122.7                | 40.0          |
| December, 2006 | 1                             | 968.4                | 300.0         |
| January, 2007  | 24                            | 5479.8               | 1412.0        |
| March, 2007    | 11                            | 1638.9               | 1617.6        |
| April, 2007    | 9                             | 1948.0               | 1228.0        |
| May, 2007      | 1                             | 28.2                 | 35.0          |
| June, 2007     | 1                             | 28.5                 | 9.5           |
| November, 2007 | 1                             | 103.3                | 40.0          |
| January, 2008  | 45                            | 10010.9              | 3222.5        |
| February, 2008 | 19                            | 4123.2               | 1021.0        |
| March, 2008    | 4                             | 1209.1               | 393.0         |
| April, 2008    | 10                            | 1331.8               | 951.4         |

| MONTH/YEAR               | NUMBER OF COPPER APPLICATIONS | POUNDS OF AL APPLIED | ACRES TREATED  |
|--------------------------|-------------------------------|----------------------|----------------|
| January, 2009            | 66                            | 8896.7               | 4075.1         |
| February, 2009           | 7                             | 712.8                | 403.5          |
| April, 2009              | 12                            | 982.9                | 1105.0         |
| November, 2009           | 1                             | 107.6                | 40.0           |
| January, 2010            | 36                            | 6712.4               | 2258.0         |
| February, 2010           | 2                             | 682.1                | 249.8          |
| March, 2010              | 6                             | 921.9                | 530.0          |
| April, 2010              | 14                            | 2167.8               | 1234.0         |
| May, 2010                | 1                             | 39.6                 | 86.0           |
| December, 2010           | 1                             | 64.5                 | 35.0           |
| January, 2011            | 56                            | 9769.6               | 2887.3         |
| February, 2011           | 12                            | 898.2                | 531.0          |
| March, 2011              | 8                             | 498.8                | 466.0          |
| April, 2011              | 6                             | 1347.4               | 1202.6         |
| June, 2011               | 2                             | 1251.4               | 220.0          |
| <b>Summaries by Year</b> |                               |                      |                |
| 2006 Total               | 100                           | 24485.2              | 10243.3        |
| 2007 Total               | 47                            | 9226.8               | 4342.1         |
| 2008 Total               | 78                            | 16674.9              | 5588.0         |
| 2009 Total               | 86                            | 10700.0              | 5623.6         |
| 2010 Total               | 60                            | 10588.5              | 4392.8         |
| 2011 Total               | 84                            | 13765.4              | 5306.9         |
| <b>Total</b>             | <b>455</b>                    | <b>85440.8</b>       | <b>35496.7</b> |



**Figure VIII-3. Berenda Slough along Ave 18 ½ site subwatershed lbs copper applied by month (2006-2011).**

Asterisk (\*) denotes months with exceedances. PUR data available through June 2011 for Madera County.

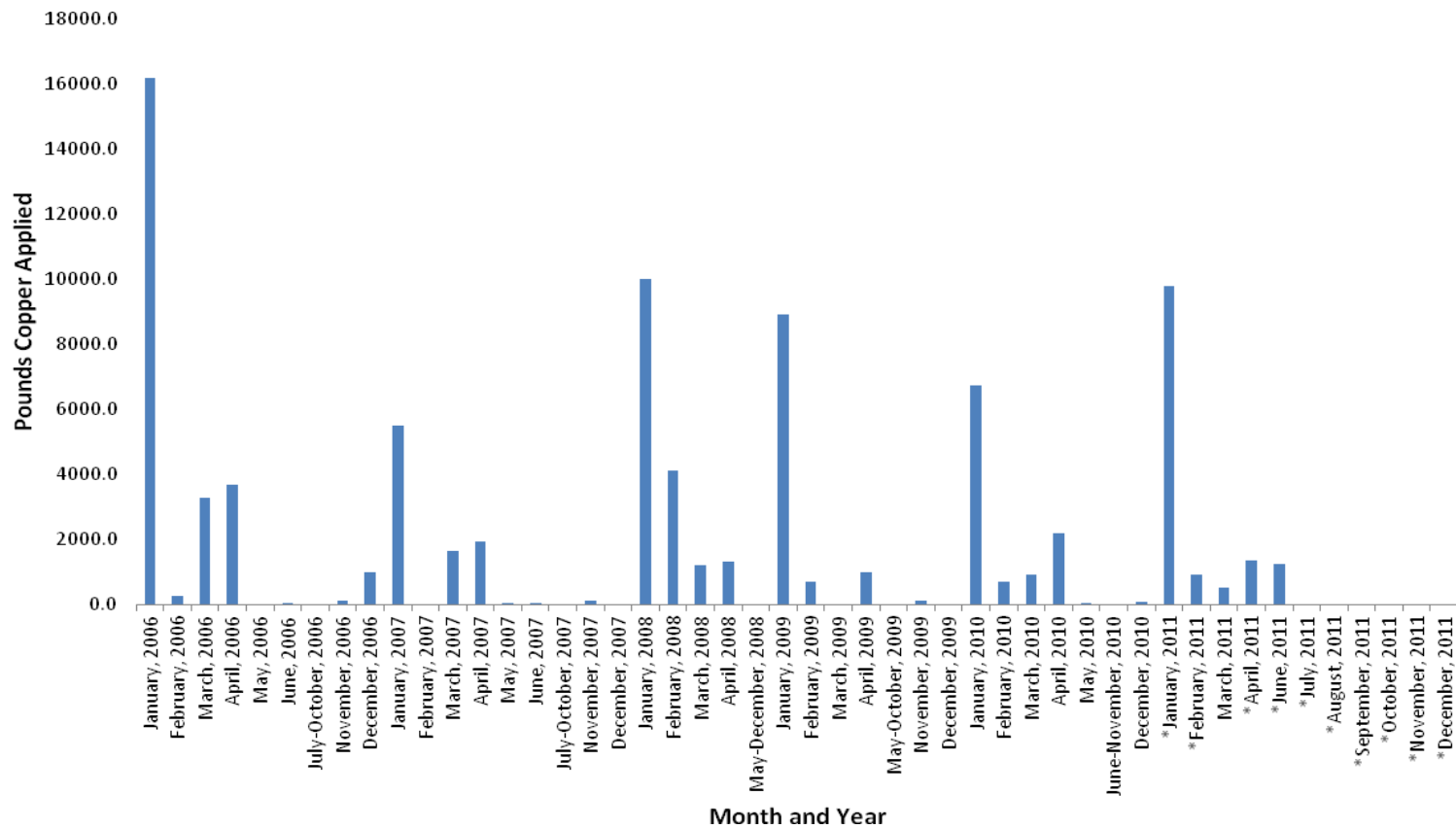


**Table VIII-11. Berenda Slough along Ave 18 ½ subwatershed copper PUR data (2006-2011).**

PUR data available through June 2011 for Madera County.

| CHEMICAL NAME                           | COMMODITY                               | PRODUCT NAME                               | LBS AL APPLIED             |
|-----------------------------------------|-----------------------------------------|--------------------------------------------|----------------------------|
| COPPER                                  | ALMOND                                  | BADGE X2                                   | 90.3                       |
|                                         |                                         | CHAMP DP                                   | 831.7                      |
|                                         |                                         | CHAMP DRY PRILL                            | 2526.6                     |
|                                         |                                         | CHAMP FORMULA 2 FLOWABLE                   | 20725.7                    |
|                                         |                                         | CUPROFIX ULTRA 40 DISPERSS                 | 1061.5                     |
|                                         |                                         | DUPONT GX-569 FUNGICIDE/BACTERICIDE        | 54.2                       |
|                                         |                                         | DUPONT KOCIDE 101 FUNGICIDE/BACTERICIDE    | 18.3                       |
|                                         |                                         | DUPONT KOCIDE 2000 FUNGICIDE/BACTERICIDE   | 14844.4                    |
|                                         |                                         | DUPONT KOCIDE 3000 FUNGICIDE/BACTERICIDE   | 8537.4                     |
|                                         |                                         | DUPONT KOCIDE DF FUNGICIDE/BACTERICIDE     | 337.7                      |
|                                         |                                         | KOCIDE 101                                 | 5017.7                     |
|                                         |                                         | KOCIDE 2000                                | 3326.6                     |
|                                         |                                         | KOCIDE 2000 T/N/O                          | 516.5                      |
|                                         |                                         | KOCIDE DF                                  | 147.4                      |
|                                         |                                         | NORDOX                                     | 225.6                      |
|                                         |                                         | NORDOX 75 WG                               | 577.2                      |
|                                         |                                         | NU-COP 50 WP                               | 326.5                      |
|                                         |                                         | NU-COP 50DF                                | 308.0                      |
|                                         |                                         | NU-COP HB                                  | 5493.2                     |
|                                         |                                         | GRAPE (RAISIN)                             | CUPROFIX ULTRA 40 DISPERSS |
|                                         | GRAPES                                  | CUPROFIX ULTRA 40 DISPERSS                 | 28.8                       |
|                                         |                                         | DUPONT KOCIDE 2000 FUNGICIDE/BACTERICIDE   | 40.4                       |
|                                         |                                         | KOCIDE 2000                                | 71.3                       |
|                                         |                                         | NU-COP 50DF                                | 77.0                       |
|                                         | GRAPES (WINE)                           | BRITZ COPPER SULFUR 15-25 DUST             | 28.5                       |
|                                         |                                         | CHAMP FORMULA 2 FLOWABLE                   | 880.1                      |
|                                         |                                         | CLEAN CROP C-O-C-S 15 SULFUR 25 DUST       | 28.5                       |
|                                         |                                         | DUPONT KOCIDE 2000 FUNGICIDE/BACTERICIDE   | 253.4                      |
|                                         |                                         | DUPONT KOCIDE 3000 FUNGICIDE/BACTERICIDE   | 1086.4                     |
|                                         |                                         | KENTAN DF                                  | 2555.7                     |
|                                         |                                         | KOCIDE 101                                 | 224.8                      |
|                                         |                                         | KOCIDE 2000                                | 3722.6                     |
|                                         |                                         | KOCIDE 606 FLOWABLE AGRICULTURAL FUNGICIDE | 276.0                      |
|                                         |                                         | KOCIDE DF                                  | 782.8                      |
|                                         | NORDOX 75 WG                            | 840.1                                      |                            |
|                                         | ORANGE (ALL OR UNSPEC)                  | KOCIDE 2000                                | 456.2                      |
|                                         |                                         | KOCIDE 2000 T/N/O                          | 107.6                      |
|                                         | WALNUT (ENGLISH WALNUT, PERSIAN WALNUT) | CHAMP FORMULA 2 FLOWABLE                   | 1255.0                     |
|                                         |                                         | COPPER-COUNT-N                             | 1068.6                     |
|                                         |                                         | CUPROFIX ULTRA 40 DISPERSS                 | 2400.3                     |
|                                         |                                         | KOCIDE 2000                                | 3371.1                     |
|                                         |                                         | KOCIDE 2000 T/N/O                          | 710.2                      |
| ALMOND-Total Pounds Copper Applied      |                                         |                                            | 64966.3                    |
| GRAPES-Total Pounds Copper Applied      |                                         |                                            | 11105.4                    |
| ORANGE-Total Pounds Copper Applied      |                                         |                                            | 563.8                      |
| WALNUT-Total Pounds Copper Applied      |                                         |                                            | 8805.2                     |
| Total Pounds Copper Applied (2006-2011) |                                         |                                            | 85440.8                    |

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Given the numerous applications of copper that occur in the Berenda Slough subwatershed throughout the year, the Coalition believes it should target outreach to growers with the greatest potential to impact water quality (i.e. with direct drainage) and encourages growers to improve irrigation and storm water management. In 2010, the Coalition compiled a list of targeted growers whose parcels were noted to have the potential to drain to the slough and who applied or may apply constituents of concern, which, at the time, was only chlorpyrifos. Copper management was initially planned to be included in discussions with growers as it could potentially relate to *S. capricornutum* toxicity; however, the Coalition was unaware of copper exceedances and therefore directed outreach to be focused toward preventing chlorpyrifos from entering the waterways. Upon reviewing the first few months of Assessment Monitoring results, the Coalition began to highlight the recent copper exceedances in its discussions with growers. Management practices recommended to prevent chlorpyrifos from entering the slough are also applicable in preventing the offsite movement of copper. In addition, the Coalition reviewed parcels with the potential to drain and found that the targeted grower list included all growers who applied copper in the past.

### *Priority D Constituents*

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Water column toxicity to *S. capricornutum* is the only priority D constituent under the Berenda Slough along Ave 18 ½ management plan.

#### *S. capricornutum* toxicity

Toxicity to *S. capricornutum* has occurred twice in the subwatershed, during 2007 (May and July). An exceedance of diuron was found to be associated with the May toxicity, but there were no exceedances of diuron associated with the July toxicity. The July toxicity was persistent in the resample that occurred a week later.

Samples were not analyzed for metals in the Berenda Slough subwatershed until Assessment Monitoring in 2011; hence no copper data for any of the 2007 (May or July) sampling events was collected. The July 2007 TIE indicated that a cationic metal was the cause of toxicity. Of note, despite all the copper exceedances during 2011, toxicity to *S. capricornutum* did not occur.

The Coalition believes managing irrigation return flows and storm water from transporting copper and/or herbicides to the slough should be effective in eliminating *S. capricornutum* toxicity. The Coalition plans to continue outreach efforts as explained above to address the toxicity.

### *Priority E Constituents*

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The priority E constituents listed under the Berenda Slough along Ave 18 ½ management plan are DO and *E. coli*.

Although these constituents will remain low priority, the Coalition will continue to collect monitoring data as a part of Assessment Monitoring and/or MPM. Dissolved oxygen is a field parameter that will be

sampled during every event, Assessment Monitoring or MPM. *E. coli* will be monitored during Assessment Monitoring which will continue through 2012 and is next scheduled for 2017. The priority E constituents are discussed during individual contacts and will continue to be discussed at annual grower meetings. In addition, the Coalition plans to participate in a focus group along with other Coalitions and Regional Board staff to develop a joint Work Plan to address *E. coli* exceedances by determining the potential agricultural sources of *E. coli* and identifying management practices to prevent discharges to surface waters.

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### Evaluation

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Berenda Slough along Ave 18 ½ is a third priority site subwatershed and is in its second year of focused outreach (2011-2013).

The Coalition's strategy for the Berenda Slough subwatershed is to focus on providing information on a subwatershed level to growers to review their operation and determine if irrigation return flows are managed properly. The Coalition targeted growers whose agricultural practices may result in the discharge or drift of pesticides into the waterway and who applied chlorpyrifos and copper. Outreach includes grower notification, management practice outreach and education, tracking of management practice implementation, and providing information on special studies of management practice efficacy.

Individual grower surveys documenting current management practice implementations and assessing future planned implementations were completed and returned to the Coalition representing 100% of targeted growers. The Summary of Implemented Management Practices section of this report summarizes the results of these contacts. The Coalition plans to conduct follow up contacts with all targeted growers to assess the implementation of new management practices. The Coalition will report on newly implemented management practices in the 2013 MPUR.

In 2012, Assessment Monitoring is scheduled to continue and all management plan constituents will be analyzed monthly at that time. Management Plan Monitoring will resume in 2013.

## IX. DRY CREEK @ RD 18

### Management Plan Constituents

#### Priority A/B

- Chlorpyrifos
- Diazinon

#### Priority C

- Copper
- Diuron

#### Priority D

- *Hyalella azteca* sediment toxicity
- *Selenastrum capricornutum* water column

#### Priority E

- Dissolved Oxygen
- *E. coli*
- Lead
- pH

### Description of Dry Creek @ Road 18 Site Subwatershed

Dry Creek @ Rd 18 (20,779 irrigated acres) –Water that flows into this site subwatershed originates in the Sierra foothills, flows to the north of the city of Madera and eventually drains to the San Joaquin River through various channels and irrigation ditches. The subwatershed contains two upstream locations (Table IX-1). Deciduous orchards are the primary irrigated agriculture in the upper portion of the site subwatershed whereas vineyards are predominately located in the lower portions. A few field crops are scattered throughout the site subwatershed (Figure IX-1).

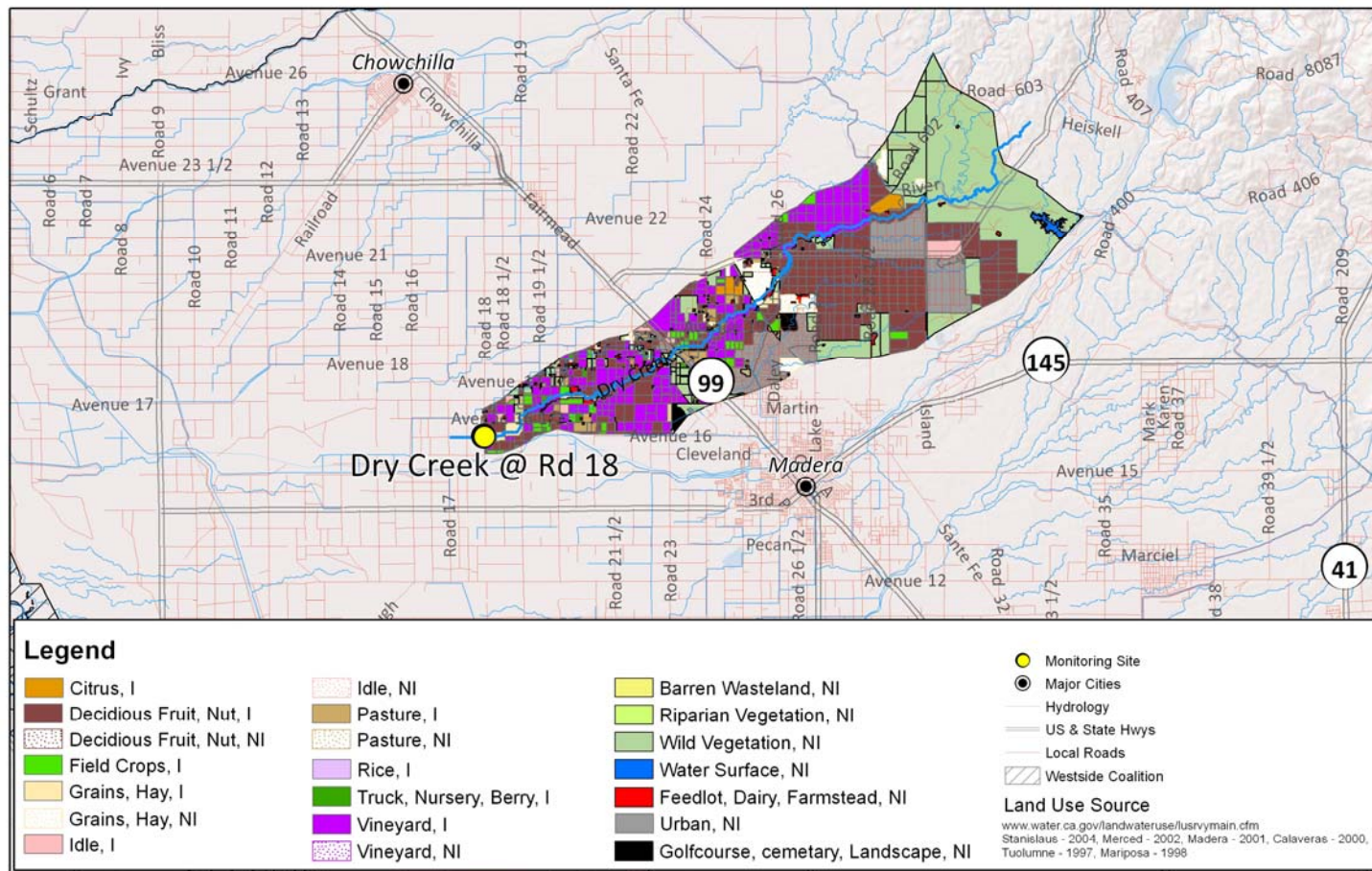
**Table IX-1. Dry Creek @ Rd 18 site subwatershed sampling locations coordinates.**

| SITE NAME                          | STATION CODE | TARGET LAT | TARGET LONG |
|------------------------------------|--------------|------------|-------------|
| Dry Creek at Rd 18*                | 545XDCARE    | 36.9818    | -120.2206   |
| Dry Creek @ Rd 22 <sup>U</sup>     | 545XDCART    | 37.0057    | -120.1471   |
| Dry Creek @ Rd 28 1/2 <sup>U</sup> | 545XDCATE    | 37.0679    | -120.0292   |

<sup>U</sup>Upstream sites

\*Original ESJWQC sampling site

Figure IX-1. Dry Creek @ Rd 18 site subwatershed land use map.



Source of Layers:  
Hydrology - NHD hydrodata, 1:24,000-scale, <http://nhd.usgs.gov/>  
Roads, highways, railroads, county boundary, city outlines - California Spatial Information Library  
TRS - Teale Public Land Survey System, Pub. date: 20050101, California Spatial Information Library  
Parcel Layer - Stanislaus 2010, Merced 2011, Madera 2011  
Basemap, Shaded Relief - ESRI  
GSC North America 1983

Date Prepared: 07/20/11

ESJWQC



Dry Creek @ Rd 18

ESJWQC MPUR, April 1, 2012

Appendix I

## Subwatershed Monitoring History

Dry Creek @ Rd 18 monitoring was initiated during 2005 irrigation season and continued through the 2008 irrigation season. During the four years, the site occasionally had insufficient flows and no samples were collected during a few events (Table IX-2). Under the 2008 MRPP, Dry Creek @ Rd 18 is an Assessment Monitoring location in the Cottonwood Creek @ Rd 20 Zone (Zone 6). The site is scheduled to rotate to the Assessment Monitoring location for the zone in 2013 and 2014. Accordingly, Normal Monitoring did not occur at the site in 2009, 2010, nor 2011, and is not scheduled for 2012; although MPM is scheduled at the site during 2012. The constituents sampled at this location from 2005 through 2011 are listed in Table IX-3.

In 2007, 2008 and 2011 MPM occurred. Additional MPM occurred in 2007 at Dry Creek @ Rd 18 for copper (June-September). In 2008, upstream MPM occurred at Dry Creek @ Rd 22 for chlorpyrifos (April and July) and copper (April-September) and at Dry Creek @ Rd 28 ½ for copper (July and September). Management Plan Monitoring resumed in 2011 at Dry Creek @ Rd 18 for chlorpyrifos (February, April, and July), diazinon (February), copper (January, February, and April-September), diuron (January and February), lead (May, June, August, and September), *H. azteca* toxicity (March and September), and *S. capricornutum* toxicity (January, February and May, Table IX-4).

Dry Creek @ Rd 18 is not listed on California's 2008-2010 303d List of Impaired Waterbodies.

**Table IX-2. Dry Creek @ Rd 18 site subwatershed sampling events per season and year (including MPM).**

| YEAR | SEASON     | EVENTS SAMPLED | EVENTS NOT SAMPLED <sup>1</sup> | TOTAL |
|------|------------|----------------|---------------------------------|-------|
| 2004 | Irrigation | NA             | NA                              | NA    |
| 2005 | Storm      | NA             | NA                              | NA    |
|      | Irrigation | 2              | 0                               | 2     |
| 2006 | Storm      | 1              | 1                               | 2     |
|      | Irrigation | 5              | 0                               | 5     |
| 2007 | Storm      | 1              | 1                               | 2     |
|      | Irrigation | 8              | 2                               | 10    |
| 2008 | Storm      | 2              | 0                               | 2     |
|      | Irrigation | 5              | 1                               | 6     |
|      | Fall       | NA             | NA                              | NA    |
| 2009 | Winter     | NA             | NA                              | NA    |
|      | Storm      | NA             | NA                              | NA    |
|      | Irrigation | NA             | NA                              | NA    |
|      | Fall       | NA             | NA                              | NA    |
| 2010 | Winter     | NA             | NA                              | NA    |
|      | Storm      | NA             | NA                              | NA    |
|      | Irrigation | NA             | NA                              | NA    |
|      | Fall       | NA             | NA                              | NA    |
| 2011 | Winter     | 2              | 0                               | 2     |
|      | Storm      | 1              | 0                               | 1     |
|      | Irrigation | 6              | 0                               | 6     |
|      | Fall       | NA             | NA                              | NA    |

<sup>1</sup>If an event was not sampled during scheduled monitoring, the site was dry.

NA – Not applicable. This site was not scheduled for sampling during this season/year.



**Table IX-3. Dry Creek @ Rd 18 site subwatershed analyses per sampling season and year.**

Only environmental samples with a sample replicate and lab replicate number of one are listed.

| METHOD                        | ANALYTE                         | 2005       | 2006  |            | 2007  |            | 2008  |            |       | 2009         | 2010         | 2011   |       |            |       |
|-------------------------------|---------------------------------|------------|-------|------------|-------|------------|-------|------------|-------|--------------|--------------|--------|-------|------------|-------|
|                               |                                 | IRRIGATION | STORM | IRRIGATION | STORM | IRRIGATION | STORM | IRRIGATION | FALL* | WINTER-FALL* | WINTER-FALL* | WINTER | STORM | IRRIGATION | FALL* |
| Field and Physical Parameters |                                 |            |       |            |       |            |       |            |       |              |              |        |       |            |       |
| EPA 110.2                     | Color                           | 2          |       | 5          | 1     | 5          | 2     | 5          |       |              |              |        |       |            |       |
| EPA 160.1                     | Dissolved Solids                | 2          |       | 5          | 1     | 5          | 2     | 5          |       |              |              |        |       |            |       |
| EPA 180.1                     | Turbidity                       | 2          |       | 5          | 1     | 5          | 2     | 5          |       |              |              |        |       |            |       |
| EPA 405.1                     | BOD                             |            |       | 1          | 1     | 2          |       |            |       |              |              |        |       |            |       |
| EPA 415.1                     | Total Organic Carbon            | 2          |       | 5          | 1     | 5          | 2     | 5          |       |              |              |        |       |            |       |
| SM 9223                       | <i>E. coli</i>                  | 2          |       | 6          | 1     | 5          | 2     | 5          |       |              |              |        |       |            |       |
| Walkley-Black                 | Total Organic Carbon (sediment) |            |       |            |       |            |       |            |       |              |              | 1      |       | 1          |       |
| ASTM D422 or ASTM D4464       | Grain size (sediment)           |            |       |            |       |            |       |            |       |              |              | 1      |       | 1          |       |
| NA                            | Dissolved Oxygen                | 2          | 1     | 6          | 1     | 9          | 3     | 6          |       |              |              | 2      | 1     | 6          |       |
| NA                            | Specific Conductivity           | 2          | 1     | 6          | 1     | 9          | 3     | 6          |       |              |              | 2      | 1     | 6          |       |
| NA                            | pH                              | 2          | 1     | 6          | 1     | 9          | 3     | 6          |       |              |              | 2      | 1     | 6          |       |
| Carbamates                    |                                 |            |       |            |       |            |       |            |       |              |              |        |       |            |       |
| EPA 8321A                     | Aldicarb                        |            |       | 5          | 1     | 5          | 2     | 5          |       |              |              |        |       |            |       |
| EPA 8321A                     | Carbaryl                        |            |       | 5          | 1     | 5          | 2     | 5          |       |              |              |        |       |            |       |
| EPA 8321A                     | Carbofuran                      |            |       | 5          | 1     | 5          | 2     | 5          |       |              |              |        |       |            |       |
| EPA 8321A                     | Diuron                          |            |       | 5          | 1     | 5          | 2     | 5          |       |              |              | 1      | 1     |            |       |
| EPA 8321A                     | Linuron                         |            |       | 5          | 1     | 5          | 2     | 5          |       |              |              |        |       |            |       |
| EPA 8321A                     | Methiocarb                      |            |       | 5          | 1     | 5          | 2     | 5          |       |              |              |        |       |            |       |
| EPA 8321A                     | Methomyl                        |            |       | 5          | 1     | 5          | 2     | 5          |       |              |              |        |       |            |       |
| EPA 8321A                     | Oxamyl                          |            |       | 5          | 1     | 5          | 2     | 5          |       |              |              |        |       |            |       |
| Organochlorines               |                                 |            |       |            |       |            |       |            |       |              |              |        |       |            |       |
| EPA 8081A                     | DDD(p,p')                       |            |       | 5          | 1     | 5          | 2     | 5          |       |              |              |        |       |            |       |
| EPA 8081A                     | DDE(p,p')                       |            |       | 5          | 1     | 5          | 2     | 5          |       |              |              |        |       |            |       |
| EPA 8081A                     | DDT(p,p')                       |            |       | 5          | 1     | 5          | 2     | 5          |       |              |              |        |       |            |       |
| EPA 8081A                     | Dicofol                         |            |       | 5          | 1     | 5          | 2     | 5          |       |              |              |        |       |            |       |
| EPA 8081A                     | Dieldrin                        |            |       | 5          | 1     | 5          | 2     | 5          |       |              |              |        |       |            |       |
| EPA 8081A                     | Endrin                          |            |       | 5          | 1     | 5          | 2     | 5          |       |              |              |        |       |            |       |
| EPA 8081A                     | Methoxychlor                    |            |       | 5          | 1     | 5          | 2     | 5          |       |              |              |        |       |            |       |
| Organophosphates              |                                 |            |       |            |       |            |       |            |       |              |              |        |       |            |       |
| EPA 8141A                     | Azinphos methyl                 |            |       | 5          | 1     | 5          | 2     | 5          |       |              |              |        |       |            |       |
| EPA 8141A                     | Chlorpyrifos                    | 2          |       | 5          | 1     | 5          | 2     | 5          |       |              |              |        | 1     | 2          |       |
| EPA 8141A                     | Diazinon                        | 2          |       | 5          | 1     | 5          | 2     | 5          |       |              |              |        | 1     |            |       |
| EPA 8141A                     | Dimethoate                      |            |       | 5          | 1     | 5          | 2     | 5          |       |              |              |        |       |            |       |
| EPA 8141A                     | Disulfoton                      |            |       | 5          | 1     | 5          | 2     | 5          |       |              |              |        |       |            |       |
| EPA 8141A                     | Malathion                       |            |       | 5          | 1     | 5          | 2     | 5          |       |              |              |        |       |            |       |
| EPA 8321A                     | Methamidophos                   |            |       | 5          | 1     | 5          | 2     | 5          |       |              |              |        |       |            |       |
| EPA 8141A                     | Methidathion                    |            |       | 5          | 1     | 5          | 2     | 5          |       |              |              |        |       |            |       |
| EPA 8141A                     | Molinate                        |            |       | 5          | 1     | 5          | 2     | 5          |       |              |              |        |       |            |       |
| EPA 8141A                     | Parathion, Methyl               |            |       | 5          | 1     | 5          | 2     | 5          |       |              |              |        |       |            |       |
| EPA 8141A                     | Phorate                         |            |       | 5          | 1     | 5          | 2     | 5          |       |              |              |        |       |            |       |
| EPA 8141A                     | Phosmet                         |            |       | 5          | 1     | 5          | 2     | 5          |       |              |              |        |       |            |       |



| METHOD                    | ANALYTE                           | 2005       | 2006  |            | 2007  |            | 2008  |            |       | 2009         | 2010         | 2011   |       |            |       |
|---------------------------|-----------------------------------|------------|-------|------------|-------|------------|-------|------------|-------|--------------|--------------|--------|-------|------------|-------|
|                           |                                   | IRRIGATION | STORM | IRRIGATION | STORM | IRRIGATION | STORM | IRRIGATION | FALL* | WINTER-FALL* | WINTER-FALL* | WINTER | STORM | IRRIGATION | FALL* |
| EPA 8141A                 | Thiobencarb                       |            |       | 5          | 1     | 5          | 2     | 5          |       |              |              |        |       |            |       |
| <b>Pyrethroids</b>        |                                   |            |       |            |       |            |       |            |       |              |              |        |       |            |       |
| EPA 8081A                 | Bifenthrin                        | 1          |       | 5          | 1     | 5          | 2     | 5          |       |              |              |        |       |            |       |
| EPA 8081A                 | Cyfluthrin, total                 | 1          |       | 5          | 1     | 5          | 2     | 5          |       |              |              |        |       |            |       |
| EPA 8081A                 | Cyhalothrin, lambda, total        | 2          |       | 5          | 1     | 5          | 2     | 5          |       |              |              |        |       |            |       |
| EPA 8081A                 | Cypermethrin, total               | 2          |       | 5          | 1     | 5          | 2     | 5          |       |              |              |        |       |            |       |
| EPA 8081A                 | Esfenvalerate/ Fenvalerate, total | 2          |       | 5          | 1     | 5          | 2     | 5          |       |              |              |        |       |            |       |
| EPA 8081A                 | Permethrin, total                 | 2          |       | 5          | 1     | 5          | 2     | 5          |       |              |              |        |       |            |       |
| <b>Triazines</b>          |                                   |            |       |            |       |            |       |            |       |              |              |        |       |            |       |
| EPA 547M                  | Glyphosate                        |            |       | 5          | 1     | 5          | 2     | 5          |       |              |              |        |       |            |       |
| EPA 549.2M                | Paraquat dichloride               |            |       | 5          | 1     | 5          | 2     | 5          |       |              |              |        |       |            |       |
| EPA 619                   | Atrazine                          |            |       | 5          | 1     | 5          | 2     | 5          |       |              |              |        |       |            |       |
| EPA 619                   | Cyanazine                         |            |       | 5          | 1     | 5          | 2     | 5          |       |              |              |        |       |            |       |
| EPA 619                   | Simazine                          |            |       | 5          | 1     | 5          | 2     | 5          |       |              |              |        |       |            |       |
| <b>Metals (Total)</b>     |                                   |            |       |            |       |            |       |            |       |              |              |        |       |            |       |
| EPA 200.8                 | Arsenic                           |            |       | 5          | 1     | 5          | 2     | 5          |       |              |              |        |       |            |       |
| EPA 200.8                 | Boron                             |            |       | 5          | 1     | 5          | 2     | 5          |       |              |              |        |       |            |       |
| EPA 200.8                 | Cadmium                           |            |       | 5          | 1     | 5          | 2     | 5          |       |              |              |        |       |            |       |
| EPA 200.8                 | Copper                            |            |       | 5          | 1     | 8          | 2     | 5          |       |              |              | 1      | 1     | 6          |       |
| EPA 200.8                 | Lead                              |            |       | 5          | 1     | 5          | 2     | 5          |       |              |              |        |       | 4          |       |
| EPA 200.8                 | Molybdenum                        |            |       |            |       |            |       |            |       |              |              |        |       |            |       |
| EPA 200.8                 | Nickel                            |            |       | 5          | 1     | 5          | 2     | 5          |       |              |              |        |       |            |       |
| EPA 200.8                 | Selenium                          |            |       | 5          | 1     | 2          | 2     | 5          |       |              |              |        |       |            |       |
| EPA 200.8                 | Zinc                              |            |       | 5          | 1     | 6          | 2     | 5          |       |              |              |        |       |            |       |
| <b>Metals (Dissolved)</b> |                                   |            |       |            |       |            |       |            |       |              |              |        |       |            |       |
| EPA 200.8                 | Copper                            |            |       |            |       |            |       |            |       |              |              | 1      | 1     | 6          |       |
| EPA 200.8                 | Lead                              |            |       |            |       |            |       |            |       |              |              |        |       | 4          |       |
| <b>Nutrients</b>          |                                   |            |       |            |       |            |       |            |       |              |              |        |       |            |       |
| SM 2340 C                 | Hardness as CaCO3                 |            |       | 5          | 1     | 8          | 2     | 5          |       |              |              | 1      | 1     | 6          |       |
| EPA 300.0                 | Nitrate as N                      |            |       | 5          | 1     | 5          | 2     | 5          |       |              |              |        |       |            |       |
| EPA 350.2                 | Ammonia as N                      |            |       | 5          | 1     | 5          | 2     | 5          |       |              |              |        |       |            |       |
| EPA 351.3                 | Nitrogen, Total Kjeldahl          |            |       | 5          | 1     | 5          | 2     | 5          |       |              |              |        |       |            |       |
| EPA 354.1                 | Nitrite as N                      |            |       | 5          | 1     | 5          | 2     | 5          |       |              |              |        |       |            |       |
| EPA 365.2                 | OrthoPhosphate as P               |            |       | 5          | 1     | 5          | 2     | 5          |       |              |              |        |       |            |       |
| EPA 365.2                 | Phosphate as P                    |            |       | 5          | 1     | 5          | 2     | 5          |       |              |              |        |       |            |       |
| <b>Toxicity</b>           |                                   |            |       |            |       |            |       |            |       |              |              |        |       |            |       |
| EPA 821/R-02-012          | <i>Ceriodaphnia dubia</i>         | 2          |       | 6          | 1     | 5          | 2     | 4          |       |              |              |        |       |            |       |
| EPA 821/R-02-012          | <i>Pimephales promelas</i>        | 2          |       | 5          | 1     | 5          | 2     | 6          |       |              |              |        |       |            |       |
| EPA 821/R-02-013          | <i>Selenastrum capricornutum</i>  | 2          |       | 5          | 1     | 6          | 3     | 5          |       |              |              | 1      | 1     | 1          |       |
| EPA 600/R-99-064          | <i>Hyalella azteca</i>            | 1          | 1     | 1          |       | 1          | 1     | 1          |       |              |              | 1      |       | 1          |       |

\*Site not sampled during the 2008 fall season, 2009 and 2010 sampling years, and 2011 fall season.

**Table IX-4. Dry Creek @ Rd 18 site subwatershed Management Plan Monitoring schedule (2007-2011).**

Upstream locations included.

| SITE NAME           | SAMPLE DATE | MONITORING TYPE | COPPER | LEAD | CHLORPYRIFOS | DIAZINON | DIURON | S. CAPRICORNUTUM | H. AZTECA |
|---------------------|-------------|-----------------|--------|------|--------------|----------|--------|------------------|-----------|
| Dry Creek @ Rd 18   | 26-Jun-07   | A               | X      |      |              |          |        |                  |           |
| Dry Creek @ Rd 18   | 24-Jul-07   | A               | X      |      |              |          |        |                  |           |
| Dry Creek @ Rd 18   | 21-Aug-07   | A               | X      |      |              |          |        |                  |           |
| Dry Creek @ Rd 18   | 18-Sep-07   | A               | X      |      |              |          |        |                  |           |
| Dry Creek @ Rd 22   | 29-Apr-08   | U               | X      |      | X            |          |        |                  |           |
| Dry Creek @ Rd 22   | 27-May-08   | U               | X      |      |              |          |        |                  |           |
| Dry Creek @ Rd 22   | 24-Jun-08   | U               | X      |      |              |          |        |                  |           |
| Dry Creek @ Rd 22   | 29-Jul-08   | U               | X      |      | X            |          |        |                  |           |
| Dry Creek @ Rd 28 ½ | 29-Jul-08   | U               | X      |      |              |          |        |                  |           |
| Dry Creek @ Rd 22   | 26-Aug-08   | U               | X      |      |              |          |        |                  |           |
| Dry Creek @ Rd 22   | 30-Sep-08   | U               | X      |      |              |          |        |                  |           |
| Dry Creek @ Rd 28 ½ | 30-Sep-08   | U               | X      |      |              |          |        |                  |           |
| Dry Creek @ Rd 18   | 18-Jan-11   | MPM             | X      |      |              |          | X      | X                |           |
| Dry Creek @ Rd 18   | 17-Feb-11   | MPM             | X      |      | X            | X        | X      | X                |           |
| Dry Creek @ Rd 18   | 17-Mar-11   | MPM             |        |      |              |          |        |                  | X         |
| Dry Creek @ Rd 18   | 19-Apr-11   | MPM             | X      |      | X            |          |        |                  |           |
| Dry Creek @ Rd 18   | 17-May-11   | MPM             | X      | X    |              |          |        | X                |           |
| Dry Creek @ Rd 18   | 21-Jun-11   | MPM             | X      | X    |              |          |        |                  |           |
| Dry Creek @ Rd 18   | 19-Jul-11   | MPM             | X      |      | X            |          |        |                  |           |
| Dry Creek @ Rd 18   | 16-Aug-11   | MPM             | X      | X    |              |          |        |                  |           |
| Dry Creek @ Rd 18   | 13-Sep-11   | MPM             | X      | X    |              |          |        |                  | X         |

A – Additional sampling

U – Upstream sampling

X – Constituent sampled for Management Plan Monitoring (MPM)

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### Exceedance History

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Samples collected from 2005 through 2011 exceeded the WQTLs for field parameters, *E. coli*, metals, and pesticides as well as water column and sediment toxicity. Exceedances at all three sites in the subwatershed include DO (4), pH (5), *E. coli* (4), total copper (28), lead (5), zinc (1), chlorpyrifos (3), diazinon (2), and diuron (2). Toxicity to *C. dubia* (1), *S. capricornutum* (4), and to *H. azteca* sediment (2) occurred (Table IX-5).

During 2011, exceedances of pH (2) and copper (7) occurred (Table IX-5).

Exceedances are based on WQTLs listed in the introduction to the ESJWQC Management Plan. The highest priority constituents in the Dry Creek @ Rd 18 subwatershed are chlorpyrifos (A/B), diazinon (A/B), copper (C), diuron (C), *S. capricornutum* toxicity (D) and *H. azteca* toxicity (D).

**Table IX-5. Dry Creek @ Rd 18 site subwatershed exceedances (2005-2011).**

The WQTL used to evaluate the data are listed in the header after the analyte. Upstream site is italicized.

| SITE NAME         | SEASON     | SAMPLE DATE | OXYGEN, DISSOLVED, <7MG/L | PH, <6.5 AND > 8.5 UNITS | E. COLI, >235 MPN/100 mL | COPPER, DISSOLVED <sup>2</sup> µG/L | COPPER, TOTAL <sup>1</sup> , >1,300 µG/L | LEAD, TOTAL <sup>1</sup> , >15 µG/L | ZINC, TOTAL <sup>1</sup> , µG/L | CHLORPYRIFOS, >0.015 µG/L | DIAZINON, >0.1 µG/L | DIURON, >2 µG/L | C. DUBIA, (% CONTROL) | S. CAPRICORNUTUM, (% CONTROL) | H. AZTECA, (% CONTROL) |
|-------------------|------------|-------------|---------------------------|--------------------------|--------------------------|-------------------------------------|------------------------------------------|-------------------------------------|---------------------------------|---------------------------|---------------------|-----------------|-----------------------|-------------------------------|------------------------|
| Dry Creek @ Rd 18 | Irrigation | 8/16/2005   |                           | 6.48                     |                          |                                     |                                          |                                     |                                 |                           |                     |                 |                       |                               |                        |
| Dry Creek @ Rd 18 | Irrigation | 9/20/2005   |                           |                          | 500                      |                                     |                                          |                                     |                                 |                           |                     |                 |                       |                               |                        |
| Dry Creek @ Rd 18 | Storm      | 5/3/2006    |                           |                          |                          |                                     |                                          |                                     |                                 |                           |                     |                 |                       |                               | 84                     |
| Dry Creek @ Rd 18 | Irrigation | 5/16/2006   |                           |                          | 1600                     |                                     | 4.3 (1.9)                                | 0.36 (0.31)                         |                                 |                           |                     |                 |                       |                               |                        |
| Dry Creek @ Rd 18 | Irrigation | 6/13/2006   |                           |                          |                          |                                     | 6.3 (1.5)                                | 0.27 (0.21)                         |                                 |                           |                     |                 | 80                    |                               |                        |
| Dry Creek @ Rd 18 | Irrigation | 7/11/2006   |                           |                          |                          |                                     | 4.1 (2.4)                                |                                     |                                 | 0.077                     |                     |                 |                       |                               |                        |
| Dry Creek @ Rd 18 | Irrigation | 8/8/2006    |                           |                          |                          |                                     | 4.6 (2.2)                                |                                     |                                 |                           |                     |                 |                       |                               |                        |
| Dry Creek @ Rd 18 | Irrigation | 9/12/2006   | 5.61                      |                          |                          |                                     | 6.1 (1.1)                                | 0.31 (0.13)                         | 18 (14.1)                       |                           |                     |                 |                       |                               |                        |
| Dry Creek @ Rd 18 | Storm      | 2/11/2007   |                           |                          |                          |                                     | 14 (3.9)                                 |                                     |                                 |                           | 0.13                |                 |                       |                               |                        |
| Dry Creek @ Rd 18 | Irrigation | 4/24/2007   |                           |                          | 1400                     |                                     | 17 (15.4)                                |                                     |                                 | 0.017                     |                     |                 |                       |                               |                        |
| Dry Creek @ Rd 18 | Irrigation | 5/29/2007   |                           |                          |                          |                                     | 4.7 (2.4)                                |                                     |                                 |                           |                     |                 |                       | 64                            |                        |
| Dry Creek @ Rd 18 | Irrigation | 6/19/2007   |                           |                          |                          |                                     | 4.9 (1.5)                                |                                     |                                 |                           |                     |                 |                       |                               |                        |
| Dry Creek @ Rd 18 | Irrigation | 6/26/2007   |                           |                          |                          |                                     | 3.6 (1.9)                                |                                     |                                 |                           |                     |                 |                       |                               |                        |
| Dry Creek @ Rd 18 | Irrigation | 7/24/2007   |                           |                          |                          |                                     | 5.6 (2.2)                                |                                     |                                 |                           |                     |                 |                       |                               |                        |
| Dry Creek @ Rd 18 | Irrigation | 7/31/2007   |                           |                          |                          |                                     | 4.5 (1.5)                                |                                     |                                 |                           |                     |                 |                       |                               |                        |
| Dry Creek @ Rd 18 | Irrigation | 8/21/2007   |                           |                          |                          |                                     | 5.5 (1.9)                                | 0.34 (0.31)                         |                                 |                           |                     |                 |                       |                               |                        |
| Dry Creek @ Rd 18 | Irrigation | 8/28/2007   |                           | 8.53                     |                          |                                     | 4.3 (1.9)                                |                                     |                                 |                           |                     |                 |                       |                               |                        |
| Dry Creek @ Rd 18 | Storm      | 1/25/2008   |                           |                          | >2400                    |                                     | 20 (5.9)                                 |                                     |                                 |                           |                     | 21              |                       | 36                            |                        |
| Dry Creek @ Rd 18 | Storm      | 2/25/2008   |                           |                          |                          |                                     | 33 (5.5)                                 |                                     |                                 | 0.034                     | 0.24                | 2               |                       | 77                            |                        |
| Dry Creek @ Rd 18 | Storm, RS  | 3/4/2008    |                           |                          |                          |                                     |                                          |                                     |                                 |                           |                     |                 |                       | 35                            |                        |
| Dry Creek @ Rd 18 | Irrigation | 4/29/2008   |                           |                          |                          |                                     | 6.8 (3.0)                                |                                     |                                 |                           |                     |                 |                       |                               |                        |
| Dry Creek @ Rd 18 | Irrigation | 5/27/2008   |                           |                          |                          |                                     | 5 (3.5)                                  |                                     |                                 |                           |                     |                 |                       |                               |                        |
| Dry Creek @ Rd 18 | Irrigation | 6/24/2008   |                           |                          |                          |                                     | 4 (2.6)                                  |                                     |                                 |                           |                     |                 |                       |                               |                        |

| SITE NAME             | SEASON     | SAMPLE DATE | OXYGEN, DISSOLVED, <7MG/L | PH, <6.5 AND > 8.5 UNITS | E. COLI, >235 MPN/100 ML | COPPER, DISSOLVED <sup>2</sup> µG/L | COPPER, TOTAL <sup>1</sup> , >1,300 µG/L | LEAD, TOTAL <sup>1</sup> , >15 µG/L | ZINC, TOTAL <sup>1</sup> , µG/L | CHLORPYRIFOS, >0.015 µG/L | DIAZINON, >0.1 µG/L | DIURON, >2 µG/L | C. DUBIA, (% CONTROL) | S. CAPRICORNUTUM, (% CONTROL) | H. AZTECA, (% CONTROL) |
|-----------------------|------------|-------------|---------------------------|--------------------------|--------------------------|-------------------------------------|------------------------------------------|-------------------------------------|---------------------------------|---------------------------|---------------------|-----------------|-----------------------|-------------------------------|------------------------|
| Dry Creek @ Rd 18     | Irrigation | 7/29/2008   |                           |                          |                          |                                     | 5.9 (1.5)                                |                                     |                                 |                           |                     |                 |                       |                               |                        |
| Dry Creek @ Rd 18     | Irrigation | 8/26/2008   | 5.82                      |                          |                          |                                     | 5.1 (1.3)                                | 0.36 (0.17)                         |                                 |                           |                     |                 |                       |                               |                        |
| Dry Creek @ Rd 18     | Sediment   | 8/28/2008   | 5.62                      |                          |                          |                                     |                                          |                                     |                                 |                           |                     |                 |                       |                               | 89                     |
| Dry Creek @ Rd 22     | Irrigation | 4/29/2008   |                           | 8.8                      |                          |                                     | 5.2 (3.0)                                |                                     |                                 |                           |                     |                 |                       |                               |                        |
| Dry Creek @ Rd 22     | Irrigation | 5/27/2008   |                           |                          |                          |                                     | 5.7 (4.1)                                |                                     |                                 |                           |                     |                 |                       |                               |                        |
| Dry Creek @ Rd 22     | Irrigation | 6/24/2008   |                           |                          |                          |                                     | 6.5 (2.6)                                |                                     |                                 |                           |                     |                 |                       |                               |                        |
| Dry Creek @ Rd 22     | Irrigation | 7/29/2008   |                           |                          |                          |                                     | 7 (2.4)                                  |                                     |                                 |                           |                     |                 |                       |                               |                        |
| Dry Creek @ Rd 28 1/2 | Irrigation | 7/29/2008   |                           |                          |                          |                                     | 5.3 (1.7)                                |                                     |                                 |                           |                     |                 |                       |                               |                        |
| Dry Creek @ Rd 22     | Irrigation | 8/26/2008   |                           |                          |                          |                                     | 6.5 (1.5)                                |                                     |                                 |                           |                     |                 |                       |                               |                        |
| Dry Creek @ Rd 22     | Irrigation | 9/30/2008   | 3.97                      |                          |                          |                                     | 36 (8.2)                                 |                                     |                                 |                           |                     |                 |                       |                               |                        |
| Dry Creek @ Rd 18     | Winter     | 1/18/2011   |                           |                          |                          | 12 (8.65)                           |                                          |                                     |                                 |                           |                     |                 |                       |                               |                        |
| Dry Creek @ Rd 18     | Storm      | 2/17/2011   |                           | 8.71                     |                          |                                     |                                          |                                     |                                 |                           |                     |                 |                       |                               |                        |
| Dry Creek @ Rd 18     | Irrigation | 4/19/2011   |                           |                          |                          | 3.9 (3.20)                          |                                          |                                     |                                 |                           |                     |                 |                       |                               |                        |
| Dry Creek @ Rd 18     | Irrigation | 5/17/2011   |                           |                          |                          | 2.9 (1.36)                          |                                          |                                     |                                 |                           |                     |                 |                       |                               |                        |
| Dry Creek @ Rd 18     | Irrigation | 6/21/2011   |                           |                          |                          | 4.8 (1.03)                          |                                          |                                     |                                 |                           |                     |                 |                       |                               |                        |
| Dry Creek @ Rd 18     | Irrigation | 7/19/2011   |                           | 5.88                     |                          | 4.3 (0.81)                          |                                          |                                     |                                 |                           |                     |                 |                       |                               |                        |
| Dry Creek @ Rd 18     | Irrigation | 8/16/2011   |                           |                          |                          | 5.0 (0.81)                          |                                          |                                     |                                 |                           |                     |                 |                       |                               |                        |
| Dry Creek @ Rd 18     | Irrigation | 9/13/2011   |                           |                          |                          | 4.6 (1.03)                          |                                          |                                     |                                 |                           |                     |                 |                       |                               |                        |
| Constituent Priority  |            |             | E                         | E                        | E                        | C                                   | C                                        | E                                   | NP                              | A/B                       | A/B                 | C               | NP                    | D                             | D                      |

<sup>1</sup>Total metal WQTL variable based on hardness.

<sup>2</sup>Dissolved metals not analyzed until October 2008; WQTL variable based on hardness.

NP – Not Prioritized; less than two exceedances within three consecutive monitoring years and currently no TMDL.

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## 2007-2011 Management Plan Monitoring Results

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All monitoring results for high priority management plan constituents in the Dry Creek @ Rd 18 subwatershed are listed in Table IX-6. These constituents include chlorpyrifos, diazinon, copper, diuron, *S. capricornutum* toxicity, *H. azteca* toxicity, and lead.

Chlorpyrifos first exceeded the WQTL in July 2006. The chlorpyrifos and diazinon TMDL for the Lower San Joaquin River was approved in October of 2007 and chlorpyrifos exceeded the WQTL for a second time in samples collected in April 2007. Consequently, the constituent was added to the Dry Creek management plan. Normal Monitoring and upstream MPM in 2008 (April and July) at Dry Creek @ Rd 22 for chlorpyrifos did not result in any chlorpyrifos exceedances. There was an exceedance of the chlorpyrifos WQTL in samples collected in February 2008 from Dry Creek @ Rd 18. Chlorpyrifos did not exceed the WQTL during 2011 MPM (Table IX-6).

Diazinon first exceeded the WQTL in February 2007 and was added to the Dry Creek management plan the following year. Management Plan Monitoring did not occur for diazinon in 2008, but Normal Monitoring resulted in a second exceedance of diazinon February 2008. The constituent was not detected in samples collected for MPM during February 2011 (Table IX-6).

Copper is a major constituent of concern for the Dry Creek subwatershed as it has exceeded the WQTL during almost every event for which samples were analyzed for copper, beginning in May 2006. Additional MPM for copper occurred during 2007 (June-September); exceedances of the copper WQTL occurred during Normal Monitoring (April-August) and MPM events (June-August); the site was dry during both events in September 2007. Upstream MPM occurred at Dry Creek @ Rd 22 in 2008 (April-September) and Dry Creek @ Rd 28 ½ (July and September) and resulted in copper exceedances in all samples collected from Dry Creek @ Rd 22 and in the July sample collected from Dry Creek @ Rd 28 ½ (@ Rd 28 ½ was dry in September). Normal Monitoring during 2008 resulted in copper exceedances for all months except when the site was dry in September. Management Plan Monitoring in 2011 (January, February, April-September) resulted in exceedances during January and April through September (Table IX-6).

Diuron exceeded the WQTL twice in 2008 (January and February) and was subsequently added to the Dry Creek management plan. Management Plan Monitoring during 2011 (January and February) detected diuron but the concentrations were below the WQTL.

Toxicity to *S. capricornutum* first occurred during May 2007 but did not recur again until 2008 storm season (January and February). The constituent was thereafter added to the Dry Creek @ Rd 18 management plan and MPM was scheduled during 2011 (January, February, and May); no toxicity occurred (Table IX-6).

Sediment toxicity first occurred in samples collected during May 2006 and occurred again in samples collected during August 2008. Management Plan Monitoring occurred during 2011 (March and September) but no toxicity to *H. azteca* occurred (Table IX-6).

Three lead exceedances occurred during 2006, which was the first year samples were analyzed for metals, and lead was consequently added to the Dry Creek @ Rd 18 management plan. Lead is not applied by agriculture, therefore it is categorized as a priority (E) constituent within the Dry Creek @ Rd 18 subwatershed management plan, and MPM for the constituent is not required. Management Plan Monitoring for lead did not occur during 2007 or 2008. Under the 2008 MRPP, the Coalition began analyzing separately for total and dissolved fractions of metals and believes this more accurate description of water quality may reduce the frequency of lead exceedances. To better characterize the water quality in Dry Creek with respect to lead, MPM for lead occurred during 2011 (May, June, August, and September), and there were no exceedances of the WQTL for total or dissolved lead (Table IX-6).

Management Plan Monitoring is scheduled for 2012 for all the above constituents during months of historical exceedances.

**Table IX-6. Dry Creek @ Rd 18 site subwatershed monitoring results for high priority constituents (2007-2011).**

Exceedance values are in bold. Resampling (RS) due to toxicity not included in table.

| MONTH:                             |                                              | JAN       | FEB     | MAR     | APR        | MAY        | JUN        | JUL        | AUG        | SEP        |
|------------------------------------|----------------------------------------------|-----------|---------|---------|------------|------------|------------|------------|------------|------------|
| <b>2007 NM<br/>(@ Rd 18)</b>       | Date                                         | NA        | NA      | NA      | 4/24/07    | 5/29/07    | 6/26/07    | 7/24/07    | 8/21/07    | 9/18/07    |
|                                    | Copper (µg/L)                                | NA        | NA      | NA      | <b>17</b>  | <b>4.7</b> | <b>3.6</b> | <b>5.6</b> | <b>5.5</b> | Site dry   |
| <b>2007 MPM A<br/>(@ Rd 18)</b>    | Date                                         | NA        | NA      | NA      | NA         | NA         | 6/19/07    | 7/31/07    | 8/28/07    | 9/25/07    |
|                                    | Copper (µg/L)                                | NA        | NA      | NA      | NA         | NA         | <b>4.9</b> | <b>4.5</b> | <b>4.3</b> | Site dry   |
| <b>2008 NM<br/>(@ Rd 18)</b>       | Date                                         | NA        | NA      | NA      | 4/29/08    | 5/27/08    | 6/24/08    | 7/29/08    | 8/26/08    | 9/30/08    |
|                                    | Copper (µg/L)                                | NA        | NA      | NA      | <b>6.8</b> | <b>5</b>   | <b>4</b>   | <b>5.9</b> | <b>5.1</b> | Site dry   |
|                                    | Chlorpyrifos (µg/L)                          | NA        | NA      | NA      | <0.003     | <0.003     | <0.003     | <0.003     | <0.003     | Site dry   |
| <b>2008 MPM US<br/>(@ Rd 22)</b>   | Date                                         | NA        | NA      | NA      | 4/29/08    | 5/27/08    | 6/24/08    | 7/29/08    | 8/26/08    | 9/30/08    |
|                                    | Copper (µg/L)                                | NA        | NA      | NA      | <b>5.2</b> | <b>5.7</b> | <b>6.5</b> | <b>7</b>   | <b>6.5</b> | <b>36</b>  |
| <b>2008 MPM US<br/>(@ Rd 28 ½)</b> | Date                                         | NA        | NA      | NA      | NA         | NA         | NA         | 7/29/08    | NA         | 9/30/08    |
|                                    | Copper (µg/L)                                | NA        | NA      | NA      | NA         | NA         | NA         | <b>5.3</b> | NA         | Site dry   |
| <b>2011 MPM<br/>(@ Rd 18)</b>      | Date                                         | 1/18/11   | 2/17/11 | 3/17/11 | 4/19/11    | 5/17/11    | 6/21/11    | 7/19/11    | 8/16/11    | 9/13/11    |
|                                    | Copper, dissolved (µg/L)                     | <b>12</b> | 11      | NA      | <b>3.9</b> | <b>2.9</b> | <b>4.8</b> | <b>4.3</b> | <b>5.0</b> | <b>4.6</b> |
|                                    | Copper, total (µg/L)                         | 15        | 14      | NA      | 5.7        | 4.8        | 6.6        | 5.7        | 7.4        | 7.1        |
|                                    | Lead, dissolved (µg/L)                       | NA        | NA      | NA      | NA         | 0.05       | 0.06       | NA         | <0.03      | 0.03       |
|                                    | Lead, total (µg/L)                           | NA        | NA      | NA      | NA         | 0.17       | 0.11       | NA         | 0.09       | 0.08       |
|                                    | Chlorpyrifos (µg/L)                          | NA        | <0.003  | NA      | <0.003     | NA         | NA         | <0.003     | NA         | NA         |
|                                    | Diazinon (µg/L)                              | NA        | <0.004  | NA      | NA         | NA         | NA         | NA         | NA         | NA         |
|                                    | Diuron (µg/L)                                | 0.3       | 0.77    | NA      | NA         | NA         | NA         | NA         | NA         | NA         |
|                                    | <i>S. capricornutum</i> toxicity (% Control) | 896       | 347     | NA      | NA         | 718        | NA         | NA         | NA         | NA         |
|                                    | <i>H. azteca</i> toxicity (% Control)        | NA        | NA      | 98      | NA         | NA         | NA         | NA         | NA         | 105        |

A – Additional MPM conducted in 2007 only.

MPM – Management Plan Monitoring (see Table 4 for MPM schedule)

NA – Not applicable. No monitoring occurred on this date for this constituent.

NM – Normal Monitoring

US – Upstream MPM conducted in 2008 only.

## Load Calculations

Loads have been calculated for all chlorpyrifos, copper, diazinon and diuron detections in the site subwatershed based on the following formula (Table IX-7):

$$\text{Load} = \text{Discharge (cfs)} \times 28.317\text{L/ft}^3 \times \text{Concentration (mg/L} \times 1000 \text{ or } \mu\text{g/L)}.$$

The load values for constituents in this report represent instantaneous loads only. These values should not be used to extrapolate loading over any period of time (e.g. weekly, monthly, seasonal or annual).

The primary purpose for reporting instantaneous loads is to provide a normalization of the concentrations by flow for various constituents at the time the samples were collected.

**Table IX-7. Dry Creek @ Rd 18 site subwatershed instantaneous load calculations for chlorpyrifos, copper, diazinon, and diuron.**

Upstream site is italicized. Sorted by analyte and date.

| SAMPLE SITE                 | ANALYTE NAME  | SAMPLE DATE     | DISCHARGE CFS | CONCENTRATION $\mu\text{G/L}$ | LOADING RATE $\mu\text{G/SEC}$ |
|-----------------------------|---------------|-----------------|---------------|-------------------------------|--------------------------------|
| Dry Creek @ Rd 18           | Chlorpyrifos  | 07/11/06        | 11.77         | 0.077                         | 25.66                          |
| Dry Creek @ Rd 18           | Chlorpyrifos  | 04/24/07        | 0             | 0.017                         | 0                              |
| Dry Creek @ Rd 18           | Chlorpyrifos  | 07/24/07        | 13.39         | 0.008                         | 3.03                           |
| Dry Creek @ Rd 18           | Chlorpyrifos  | 01/25/08        | 2.56          | 0.01                          | 0.72                           |
| Dry Creek @ Rd 18           | Chlorpyrifos  | 02/25/08        | 1.44          | 0.034                         | 1.39                           |
| Dry Creek @ Rd 18           | Copper        | 05/16/06        | 5.35          | 4.3                           | 651.43                         |
| Dry Creek @ Rd 18*          | Copper        | 06/13/06        | 4.02          | 5.5                           | 626.09                         |
| Dry Creek @ Rd 18           | Copper        | 06/13/06        | 4.02          | 6.3                           | 717.16                         |
| Dry Creek @ Rd 18           | Copper        | 07/11/06        | 11.77         | 4.1                           | 1366.49                        |
| Dry Creek @ Rd 18           | Copper        | 08/08/06        | 18.85         | 4.6                           | 2455.37                        |
| Dry Creek @ Rd 18           | Copper        | 09/12/06        | 14.97         | 6.1                           | 2585.82                        |
| Dry Creek @ Rd 18           | Copper        | 04/24/07        | 0             | 17                            | 0                              |
| Dry Creek @ Rd 18           | Copper        | 05/29/07        | 12.51         | 4.7                           | 1664.95                        |
| Dry Creek @ Rd 18           | Copper        | 06/19/07        | 7.33          | 4.9                           | 1017.06                        |
| Dry Creek @ Rd 18           | Copper        | 06/26/07        | 19.06         | 3.6                           | 1943.00                        |
| Dry Creek @ Rd 18           | Copper        | 07/24/07        | 13.39         | 5.6                           | 2123.32                        |
| Dry Creek @ Rd 18           | Copper        | 07/31/07        | 5.29          | 4.5                           | 674.09                         |
| Dry Creek @ Rd 18           | Copper        | 08/21/07        | 4.7           | 5.5                           | 731.99                         |
| Dry Creek @ Rd 18*          | Copper        | 08/21/07        | 4.7           | 6.2                           | 825.16                         |
| Dry Creek @ Rd 18           | Copper        | 08/28/07        | 2.66          | 4.3                           | 323.89                         |
| Dry Creek @ Rd 18           | Copper        | 01/25/08        | 2.56          | 20                            | 1449.83                        |
| Dry Creek @ Rd 18           | Copper        | 02/25/08        | 1.44          | 33                            | 1345.62                        |
| Dry Creek @ Rd 18           | Copper        | 04/29/08        | 5.2           | 6.8                           | 1001.29                        |
| Dry Creek @ Rd 18*          | Copper        | 04/29/08        | 5.2           | 6.9                           | 1016.01                        |
| Dry Creek @ Rd 18           | Copper        | 05/27/08        | 16.26         | 5                             | 2302.17                        |
| Dry Creek @ Rd 18           | Copper        | 06/24/08        | 7.47          | 4                             | 846.11                         |
| Dry Creek @ Rd 18           | Copper        | 07/29/08        | 44.11         | 5.9                           | 7369.47                        |
| Dry Creek @ Rd 18*          | Copper        | 08/26/08        | 14.86         | 4.8                           | 2019.79                        |
| Dry Creek @ Rd 18           | Copper        | 08/26/08        | 14.86         | 5.1                           | 2146.03                        |
| <i>Dry Creek at Road 22</i> | <i>Copper</i> | <i>09/30/08</i> | <i>0</i>      | <i>36</i>                     | <i>0</i>                       |
| Dry Creek @ Rd 18           | Copper        | 01/18/11        | 2.2           | 15                            | 934.46                         |
| Dry Creek @ Rd 18           | Copper        | 02/17/11        | 0.3           | 14                            | 118.93                         |



| SAMPLE SITE        | ANALYTE NAME | SAMPLE DATE | DISCHARGE CFS | CONCENTRATION µG/L | LOADING RATE µG/SEC |
|--------------------|--------------|-------------|---------------|--------------------|---------------------|
| Dry Creek @ Rd 18  | Copper       | 04/19/11    | 22.83         | 5.7                | 3684.92             |
| Dry Creek @ Rd 18  | Copper       | 05/17/11    | 24.25         | 4.8                | 3296.10             |
| Dry Creek @ Rd 18  | Copper       | 06/21/11    | 13.7          | 6.6                | 2560.42             |
| Dry Creek @ Rd 18  | Copper       | 07/19/11    | 18.46         | 5.7                | 2979.57             |
| Dry Creek @ Rd 18  | Copper       | 08/16/11    | 41.86         | 7.4                | 8771.59             |
| Dry Creek @ Rd 18  | Copper       | 09/13/11    | 25.13         | 7.1                | 5052.40             |
| Dry Creek @ Rd 18  | Copper (D)   | 01/18/11    | 2.2           | 12                 | 747.57              |
| Dry Creek @ Rd 18  | Copper (D)   | 02/17/11    | 0.3           | 11                 | 93.45               |
| Dry Creek @ Rd 18  | Copper (D)   | 04/19/11    | 22.83         | 3.9                | 2521.26             |
| Dry Creek @ Rd 18  | Copper (D)   | 05/17/11    | 24.25         | 2.9                | 1991.39             |
| Dry Creek @ Rd 18  | Copper (D)   | 06/21/11    | 13.7          | 4.8                | 1862.13             |
| Dry Creek @ Rd 18  | Copper (D)   | 07/19/11    | 18.46         | 4.3                | 2247.75             |
| Dry Creek @ Rd 18  | Copper (D)   | 08/16/11    | 41.86         | 5                  | 5926.75             |
| Dry Creek @ Rd 18  | Copper (D)   | 09/13/11    | 25.13         | 4.6                | 3273.39             |
| Dry Creek @ Rd 18  | Diazinon     | 01/25/08    | 2.56          | 0.049              | 3.55                |
| Dry Creek @ Rd 18  | Diazinon     | 02/25/08    | 1.44          | 0.24               | 9.79                |
| Dry Creek @ Rd 18  | Diuron       | 01/25/08    | 2.56          | 21                 | 1522.32             |
| Dry Creek @ Rd 18  | Diuron       | 02/25/08    | 1.44          | 2.1                | 85.63               |
| Dry Creek @ Rd 18* | Diuron       | 04/29/08    | 5.2           | 0.36               | 53.01               |
| Dry Creek @ Rd 18  | Diuron       | 04/29/08    | 5.2           | 0.37               | 54.48               |
| Dry Creek @ Rd 18  | Diuron       | 01/18/11    | 2.2           | 0.3                | 18.69               |
| Dry Creek @ Rd 18  | Diuron       | 02/17/11    | 0.3           | 0.77               | 6.54                |

\*Field duplicate

### Source Identification and Outreach

The Coalition focuses its efforts on applied pesticides and considers past monitoring results and associated PUR data to address source identification and determine an outreach strategy. During 2007 and 2008, the Coalition conducted additional and upstream MPM during the months when exceedances historically occurred to better characterize water quality in the subwatershed. Management Plan Monitoring occurred at the site during 2011. The Coalition also reviews PUR data to determine the most frequent crop type and timing associated with pesticide applications. From these actions, the Coalition developed an outreach strategy, which is detailed in the following sections.

In the Coalition's approved Management Plan, Dry Creek @ Rd 18 is a high priority subwatershed as of 2011 and will remain as such through 2013. The Coalition will actively engage in grower outreach and education to address the Dry Creek management plan's highest priority constituents. The Coalition organized grower meetings and mailings to educate growers about management practices and their importance in achieving acceptable water quality. Grower meetings with targeted members occurred throughout the irrigation season of 2011 to inform growers about management practices as well as to assess current and expected future implementation of additional management practices. Follow up with the targeted members will occur following the 2012 irrigation season to determine if additional management practices were implemented and if any are planned to be implemented in the 2013. Management Plan Monitoring will continue through 2013 as necessary to assess the effect of outreach on water quality.

### Priority A/B Constituents

Chlorpyrifos and diazinon are listed as A/B constituent for the Dry Creek @ Rd 18 subwatershed.

#### Chlorpyrifos

The WQTL for chlorpyrifos (0.015 µg/L) was exceeded three times in the Dry Creek subwatershed (July 2006, April 2007, and February 2008, Table IX-5).

Orchards and vineyards are the primary crops in the Dry Creek subwatershed. Chlorpyrifos can be applied to vineyards in the fall during post-harvest applications, to orchards in the winter months during dormant sprays, and throughout the irrigation season to numerous crops.

To determine the most appropriate strategy for outreach, the Coalition reviewed PUR data from the subwatershed for the number of monthly chlorpyrifos applications and pounds of active ingredient applied, and the acres treated (Table IX-8 and Figure IX-2). The greatest amount of chlorpyrifos use occurred in 2007 (4,392 lbs AI) and has since decreased significantly (although PUR data are available only through June 2011). Chlorpyrifos applications typically peak in the months of March, July, and October; though applications do occur throughout the year in the Dry Creek @ Rd 18 subwatershed.

The Coalition also uses PUR data to determine which crops receive the most applications of chlorpyrifos. In the Dry Creek subwatershed, almonds (7,854 lbs AI) and grapes (3,500 lbs AI) received the largest amount of chlorpyrifos from 2005 through 2011 (Table IX-9). The most common product containing chlorpyrifos used within this subwatershed was Lorsban (Table IX-9).

**Table IX-8. Dry Creek @ Rd 18 site subwatershed chlorpyrifos applications, lbs AI applied, and acres treated by month (2005-2011).**

PUR data available through June 2011 for Madera County. If month is not included in table, no applications were made.

| MONTH/YEAR      | NUMBER OF CHLORPYRIFOS APPLICATION | POUNDS OF AI APPLIED | ACRES TREATED |
|-----------------|------------------------------------|----------------------|---------------|
| January, 2005   | 4                                  | 175.1                | 92.0          |
| March, 2005     | 3                                  | 124.1                | 62.0          |
| May, 2005       | 8                                  | 68.1                 | 268.0         |
| June, 2005      | 2                                  | 40.2                 | 40.1          |
| July, 2005      | 8                                  | 523.4                | 322.0         |
| August, 2005    | 9                                  | 230.0                | 150.7         |
| May, 2006       | 4                                  | 255.9                | 155.0         |
| June, 2006      | 6                                  | 165.2                | 236.8         |
| July, 2006      | 18                                 | 2413.5               | 1288.8        |
| August, 2006    | 5                                  | 220.8                | 244.3         |
| September, 2006 | 2                                  | 58.0                 | 58.1          |
| December, 2006  | 2                                  | 1.0                  | 1.1           |
| January, 2007   | 1                                  | 74.3                 | 40.0          |
| February, 2007  | 2                                  | 61.4                 | 30.8          |
| May, 2007       | 2                                  | 236.6                | 100.0         |
| June, 2007      | 1                                  | 65.8                 | 33.0          |
| July, 2007      | 21                                 | 3218.2               | 1605.2        |

| MONTH/YEAR               | NUMBER OF CHLORPYRIFOS<br>APPLICATION | POUNDS OF AL APPLIED | ACRES TREATED |
|--------------------------|---------------------------------------|----------------------|---------------|
| August,2007              | 4                                     | 79.8                 | 144.0         |
| October, 2007            | 5                                     | 655.5                | 328.7         |
| January, 2008            | 2                                     | 70.0                 | 35.0          |
| July, 2008               | 3                                     | 428.8                | 220.0         |
| March, 2009              | 2                                     | 540.5                | 270.1         |
| April, 2009              | 1                                     | 37.0                 | 37.0          |
| July, 2009               | 4                                     | 135.0                | 167.0         |
| August, 2009             | 1                                     | 20.0                 | 16.5          |
| October, 2009            | 4                                     | 217.1                | 115.6         |
| July, 2010               | 6                                     | 178.7                | 107.0         |
| August, 2010             | 3                                     | 258.0                | 126.5         |
| October, 2010            | 6                                     | 1652.6               | 880.0         |
| November, 2010           | 5                                     | 333.1                | 177.4         |
| March, 2011              | 1                                     | 37.6                 | 40.0          |
| <b>Summaries by Year</b> |                                       |                      |               |
| 2005 Total               | 34                                    | 1160.8               | 934.8         |
| 2006 Total               | 37                                    | 3114.3               | 1984.1        |
| 2007 Total               | 36                                    | 4391.5               | 2281.7        |
| 2008 Total               | 5                                     | 498.8                | 255.0         |
| 2009 Total               | 12                                    | 949.6                | 606.2         |
| 2010 Total               | 20                                    | 2422.5               | 1290.9        |
| 2011 Total               | 1                                     | 37.6                 | 40.0          |
| <b>Total</b>             | <b>145</b>                            | <b>12575.1</b>       | <b>7392.7</b> |

**Figure IX-2. Dry Creek @ Rd 18 site subwatershed lbs chlorpyrifos applied by month (2005-2011).**

Asterisk (\*) denotes months with exceedances. PUR data available through June 2011 for Madera County.

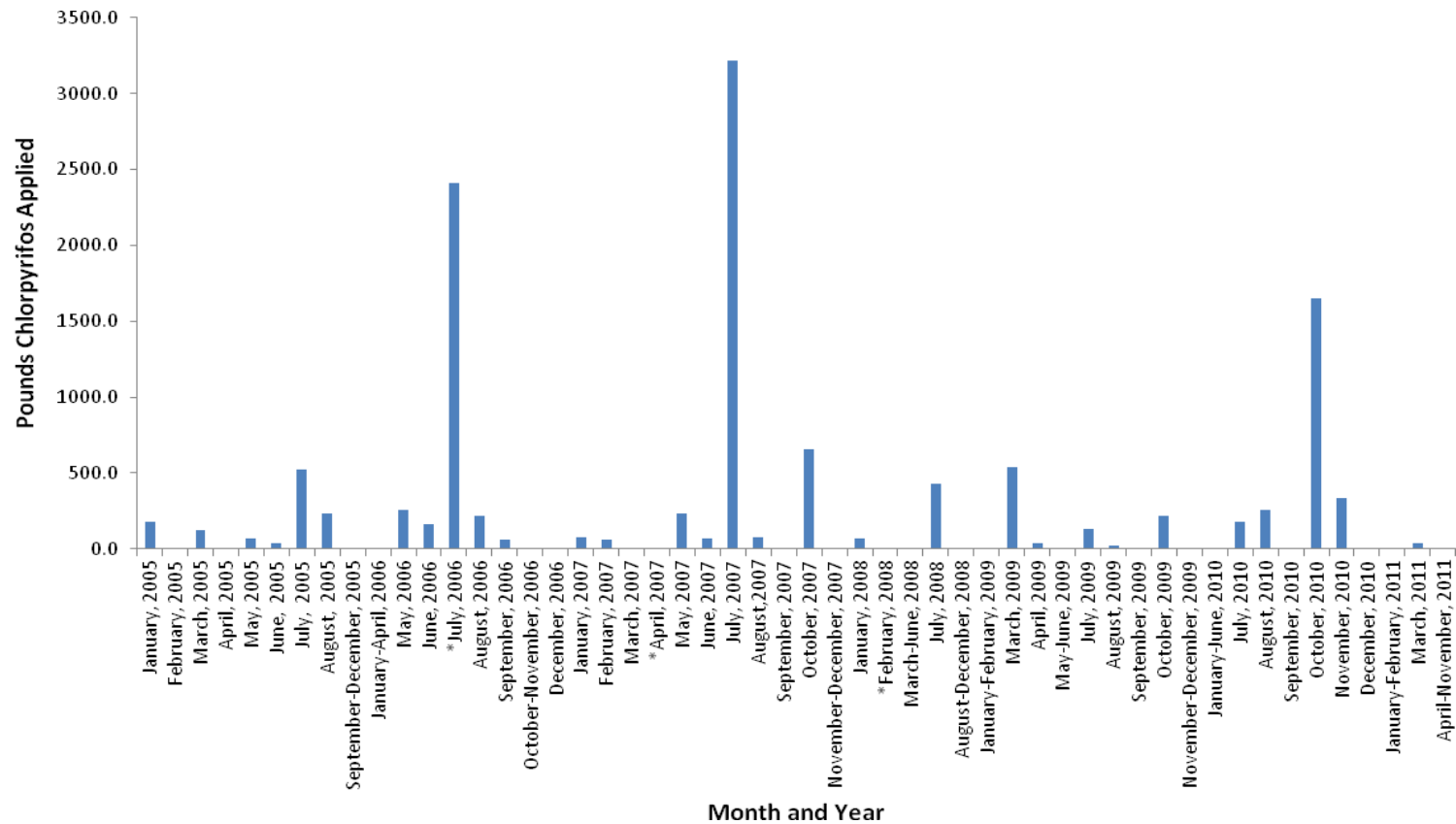


**Table IX-9. Dry Creek @ Rd 18 site subwatershed chlorpyrifos PUR data (2005-2011).**

PUR data available through June 2011 for Madera County.

| CHEMICAL NAME                                                      | COMMODITY                                    | PRODUCT NAME                  | LBS AL APPLIED |
|--------------------------------------------------------------------|----------------------------------------------|-------------------------------|----------------|
| CHLORPYRIFOS                                                       | ALFALFA (FORAGE - FODDER) (ALFALFA HAY)      | LOCK-ON INSECTICIDE           | 30.0           |
|                                                                    |                                              | LORSBAN-4E                    | 112.2          |
|                                                                    | ALMOND                                       | GOVERN 4E INSECTICIDE         | 1122.1         |
|                                                                    |                                              | LORSBAN 4E INSECTICIDE        | 320.0          |
|                                                                    |                                              | LORSBAN 4E-HF                 | 748.2          |
|                                                                    |                                              | LORSBAN ADVANCED              | 37.6           |
|                                                                    |                                              | LORSBAN-4E                    | 2487.2         |
|                                                                    |                                              | NUFOS 4E                      | 1270.1         |
|                                                                    |                                              | WARHAWK                       | 78.8           |
|                                                                    |                                              | WHIRLWIND                     | 1789.7         |
|                                                                    |                                              | CORN (FORAGE - FODDER)        | LORSBAN 4E-HF  |
|                                                                    | LORSBAN-4E                                   |                               | 40.0           |
|                                                                    | GRAPES (WINE)                                | LORSBAN 4E-HF                 | 716.9          |
|                                                                    |                                              | LORSBAN ADVANCED              | 2202.9         |
|                                                                    |                                              | LORSBAN-4E                    | 580.5          |
|                                                                    | N-GRNHS GRWN CUT FLWRS OR GREENS             | WHITMIRE PT 1325 ME DURAGUARD | 2.7            |
|                                                                    | ORANGE (ALL OR UNSPEC)                       | LORSBAN 4E-HF                 | 340.6          |
|                                                                    | TANGELO                                      | LORSBAN 4E-HF                 | 119.6          |
|                                                                    | TANGERINE (MANDARIN, SATSUMA, MURCOTT, ETC.) | LORSBAN ADVANCED              | 10.3           |
|                                                                    | WALNUT (ENGLISH WALNUT, PERSIAN WALNUT)      | GOVERN 4E INSECTICIDE         | 43.0           |
|                                                                    |                                              | LORSBAN 4E-HF                 | 164.5          |
|                                                                    |                                              | LORSBAN ADVANCED              | 36.6           |
|                                                                    |                                              | LORSBAN-4E                    | 86.0           |
| ALFALFA-Total Pounds Chlorpyrifos Applied                          |                                              |                               | 142.3          |
| ALMOND-Total Pounds Chlorpyrifos Applied                           |                                              |                               | 7853.7         |
| CORN-Total Pounds Chlorpyrifos Applied                             |                                              |                               | 275.3          |
| GRAPES -Total Pounds Chlorpyrifos Applied                          |                                              |                               | 3500.2         |
| N-GRNHS GRWN CUT FLWRS OR GREENS-Total Pounds Chlorpyrifos Applied |                                              |                               | 2.7            |
| ORANGE-Total Pounds Chlorpyrifos Applied                           |                                              |                               | 340.6          |
| TANGELO-Total Pounds Chlorpyrifos Applied                          |                                              |                               | 119.6          |
| TANGERINE-Total Pounds Chlorpyrifos Applied                        |                                              |                               | 10.3           |
| WALNUT-Total Pounds Chlorpyrifos Applied                           |                                              |                               | 330.2          |
| Total Pounds Chlorpyrifos Applied (2005-2011)                      |                                              |                               | 12575.1        |

The Coalition noted in its 2008 Management Plan that the chlorpyrifos concentrations found in Dry Creek @ Rd 18 were most likely the result of tailwater discharging chlorpyrifos to the creek. Pesticide Use Report data indicated that the July 2006 exceedance coincided with a large number of applications, whereas the other two exceedances occurred following periods of comparably little or no applications. Consequently, tailwater runoff is suspected of transporting previously applied chlorpyrifos from fields to the creek. In addition, the relatively large concentration of chlorpyrifos in the July 2006 exceedance indicates the source is not likely to only be spray drift. The Coalition encouraged growers to review their irrigation techniques as well as evaluate their potential for tailwater and/or storm water runoff to transport the pesticide to surface waterways.

Since 2007, general Coalition outreach included grower meetings and the mailing/distribution of information. A complete list of coalition outreach during 2011 is provided in the Actions Taken to Address Water Quality Exceedances section of the 2012 AMR (Table 46, page 142). Focused outreach is directed at growers whose parcels are in the direct drainage area of the subwatershed and who applied chlorpyrifos. From these criteria, the Coalition compiled a list of targeted growers.

The Coalition conducted individual meetings with targeted growers in the third priority subwatersheds during the summer and fall of 2011. Although meetings focused mainly on chlorpyrifos exceedances, all water quality results were reviewed and discussed including diazinon, copper, diuron, *H. azteca* toxicity, *S. capricornutum* toxicity, DO, *E. coli*, lead, and pH. The Coalition contacted 17 members accounting for 4,710 acres of targeted direct drainage.

Grower surveys completed at the meetings documenting members' current practices and indicating which recommended practices growers anticipate implementing in the upcoming years have been compiled and assessed by the Coalition in the Third Priority Subwatersheds Summary of Management Practices section of this report. The Coalition anticipates growers being able to implement recommended practices during the irrigation season of 2012. Follow up meetings with targeted growers who were recommended practices will occur in the winter and/or spring of 2012 (depending on the timing of the initial contact with the grower) to determine what additional management practices were implemented.

Management Plan Monitoring will continue in 2012 at Dry Creek @ Rd 18 during months of historical exceedances. The Coalition plans to conduct MPM through 2013 during months of previous exceedances to evaluate improvements in water quality as recommended management practice implementation occurs.

### **Diazinon**

The WQTL for diazinon (0.10 µg/L) was exceeded twice in this subwatershed (February 2007 and 2008, Table IX-5).

Diazinon is often used for dormant sprays and is applied to orchards during the winter.

The Coalition reviewed PUR data for the number of monthly diazinon applications and pounds of active ingredient applied, and the acres treated (Table IX-10, Figure IX-3). Aside from 2010, diazinon use increased in the Dry Creek @ Rd 18 subwatershed since 2007 and the greatest amount of pounds applied is in 2011 (567 lbs AI), even though PUR data are available only through June 2011. However, the number of acres receiving application is up significantly in 2011, and ratio of lbs AI applied per acre is lower in 2011 compared to 2009, 2007, and 2005. There were no exceedances in 2009 and 2011 despite the increased use (no exceedances in 2010, but use was very minimal). Diazinon use generally occurs between December and March for dormant sprays, but diazinon was applied in the early

irrigation season in the Dry Creek @ Rd 18 subwatershed. Almond orchards receive the most pounds of diazinon (1,099 lbs AI) in the Dry Creek @ Rd 18 subwatershed (Table IX-11).

**Table IX-10. Dry Creek @ Rd 18 site subwatershed diazinon applications, lbs AI applied, and acres treated by month (2005-2011).**

PUR data available through June 2011 for Madera County. If month is not included in table, no applications were made.

| MONTH/YEAR               | NUMBER OF DIAZINON APPLICATIONS | POUNDS OF AI APPLIED | ACRES TREATED |
|--------------------------|---------------------------------|----------------------|---------------|
| January, 2005            | 4                               | 127.9                | 64.0          |
| February, 2005           | 2                               | 154.7                | 77.4          |
| June, 2005               | 1                               | 100.0                | 59.0          |
| February, 2006           | 3                               | 149.9                | 110.0         |
| May, 2006                | 2                               | 110.0                | 94.0          |
| January, 2007            | 2                               | 179.6                | 89.0          |
| May, 2007                | 1                               | 92.5                 | 60.0          |
| January, 2008            | 1                               | 37.7                 | 19.0          |
| February, 2008           | 3                               | 387.0                | 780.0         |
| January, 2009            | 1                               | 142.9                | 72.0          |
| December, 2009           | 3                               | 296.5                | 149.4         |
| May, 2010                | 1                               | 16.6                 | 33.3          |
| January, 2011            | 2                               | 252.0                | 127.0         |
| May, 2011                | 3                               | 315.0                | 635.0         |
| <b>Summaries by Year</b> |                                 |                      |               |
| 2005 Total               | 7                               | 382.7                | 200.4         |
| 2006 Total               | 5                               | 259.9                | 204.0         |
| 2007 Total               | 3                               | 272.1                | 149.0         |
| 2008 Total               | 4                               | 424.7                | 799.0         |
| 2009 Total               | 4                               | 439.3                | 221.4         |
| 2010 Total               | 1                               | 16.6                 | 33.3          |
| 2011 Total               | 5                               | 567.1                | 762.0         |
| <b>Total</b>             | <b>29</b>                       | <b>2362.3</b>        | <b>2369.1</b> |

**Figure IX-3. Dry Creek @ Rd 18 site subwatershed lbs diazinon applied by month (2005-2011).**

Asterisk (\*) denotes months with exceedances. PUR data available through June 2011 for Madera County.

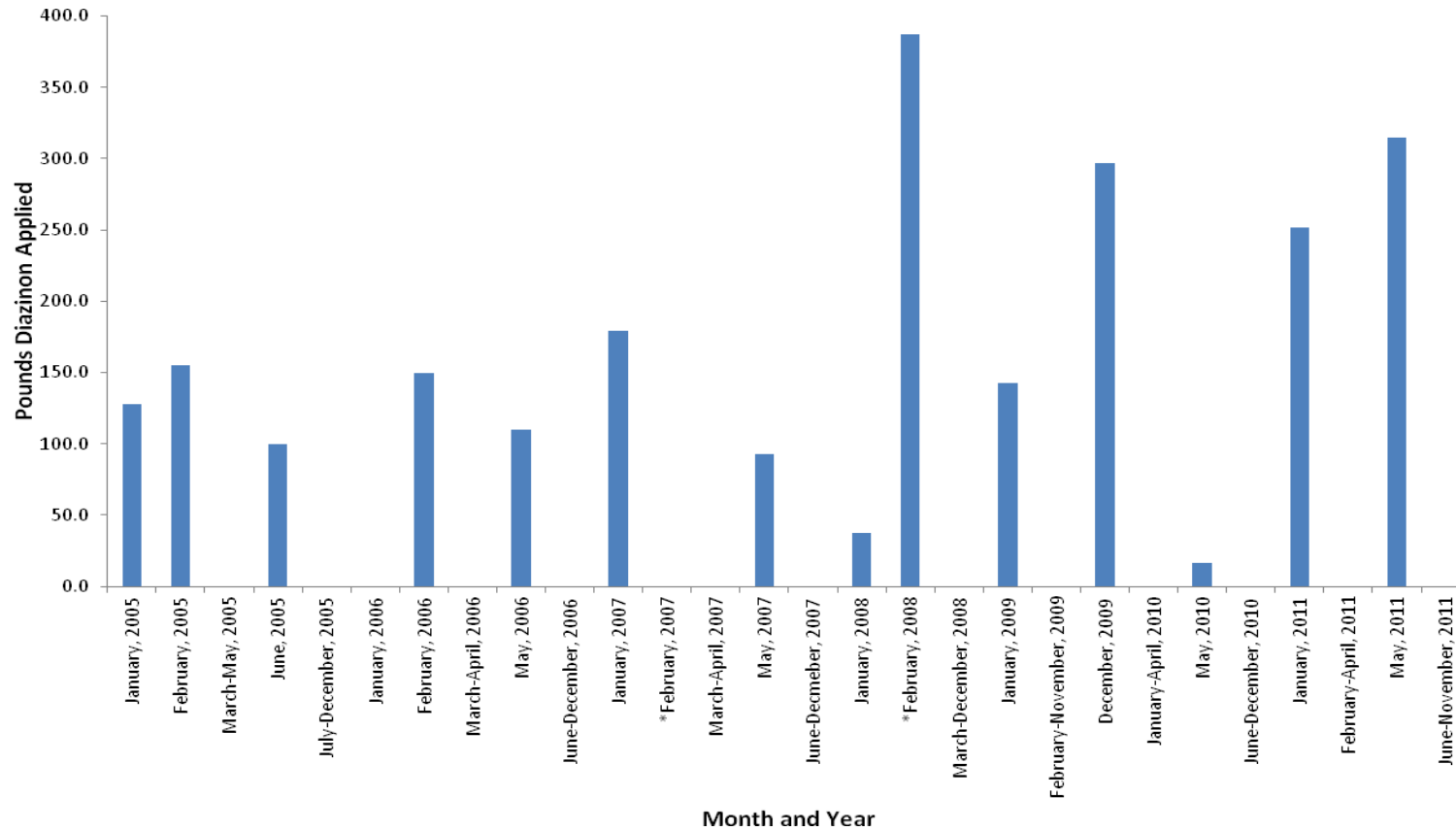




**Table IX-11. Dry Creek @ Rd 18 subwatershed diazinon PUR data (2005-2011).**

PUR data available through June 2011 for Madera County.

| CHEMICAL NAME                             | COMMODITY                                        | PRODUCT NAME                          | LBS AI APPLIED |
|-------------------------------------------|--------------------------------------------------|---------------------------------------|----------------|
| DIAZINON                                  | ALMOND                                           | CLEAN CROP DIAZINON AG500 INSECTICIDE | 253.3          |
|                                           |                                                  | DIAZINON AG 500                       | 691.4          |
|                                           |                                                  | GOWAN DIAZINON 4E                     | 154.7          |
|                                           | APRICOT                                          | DIAZINON AG 500                       | 75.4           |
|                                           |                                                  | DIAZINON AG500 INSECTICIDE            | 37.8           |
|                                           |                                                  | GOWAN DIAZINON 4E                     | 127.9          |
|                                           | FIG                                              | DIAZINON AG 500                       | 331.6          |
|                                           |                                                  | DIAZOL AG 500                         | 387.0          |
|                                           | PLUM (INCLUDES WILD PLUMS FOR HUMAN CONSUMPTION) | CLEAN CROP DIAZINON 14G               | 0.6            |
|                                           | PRUNE                                            | DIAZINON 50W                          | 100.0          |
|                                           |                                                  | DIAZOL 50 W                           | 192.5          |
|                                           | WATERMELONS                                      | RED-TOP DIAZINON 4 SPRAY              | 10.0           |
| ALMOND-Total Pounds Diazinon Applied      |                                                  |                                       | 1099.4         |
| APRICOT-Total Pounds Diazinon Applied     |                                                  |                                       | 241.2          |
| FIG-Total Pounds Diazinon Applied         |                                                  |                                       | 718.6          |
| PLUM -Total Pounds Diazinon Applied       |                                                  |                                       | 0.6            |
| PRUNE-Total Pounds Diazinon Applied       |                                                  |                                       | 292.5          |
| WATERMELONS-Total Pounds Diazinon Applied |                                                  |                                       | 10.0           |
| Total Pounds Diazinon Applied (2005-2011) |                                                  |                                       | 2362.3         |

The Coalition suspects the exceedances of diazinon to be most likely due to storm water runoff, but spray drift may also contribute to the concentrations in the waterway. There were two applications, totaling 180 lbs AI, in the month before the February 2007 diazinon exceedance and four applications, totaling 425 lbs AI applied, in January and February prior to the February 2008 exceedance. However there were no exceedances in other months with high application rates indicating the method of application may not be the largest contributor to concentrations in the waterways and other factors, such as storm events, may exert greater influence on the movement of diazinon to the creek. Therefore, the Coalition's focused outreach is to growers with the potential to discharge to the creek (including spray drift) and who have applied diazinon. Individual contacts within this subwatershed are described under the chlorpyrifos outreach section above and include discussions of diazinon exceedances as well as spray drift and storm water runoff management practices.

### *Priority C Constituents*

Copper and diuron are the priority C constituents listed for the Dry Creek @ Rd 18 subwatershed.

#### **Copper**

Copper concentrations exceeded the WQTL in almost every event in the Dry Creek subwatershed for which samples were analyzed for metals resulting in a total of 35 exceedances to date.

To determine an outreach strategy, the Coalition reviews PUR data. As is true across the Coalition region, copper is primarily applied in the fall and winter months in the Dry Creek @ Rd 18 subwatershed

(Table IX-12, Figure IX-4). Since copper does not degrade, copper applied during the fall and winter may be available for transport to surface waters during the irrigation season. The amount of copper applied within the subwatershed has decreased since its peak in 2006 (19,833 lbs AI) and, although complete PUR data are only available through June 2011, this trend of declining use appears to continue through 2011.

Almonds, grapes, tangerines and oranges received the most applications of copper in the Dry Creek subwatershed (Table IX-13). The most common product containing copper used within the subwatershed is Kocide (Table IX-13).

**Table IX-12. Dry Creek @ Rd 18 site subwatershed copper applications, lbs AI applied, and acres treated by month (2005-2011).**

PUR data available through June 2011 for Madera County. If month is not included in table, no applications were made.

| MONTH/YEAR      | NUMBER OF COPPER APPLICATIONS | POUNDS OF AI APPLIED | ACRES TREATED |
|-----------------|-------------------------------|----------------------|---------------|
| January, 2005   | 24                            | 3440.1               | 1057.1        |
| February, 2005  | 11                            | 749.4                | 131.4         |
| March, 2005     | 27                            | 2374.9               | 2184.2        |
| April, 2005     | 39                            | 4393.9               | 3693.0        |
| May, 2005       | 1                             | 0.1                  | 0.2           |
| June, 2005      | 1                             | 0.2                  | 37.0          |
| July, 2005      | 2                             | 32.0                 | 36.0          |
| August, 2005    | 1                             | 22.5                 | 10.0          |
| September, 2005 | 4                             | 532.5                | 180.0         |
| October, 2005   | 11                            | 2182.3               | 376.8         |
| November, 2005  | 1                             | 122.8                | 40.0          |
| December, 2005  | 12                            | 2097.2               | 472.3         |
| January, 2006   | 24                            | 4345.2               | 1321.0        |
| February, 2006  | 7                             | 733.0                | 127.0         |
| March, 2006     | 10                            | 46.6                 | 36.1          |
| April, 2006     | 94                            | 7612.6               | 6344.0        |
| May, 2006       | 6                             | 201.3                | 249.9         |
| June, 2006      | 3                             | 0.6                  | 0.9           |
| August, 2006    | 1                             | 0.1                  | 0.2           |
| September, 2006 | 4                             | 1039.6               | 465.2         |
| October, 2006   | 27                            | 2362.2               | 1481.5        |
| November, 2006  | 4                             | 742.8                | 155.5         |
| December, 2006  | 11                            | 2748.7               | 660.1         |
| January, 2007   | 30                            | 5416.0               | 1713.9        |
| February, 2007  | 14                            | 870.0                | 673.2         |
| March, 2007     | 16                            | 412.9                | 450.0         |
| April, 2007     | 27                            | 2305.4               | 1942.2        |
| May, 2007       | 17                            | 801.7                | 1182.7        |
| June, 2007      | 6                             | 312.6                | 531.3         |
| July, 2007      | 6                             | 634.9                | 643.0         |
| September, 2007 | 4                             | 97.1                 | 60.7          |
| October, 2007   | 2                             | 67.9                 | 20.5          |
| November, 2007  | 7                             | 90.9                 | 639.6         |

| MONTH/YEAR        | NUMBER OF COPPER APPLICATIONS | POUNDS OF AL APPLIED | ACRES TREATED  |
|-------------------|-------------------------------|----------------------|----------------|
| December, 2007    | 5                             | 1324.7               | 215.7          |
| January, 2008     | 28                            | 6009.9               | 1779.7         |
| February, 2008    | 13                            | 885.9                | 682.8          |
| March, 2008       | 7                             | 105.0                | 156.4          |
| April, 2008       | 29                            | 2609.4               | 2668.9         |
| May, 2008         | 1                             | 0.5                  | 0.9            |
| June, 2008        | 2                             | 0.6                  | 1.2            |
| October, 2008     | 2                             | 0.2                  | 0.1            |
| November, 2008    | 2                             | 0.2                  | 0.5            |
| December, 2008    | 3                             | 265.6                | 123.4          |
| January, 2009     | 14                            | 1354.2               | 602.4          |
| February, 2009    | 5                             | 2.3                  | 2.8            |
| March, 2009       | 4                             | 1.3                  | 2.2            |
| April, 2009       | 38                            | 1080.7               | 1985.5         |
| July, 2009        | 1                             | 29.7                 | 43.0           |
| September, 2009   | 1                             | 0.0                  | 0.0            |
| October, 2009     | 11                            | 3483.9               | 980.0          |
| December, 2009    | 6                             | 88.8                 | 64.1           |
| January, 2010     | 22                            | 2191.4               | 1401.3         |
| February, 2010    | 1                             | 0.5                  | 0.9            |
| March, 2010       | 12                            | 323.7                | 359.5          |
| April, 2010       | 47                            | 2019.8               | 3434.7         |
| May, 2010         | 4                             | 8.2                  | 29.1           |
| June, 2010        | 2                             | 0.6                  | 0.5            |
| July, 2010        | 18                            | 1.7                  | 3.6            |
| August, 2010      | 3                             | 771.5                | 257.8          |
| September, 2010   | 2                             | 0.2                  | 0.3            |
| November, 2010    | 15                            | 3974.9               | 919.4          |
| December, 2010    | 3                             | 74.3                 | 40.9           |
| January, 2011     | 41                            | 4966.5               | 2135.2         |
| February, 2011    | 5                             | 2.4                  | 3.9            |
| March, 2011       | 3                             | 3.7                  | 0.6            |
| April, 2011       | 13                            | 205.3                | 532.5          |
| May, 2011         | 3                             | 0.8                  | 0.7            |
| June, 2011        | 2                             | 74.4                 | 15.1           |
| Summaries by Year |                               |                      |                |
| 2005 Total        | 134                           | 15948.0              | 8217.9         |
| 2006 Total        | 191                           | 19832.7              | 10841.4        |
| 2007 Total        | 134                           | 12334.0              | 8072.9         |
| 2008 Total        | 87                            | 9877.3               | 5413.8         |
| 2009 Total        | 80                            | 6041.0               | 3679.9         |
| 2010 Total        | 129                           | 9366.8               | 6448.2         |
| 2011 Total        | 67                            | 5253.1               | 2687.9         |
| <b>Total</b>      | <b>822</b>                    | <b>78652.9</b>       | <b>45361.9</b> |

**Figure IX-4. Dry Creek @ Rd 18 site subwatershed lbs copper applied by month (2005-2011).**

Asterisk (\*) denotes month with exceedances. PUR data available through June 2011 for Madera County.

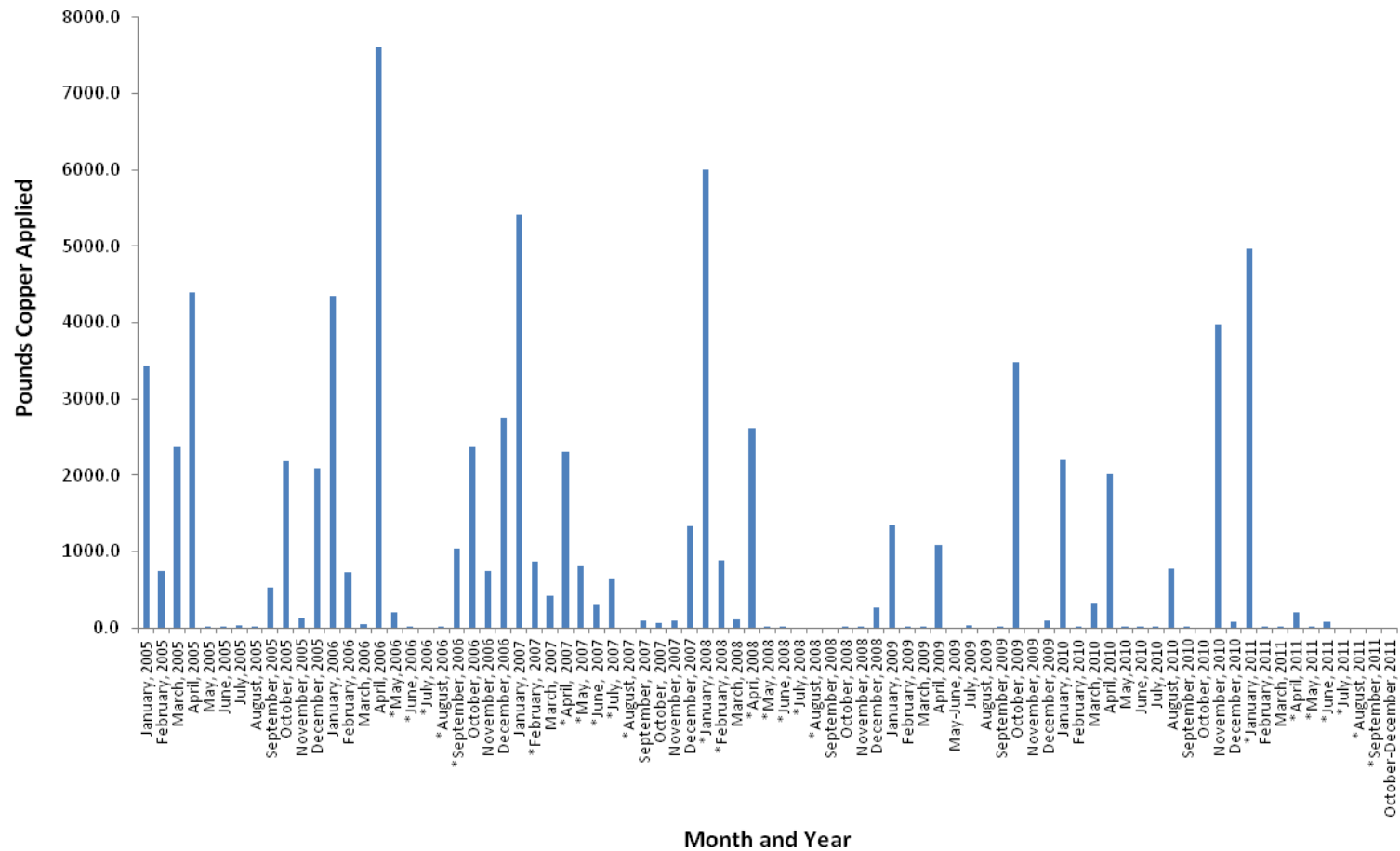


**Table IX-13. Dry Creek @ Rd 18 site subwatershed copper PUR data (2005-2011).**

PUR data available through June 2011 for Madera County.

| CHEMICAL NAME | COMMODITY      | PRODUCT NAME                                 | LBS AL APPLIED |
|---------------|----------------|----------------------------------------------|----------------|
| COPPER        | ALMOND         | CHAMP DRY PRILL                              | 140.1          |
|               |                | CHAMP FORMULA 2 FLOWABLE                     | 1059.5         |
|               |                | CHIPCO COPPER SULFATE CRYSTALS               | 732.6          |
|               |                | COOKE KOP-R-SPRAY                            | 445.3          |
|               |                | COPPER SULFATE CRYSTALS                      | 74.3           |
|               |                | CUPROFIX ULTRA 40 DISPERSS                   | 842.5          |
|               |                | DUPONT GX-569 FUNGICIDE/BACTERICIDE          | 304.1          |
|               |                | DUPONT KOCIDE 2000 FUNGICIDE/BACTERICIDE     | 3769.4         |
|               |                | DUPONT KOCIDE 3000 FUNGICIDE/BACTERICIDE     | 5464.3         |
|               |                | DUPONT KOCIDE DF FUNGICIDE/BACTERICIDE       | 371.5          |
|               |                | HYDROX                                       | 2507.1         |
|               |                | KOCIDE 101                                   | 762.3          |
|               |                | KOCIDE 2000                                  | 2033.0         |
|               |                | KOCIDE DF                                    | 5096.2         |
|               |                | NORDOX                                       | 662.6          |
|               |                | NORDOX 75 WG                                 | 671.2          |
|               |                | NU-COP 50DF                                  | 5058.9         |
|               |                | NU-COP HB                                    | 2048.2         |
|               |                | STRETCH FUNGICIDE                            | 0.7            |
|               |                | TRIANGLE BRAND BASIC COPPER SULFATE          | 806.0          |
|               |                | TRIANGLE BRAND COPPER SULFATE INSTANT POWDER | 1980.0         |
|               | APRICOT        | DUPONT KOCIDE 2000 FUNGICIDE/BACTERICIDE     | 138.0          |
|               |                | DUPONT KOCIDE 3000 FUNGICIDE/BACTERICIDE     | 35.4           |
|               |                | KOCIDE DF                                    | 509.6          |
|               | FIG            | TRIANGLE BRAND BASIC COPPER SULFATE          | 442.0          |
|               | GRAPE (RAISIN) | BADGE X2                                     | 11.9           |
|               |                | DUPONT KOCIDE 3000 FUNGICIDE/BACTERICIDE     | 27.4           |
|               | GRAPES         | BRITZ COPPER SULFUR 15-25 DUST               | 30.0           |
|               |                | CHAMP FORMULA 2 FLOWABLE                     | 109.8          |
|               |                | CHAMPION WETTABLE POWDER                     | 246.4          |
|               |                | CLEAN CROP C-O-C-S 15 SULFUR 25 DUST         | 45.0           |
|               |                | CSC COPPER SULFUR DUST                       | 40.7           |
|               |                | CUPROFIX ULTRA 40 DISPERSS                   | 142.9          |
|               |                | DUPONT KOCIDE 2000 FUNGICIDE/BACTERICIDE     | 984.3          |
|               |                | DUPONT KOCIDE 3000 FUNGICIDE/BACTERICIDE     | 409.9          |
|               |                | KOCIDE 2000                                  | 396.9          |
|               |                | KOCIDE DF                                    | 311.9          |
|               |                | NORDOX                                       | 65.4           |
|               |                | NORDOX 75 WG                                 | 283.0          |
|               |                | NU-COP 50DF                                  | 939.4          |
|               |                | STRETCH FUNGICIDE                            | 2.3            |
|               | GRAPES (WINE)  | BADGE X2                                     | 109.3          |
|               |                | CHAMP FLOWABLE                               | 1773.2         |
|               |                | CHAMP FORMULA 2 FLOWABLE                     | 6082.5         |
|               |                | CHAMPION WETTABLE POWDER                     | 47.7           |
|               |                | CLEAN CROP C-O-C-S 15 SULFUR 25 DUST         | 510.0          |

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| CHEMICAL NAME                                                | COMMODITY                                        | PRODUCT NAME                                              | LBS AL APPLIED |
|--------------------------------------------------------------|--------------------------------------------------|-----------------------------------------------------------|----------------|
| COPPER                                                       | GRAPES (WINE)                                    | COCS 15 SULFUR 25 DUST                                    | 771.0          |
|                                                              |                                                  | DUPONT KOCIDE 2000 FUNGICIDE/BACTERICIDE                  | 1334.3         |
|                                                              |                                                  | DUPONT KOCIDE 3000 FUNGICIDE/BACTERICIDE                  | 2665.3         |
|                                                              |                                                  | KOCIDE 101                                                | 3910.8         |
|                                                              |                                                  | KOCIDE 2000                                               | 3088.4         |
|                                                              |                                                  | KOCIDE DF                                                 | 95.8           |
|                                                              |                                                  | NORDOX                                                    | 24.8           |
|                                                              |                                                  | NORDOX 75 WG                                              | 75.5           |
|                                                              | N-GRNHS GRWN CUT FLWRS OR GREENS                 | CAMELOT                                                   | 2.9            |
|                                                              |                                                  | PHYTON 27 NEW DIMENSION                                   | 4.5            |
|                                                              |                                                  | PHYTON-27 BACTERICIDE & FUNGICIDE                         | 55.4           |
|                                                              |                                                  | PRESCRIPTION TREATMENT BRAND CAMELOT FUNGICIDE/BATERICIDE | 40.5           |
|                                                              | N-OUTDR CONTAINER/FLD GRWN PLANTS                | CHAMP FORMULA 2 FLOWABLE                                  | 7.3            |
|                                                              | N-OUTDR GRWN TRNSPLNT/PRPGTV MTRL                | KOCIDE 2000                                               | 0.8            |
|                                                              | OLIVE (ALL OR UNSPEC)                            | DUPONT KOCIDE 3000 FUNGICIDE/BACTERICIDE                  | 48.4           |
|                                                              |                                                  | KOCIDE 2000                                               | 96.8           |
|                                                              |                                                  | NORDOX                                                    | 67.7           |
|                                                              | ORANGE (ALL OR UNSPEC)                           | BASIC COPPER 53                                           | 588.0          |
|                                                              |                                                  | CUPROFIX ULTRA 40 DISPERSS                                | 1137.6         |
|                                                              |                                                  | KOCIDE DF                                                 | 2387.2         |
|                                                              |                                                  | NORDOX                                                    | 1071.6         |
|                                                              |                                                  | NU-COP 50DF                                               | 1094.0         |
|                                                              | PEACH                                            | KOCIDE DF                                                 | 63.9           |
|                                                              |                                                  | NU-COP 50DF                                               | 160.2          |
|                                                              | PISTACHIO (PISTACHE NUT)                         | KOCIDE 2000                                               | 100.1          |
|                                                              |                                                  | TRIANGLE BRAND BASIC COPPER SULFATE                       | 79.1           |
|                                                              |                                                  | TRIANGLE BRAND COPPER SULFATE INSTANT POWDER              | 297.0          |
|                                                              | PLUM (INCLUDES WILD PLUMS FOR HUMAN CONSUMPTION) | KOCIDE 2000                                               | 444.2          |
|                                                              |                                                  | KOCIDE DF                                                 | 558.1          |
|                                                              |                                                  | NU-COP 50DF                                               | 1755.6         |
|                                                              | TANGELO                                          | KOCIDE DF                                                 | 368.4          |
|                                                              |                                                  | NORDOX                                                    | 225.6          |
|                                                              |                                                  | NU-COP 50DF                                               | 184.8          |
|                                                              | TANGERINE (MANDARIN, SATSUMA, MURCOTT, ETC.)     | CUPROFIX ULTRA 40 DISPERSS                                | 6676.6         |
|                                                              |                                                  | NORDOX                                                    | 236.9          |
|                                                              | WALNUT (ENGLISH WALNUT, PERSIAN WALNUT)          | CUPROFIX ULTRA 40 DISPERSS                                | 409.5          |
| ALMOND-Total Pounds Copper Applied                           |                                                  |                                                           | 34829.7        |
| APRICOT-Total Pounds Copper Applied                          |                                                  |                                                           | 683.0          |
| FIG-Total Pounds Copper Applied                              |                                                  |                                                           | 442.0          |
| GRAPES-Total Pounds Copper Applied                           |                                                  |                                                           | 24535.6        |
| N-GRNHS GRWN CUT FLWRS OR GREENS-Total Pounds Copper Applied |                                                  |                                                           | 103.3          |
| N-OUTDR CONTAINER-Total Pounds Copper Applied                |                                                  |                                                           | 8.1            |
| OLIVE-Total Pounds Copper Applied                            |                                                  |                                                           | 212.9          |
| ORANGE-Total Pounds Copper Applied                           |                                                  |                                                           | 6278.4         |
| PEACH-Total Pounds Copper Applied                            |                                                  |                                                           | 224.0          |
| PISTACHIO-Total Pounds Copper Applied                        |                                                  |                                                           | 476.2          |
| PLUM-Total Pounds Copper Applied                             |                                                  |                                                           | 2757.9         |

| CHEMICAL NAME | COMMODITY | PRODUCT NAME                            | LBS AI APPLIED |
|---------------|-----------|-----------------------------------------|----------------|
|               |           | TANGELO-Total Pounds Copper Applied     | 778.8          |
|               |           | TANGERINE-Total Pounds Copper Applied   | 6913.5         |
|               |           | WALNUT-Total Pounds Copper Applied      | 409.5          |
|               |           | Total Pounds Copper Applied (2005-2011) | 78652.9        |

In addition to high applications rates of copper, there are a large number of copper mines in the Sierra Nevada Mountains which may contribute to the copper load. The Coalition obtained maps of all mines in the areas above Dry Creek and will sample upstream of agriculture, if there is ever significant flow in the creek, to determine potential copper input from mines.

The Coalition continued with its Management Plan strategy outlined above under the chlorpyrifos outreach section when conducting individual contacts, and added growers applying copper to its initial targeted grower list. Because copper tends to be sediment bound, it is probable that copper is mobilized with sediment during irrigation and/or storms and is transported to surface waters. Orchard and vineyard operators were advised to consider irrigation and storm water management to prevent copper from entering the waterway with runoff.

#### Diuron

Two exceedances of the diuron WQTL (2 µg/L) occurred in the Dry Creek subwatershed (January and February 2008). Both exceedances coincided with toxicity to *S. capricornutum*.

Diuron is an herbicide often applied during the dormant season to orchards. Diuron use in the Dry Creek @ Rd 18 subwatershed follows this trend; PUR data indicate diuron is only applied during October through March (Table IX-14, Figure IX-5). Diuron use increased in the subwatershed since 2007(3,167 lbs AI) to its peak level in 2009 (2,072 lbs AI; although complete PUR data are only available through June 2011), yet exceedances have not occurred since 2008. Neither of the diuron exceedances in Dry Creek @ Rd 18 occurred during months of the greatest amount of use.

The highest application rates and largest amount of diuron applied from 2005 through 2010 were associated with citrus orchards (oranges and tangerines, Table IX-15).

**Table IX-14. Dry Creek @ Rd 18 site subwatershed diuron applications, lbs AI applied, and acres treated by month (2005-2011).**

PUR data available through June 2011 for Madera County. If month is not included in table, no applications were made.

| MONTH/YEAR               | NUMBER OF DIURON APPLICATIONS | POUNDS OF AI APPLIED | ACRES TREATED |
|--------------------------|-------------------------------|----------------------|---------------|
| February, 2005           | 5                             | 142.4                | 74.0          |
| March, 2005              | 9                             | 538.9                | 336.8         |
| May, 2005                | 4                             | 160.0                | 200.0         |
| December, 2005           | 3                             | 146.4                | 183.0         |
| February, 2006           | 3                             | 67.2                 | 28.0          |
| March, 2006              | 1                             | 20.0                 | 13.5          |
| April, 2006              | 3                             | 47.3                 | 38.0          |
| October, 2006            | 2                             | 256.0                | 120.0         |
| February, 2007           | 5                             | 732.8                | 391.5         |
| March, 2007              | 11                            | 709.6                | 470.3         |
| October, 2007            | 5                             | 396.8                | 248.0         |
| November, 2007           | 8                             | 1327.4               | 829.6         |
| February, 2008           | 7                             | 247.1                | 136.5         |
| March, 2008              | 14                            | 1938.4               | 901.0         |
| April, 2008              | 2                             | 288.0                | 180.0         |
| November, 2008           | 1                             | 128.0                | 80.0          |
| December, 2008           | 3                             | 902.4                | 564.0         |
| February, 2009           | 4                             | 64.0                 | 71.5          |
| March, 2009              | 12                            | 1600.0               | 1000.0        |
| October, 2009            | 2                             | 401.6                | 194.0         |
| November, 2009           | 10                            | 1649.6               | 806.0         |
| February, 2010           | 3                             | 226.7                | 192.0         |
| March, 2010              | 11                            | 2810.4               | 898.0         |
| April, 2010              | 2                             | 128.0                | 40.0          |
| October, 2010            | 2                             | 160.8                | 134.0         |
| January, 2011            | 1                             | 120.1                | 60.0          |
| March, 2011              | 9                             | 1504.0               | 470.0         |
| April, 2011              | 3                             | 1696.0               | 530.0         |
| <b>Summaries by Year</b> |                               |                      |               |
| 2005 Total               | 21                            | 987.7                | 793.8         |
| 2006 Total               | 9                             | 390.5                | 199.5         |
| 2007 Total               | 29                            | 3166.6               | 1939.4        |
| 2008 Total               | 27                            | 3503.9               | 1861.5        |
| 2009 Total               | 28                            | 3715.2               | 2071.5        |
| 2010 Total               | 18                            | 3325.9               | 1264.0        |
| 2011 Total               | 13                            | 3320.1               | 1060.0        |
| <b>Total</b>             | <b>145</b>                    | <b>18409.8</b>       | <b>9189.7</b> |



**Figure IX-5. Dry Creek @ Rd 18 site subwatershed lbs diuron applied by month (2005-2011).**

Asterisk (\*) denotes months with exceedances. PUR data available through June 2011 for Madera County.

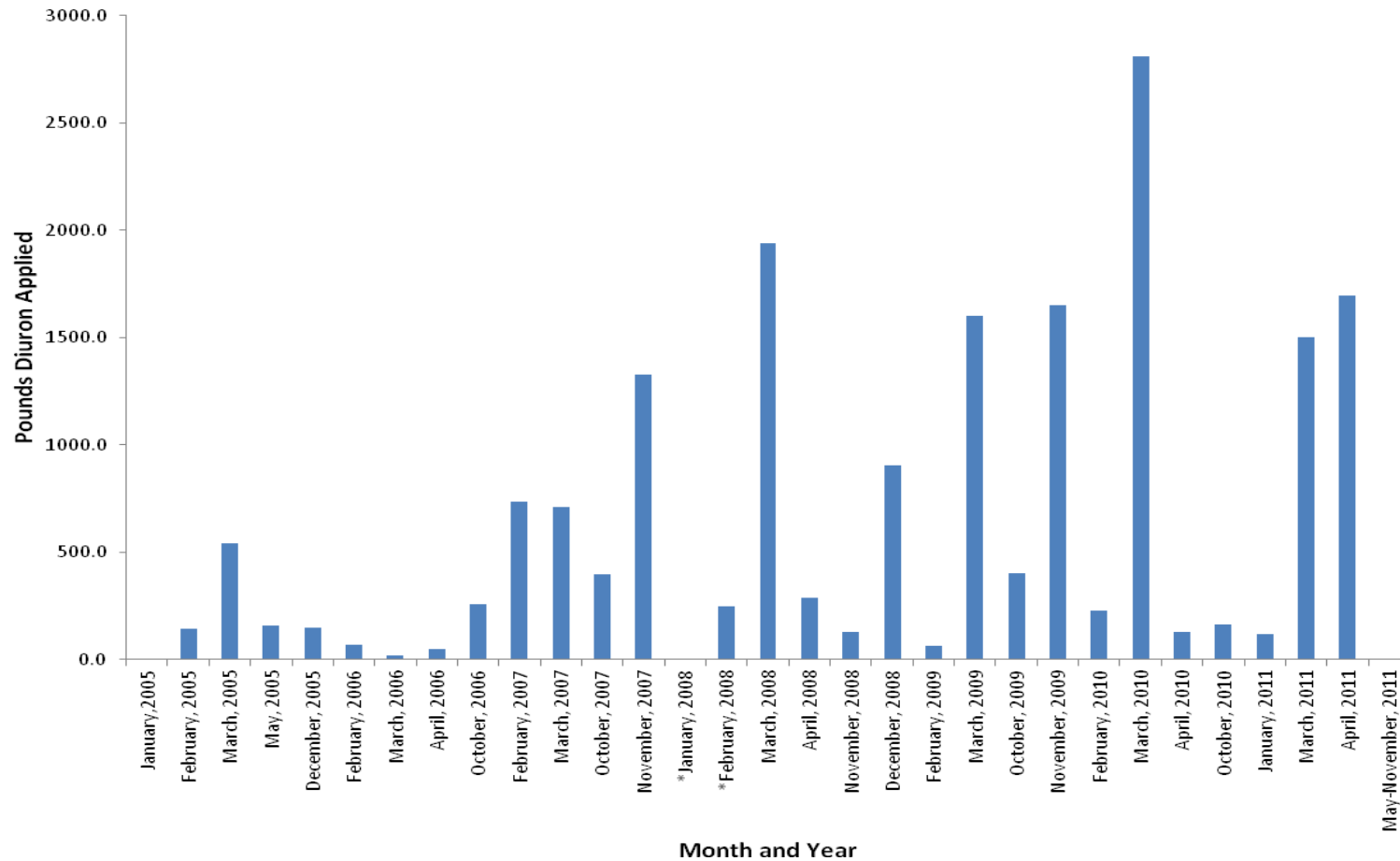


**Table IX-15. Dry Creek @ Rd 18 site subwatershed diuron PUR data (2005-2011).**

PUR data available through June 2011 for Madera County.

| CHEMICAL NAME                           | COMMODITY                                    | PRODUCT NAME                                  | LBS AI APPLIED                                |      |
|-----------------------------------------|----------------------------------------------|-----------------------------------------------|-----------------------------------------------|------|
| DIURON                                  | ALFALFA (FORAGE - FODDER) (ALFALFA HAY)      | CLEAN CROP DIURON WETTABLE POWDER WEED KILLER | 120.0                                         |      |
|                                         |                                              | DIURON 4L HERBICIDE                           | 346.7                                         |      |
|                                         |                                              | DUPONT DIREX 4L HERBICIDE                     | 44.0                                          |      |
|                                         | GRAPES                                       | CLEAN CROP DIURON WETTABLE POWDER WEED KILLER | 61.6                                          |      |
|                                         |                                              | DIREX 80DF                                    | 52.8                                          |      |
|                                         |                                              | DIURON 80 DF HERBICIDE                        | 11.6                                          |      |
|                                         |                                              | DREXEL DIURON 80 HERBICIDE                    | 76.8                                          |      |
|                                         |                                              | DU PONT KARMEX DF HERBICIDE                   | 52.0                                          |      |
|                                         |                                              | DUPONT KARMEX DF HERBICIDE                    | 46.4                                          |      |
|                                         |                                              | DUPONT KARMEX XP HERBICIDE                    | 14.4                                          |      |
|                                         |                                              | KARMEX DF HERBICIDE                           | 11.0                                          |      |
|                                         |                                              | KARMEX XP HERBICIDE                           | 117.6                                         |      |
|                                         |                                              | GRAPES (WINE)                                 | CLEAN CROP DIURON WETTABLE POWDER WEED KILLER | 16.8 |
|                                         |                                              |                                               | DIREX 80DF                                    | 14.4 |
|                                         | DREXEL DIURON 80 HERBICIDE                   |                                               | 186.7                                         |      |
|                                         | DUPONT KARMEX DF HERBICIDE                   |                                               | 17.6                                          |      |
|                                         | DUPONT KARMEX XP HERBICIDE                   |                                               | 5.6                                           |      |
|                                         | KARMEX DF HERBICIDE                          |                                               | 4.2                                           |      |
|                                         | ORANGE (ALL OR UNSPEC)                       | DIREX 80DF                                    | 951.4                                         |      |
|                                         |                                              | DREXEL DIURON 80 HERBICIDE                    | 384.0                                         |      |
|                                         |                                              | DU PONT KROVAR I DF HERBICIDE                 | 352.0                                         |      |
|                                         |                                              | DUPONT KARMEX XP HERBICIDE                    | 624.0                                         |      |
|                                         |                                              | KARMEX DF HERBICIDE                           | 2554.9                                        |      |
|                                         |                                              | KARMEX XP HERBICIDE                           | 240.0                                         |      |
|                                         | TANGELO                                      | DIREX 80DF                                    | 64.0                                          |      |
|                                         | TANGERINE (MANDARIN, SATSUMA, MURCOTT, ETC.) | DIREX 80DF                                    | 172.8                                         |      |
|                                         |                                              | DREXEL DIURON 80 HERBICIDE                    | 2816.0                                        |      |
|                                         |                                              | DU PONT KROVAR I DF HERBICIDE                 | 1130.4                                        |      |
|                                         |                                              | DUPONT KARMEX XP HERBICIDE                    | 6809.6                                        |      |
|                                         |                                              | KARMEX XP HERBICIDE                           | 1110.4                                        |      |
| ALFALFA-Total Pounds Diuron Applied     |                                              |                                               | 510.7                                         |      |
| GRAPES-Total Pounds Diuron Applied      |                                              |                                               | 689.6                                         |      |
| ORANGE-Total Pounds Diuron Applied      |                                              |                                               | 5106.2                                        |      |
| TANGELO-Total Pounds Diuron Applied     |                                              |                                               | 64.0                                          |      |
| TANGERINE-Total Pounds Diuron Applied   |                                              |                                               | 12039.2                                       |      |
| Total Pounds Diuron Applied (2005-2011) |                                              |                                               | 18409.8                                       |      |

The Coalition's strategy for addressing diuron exceedances is to add growers with the potential to drain to the creek who have applied diuron to the targeted growers list. Individual contacts included diuron in discussions and growers are encouraged to implement management practices relevant to preventing storm and irrigation discharge to waterways that may transport diuron. Improved and additional water management practices should reduce or eliminate diuron exceedances.

### *Priority D Constituents*

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Priority D constituents in the Dry Creek @ Rd 18 subwatershed are sediment toxicity to *H. azteca* and water column toxicity to *S. capricornutum*.

#### ***H. azteca* toxicity**

Sediment toxicity to *H. azteca* occurred in May 2006 and August 2008. Both toxicities were statically different from the control, but were greater than 80% survival which is not considered ecologically significant. No TIE was conducted on either sample. To better determine the cause of toxicity, the Coalition now analyzes toxic sediment for pesticide concentrations. Management Plan Monitoring for *H. azteca* toxicity was scheduled during 2011, and no toxicity occurred.

#### ***S. capricornutum* toxicity**

Toxicity to *S. capricornutum* occurred in May 2007 and January and February 2008; the February toxicity was persistent in the resample one week later. All three toxicities coincided with exceedances of copper; however, there have been numerous copper exceedances in the subwatershed that have not coincided with *S. capricornutum* toxicity. Diuron exceedances coincided with the January and February 2008 toxicities. A TIE was conducted on the January 2008 toxic sample, but all toxicity was lost and no conclusions could be drawn.

The Coalition believes sediment bound metals and/or pesticides may be contributing to toxicity. The Coalition's strategy for eliminating *S. capricornutum* toxicity is to reduce the offsite movement of agricultural constituents that have the potential to contribute to toxicity by encouraging better management of storm water and irrigation tailwater. This strategy is consistent with the strategies discussed above.

### *Priority E Constituents*

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The priority E constituents listed under the Dry Creek @ Rd 18 management plan are DO, *E. coli*, lead, and pH.

The Coalition conducted MPM for lead in 2011 and no exceedances of the WQTL occurred. The Coalition believes this may be because the samples are now analyzed separately for total and dissolved fractions of metals which allows for a more accurate characterization of water quality. The Coalition plans to continue MPM for lead to evaluate if the constituent is still impairing water quality. Although lead is not applied by agriculture, it is possible that offsite movement of irrigation tailwater mobilizes sediment bound lead and transports the metal to the waterbody. Therefore, the Coalition's strategy described above should address potential agriculture-induced movement of lead to waterways.

Although the priority E constituents will remain low priority, the Coalition will continue to collect monitoring data as a part of Assessment Monitoring and/or MPM. Dissolved oxygen and pH are field parameters that will be sampled during every event, Assessment or MPM. *E. coli* and lead will be

monitored during Assessment Monitoring as scheduled in 2013 through 2014. In addition, lead will continue to be monitored during MPM. The priority E constituents have been discussed during individual contacts and will continue to be discussed at annual grower meetings.

In addition, the Coalition plans to participate in a focus group along with other Coalitions and Regional Board staff to develop a joint Work Plan to address *E. coli* exceedances by determining the potential agricultural sources of *E. coli* and identifying management practices to prevent discharges to surface waters

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### Evaluation

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Dry Creek @ Rd 18 is a third priority site subwatershed and is in its second year of focused outreach (2011-2013).

The Coalition's strategy for the Dry Creek subwatershed is to focus on providing information on a subwatershed level to growers to review their operation and determine if irrigation return flows and storm water are managed properly. The Coalition targeted growers whose agricultural practices may result in the discharge or drift of pesticides into the waterway and who applied chlorpyrifos, diazinon, copper, and/or diuron. Outreach efforts include grower notification, management practice outreach and education, tracking of management practice implementation, and providing information on special studies of management practice efficacy.

All individual grower surveys documenting current management practice implementations and assessing future planned implementations were completed and returned to the Coalition representing 100% of targeted growers. The Third Priority Subwatersheds Summary of Management Practices section of this report summarizes the results of these contacts. The Coalition plans to conduct follow up contacts with targeted growers recommended to implement additional management practices to document changes on growers' properties. The Coalition will report on newly implemented management practices in the 2013 MPUR.

In 2012, MPM is scheduled to continue to aid in the evaluation of newly implemented management practices.

## X. LATERAL 2 ½ NEAR KEYES RD

### Management Plan Constituents

#### Priority A/B

- Chlorpyrifos

#### Priority E

- pH
- *E. coli*

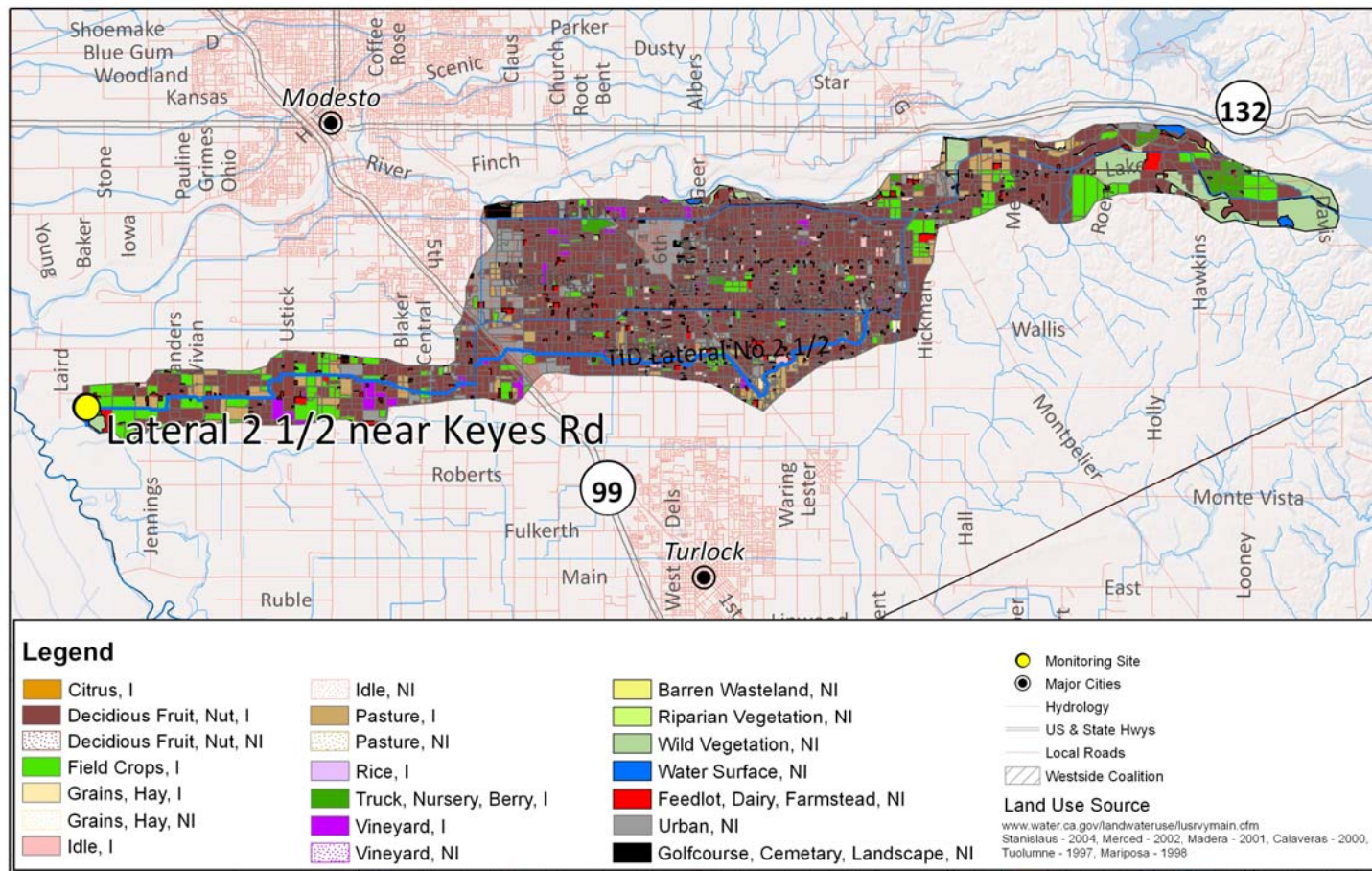
### Description of Lateral 2 ½ near Keyes Rd Site Subwatershed

Lateral 2 1/2 near Keyes Rd (31,810 Irrigated acres) – This site subwatershed is located in the western portion of the Coalition region just south of the Tuolumne River and East of the San Joaquin River (Table X-1). The site subwatershed extends east past the City of Modesto to Turlock Lake. Land use in this site subwatershed is dominated by deciduous fruits and nuts but also includes almost all other crops types and land use found in the Coalition Region (Figure X-1).

**Table X-1. Lateral 2 ½ near Keyes Rd site subwatershed sampling location coordinates.**

| SITE NAME                 | STATION CODE | TARGET LAT | TARGET LONG |
|---------------------------|--------------|------------|-------------|
| Lateral 2 ½ near Keyes Rd | 535LTHNKR    | 37.5478    | -121.0927   |

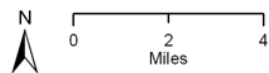
Figure X-1. Lateral 2 ½ near Keyes Rd site subwatershed land use map.



Source of Layers:  
 Hydrology - NHD hydrodata, 1:24,000-scale, <http://nhd.usgs.gov/>  
 Roads, highways, railroads, county boundary, city outlines - California Spatial Information Library  
 TRS - Teale Public Land Survey System, Pub. date: 20050101, California Spatial Information Library  
 Parcel Layer - Stanislaus 2010, Merced 2011, Madera 2011  
 Basemap, Shaded Relief - ESRI  
 GSC North America 1983

Date Prepared: 08/10/11

ESJWQC



Lateral 2 1/2 near Keyes Rd

ESJWQC MPUR, April 1, 2012

Appendix I

## Subwatershed Monitoring History

Monitoring began at the Lateral 2 ½ near Keyes Rd site subwatershed under the 2008 MRPP in the fall of 2008 and continued through 2010 (Table X-2). The constituents sampled at this location from 2008 through 2011 are listed in (Table X-3.) Management Plan Monitoring first occurred at the site in 2011 for chlorpyrifos (April and July, Table X-4).

Lateral 2 ½ near Keyes Rd is an Assessment Monitoring location in the Prairie Flower Zone (Zone 2). Assessment Monitoring occurred 2008 through 2010 and is scheduled again for 2028 and 2029. Accordingly, only MPM occurred at the site in 2011 and MPM will continue through 2013.

Lateral 2 ½ near Keyes Rd is not considered impaired on California's 2008-2010 303d List of Impaired Waterbodies. However, the section of the San Joaquin River which receives water from Lateral 2 ½ near Keyes Rd (Merced River to Tuolumne River) is listed as impaired for boron, BHC-alpha, chlorpyrifos, DDE, DDT, electrical conductance, group A pesticides, mercury, water temperature, and unknown water column toxicity.

**Table X-2. Lateral 2 ½ near Keyes Rd site subwatershed sampling events per season and year (including MPM).**

| YEAR | SEASON     | EVENTS SAMPLED | EVENTS NOT SAMPLED <sup>1</sup> | TOTAL |
|------|------------|----------------|---------------------------------|-------|
| 2004 | Irrigation | NA             | NA                              | NA    |
| 2005 | Storm      | NA             | NA                              | NA    |
|      | Irrigation | NA             | NA                              | NA    |
| 2006 | Storm      | NA             | NA                              | NA    |
|      | Irrigation | NA             | NA                              | NA    |
| 2007 | Storm      | NA             | NA                              | NA    |
|      | Irrigation | NA             | NA                              | NA    |
| 2008 | Storm      | 0              | 1                               | 1     |
|      | Irrigation | NA             | NA                              | NA    |
|      | Fall       | 2              | 0                               | 2     |
| 2009 | Winter     | 0              | 2                               | 2     |
|      | Storm      | 0              | 2                               | 2     |
|      | Irrigation | 6              | 0                               | 6     |
|      | Fall       | 1              | 1                               | 2     |
| 2010 | Winter     | 1              | 0                               | 1     |
|      | Storm      | 1              | 2                               | 3     |
|      | Irrigation | 5              | 0                               | 5     |
|      | Fall       | 1              | 2                               | 3     |
| 2011 | Winter     | NA             | NA                              | NA    |
|      | Storm      | NA             | NA                              | NA    |
|      | Irrigation | 2              | 0                               | 2     |
|      | Fall       | NA             | NA                              | NA    |

<sup>1</sup>If an event was not sampled during scheduled monitoring, the site was dry.

NA – Not applicable. This site was not scheduled for sampling during this season/year.

**Table X-3. Lateral 2 ½ near Keyes Rd site subwatershed analyses per sampling season and year.**

Only environmental samples with a sample replicate and lab replicate number of one are listed.

| METHOD                        | ANALYTE                         | 2008  |             |      | 2009   |       |            |      | 2010   |       |            |      | 2011    |        |            |       |
|-------------------------------|---------------------------------|-------|-------------|------|--------|-------|------------|------|--------|-------|------------|------|---------|--------|------------|-------|
|                               |                                 | STORM | IRRIGATION* | FALL | WINTER | STORM | IRRIGATION | FALL | WINTER | STORM | IRRIGATION | FALL | WINTER* | STORM* | IRRIGATION | FALL* |
| Field and Physical Parameters |                                 |       |             |      |        |       |            |      |        |       |            |      |         |        |            |       |
| EPA 110.2                     | Color                           |       |             |      |        |       |            |      |        |       |            |      |         |        |            |       |
| EPA 160.1                     | Dissolved Solids                |       |             | 2    |        |       | 6          | 1    | 1      | 1     | 5          | 1    |         |        |            |       |
| EPA 160.2                     | Suspended Solids                |       |             | 2    |        |       | 6          | 1    | 1      | 1     | 5          | 1    |         |        |            |       |
| EPA 180.1                     | Turbidity                       |       |             | 2    |        |       | 6          | 1    | 1      | 1     | 5          | 1    |         |        |            |       |
| EPA 405.1                     | BOD                             |       |             |      |        |       |            |      |        |       |            |      |         |        |            |       |
| EPA 415.1                     | Total Organic Carbon            |       |             | 2    |        |       | 6          | 1    | 1      | 1     | 5          | 1    |         |        |            |       |
| Walkley-Black                 | Total Organic Carbon (sediment) |       |             |      |        |       | 2          |      | 1      |       | 1          |      |         |        |            |       |
| SM 9223                       | <i>E. coli</i>                  |       |             | 2    |        |       | 6          | 1    | 1      | 1     | 5          | 1    |         |        |            |       |
| ASTM D422                     | Grain size (sediment)           |       |             |      |        |       | 2          |      | 1      |       | 1          |      |         |        |            |       |
| NA                            | Dissolved Oxygen                |       |             | 2    |        |       | 6          | 1    | 1      | 1     | 5          | 1    |         |        | 2          |       |
| NA                            | Specific Conductivity           |       |             | 2    |        |       | 6          | 1    | 1      | 1     | 5          | 1    |         |        | 2          |       |
| NA                            | pH                              |       |             | 2    |        |       | 6          | 1    | 1      | 1     | 5          | 1    |         |        | 2          |       |
| Carbamates                    |                                 |       |             |      |        |       |            |      |        |       |            |      |         |        |            |       |
| EPA 8321A                     | Aldicarb                        |       |             | 2    |        |       | 6          | 1    | 1      | 1     | 5          | 1    |         |        |            |       |
| EPA 8321A                     | Carbaryl                        |       |             | 2    |        |       | 6          | 1    | 1      | 1     | 5          | 1    |         |        |            |       |
| EPA 8321A                     | Carbofuran                      |       |             | 2    |        |       | 6          | 1    | 1      | 1     | 5          | 1    |         |        |            |       |
| EPA 8321A                     | Diuron                          |       |             | 2    |        |       | 6          | 1    | 1      | 1     | 5          | 1    |         |        |            |       |
| EPA 8321A                     | Linuron                         |       |             | 2    |        |       | 6          | 1    | 1      | 1     | 5          | 1    |         |        |            |       |
| EPA 8321A                     | Methamidophos                   |       |             |      |        |       |            |      |        |       | 3          | 1    |         |        |            |       |
| EPA 8321A                     | Methiocarb                      |       |             | 2    |        |       | 6          | 1    | 1      | 1     | 5          | 1    |         |        |            |       |
| EPA 8321A                     | Methomyl                        |       |             | 2    |        |       | 6          | 1    | 1      | 1     | 5          | 1    |         |        |            |       |
| EPA 8321A                     | Oxamyl                          |       |             | 2    |        |       | 6          | 1    | 1      | 1     | 5          | 1    |         |        |            |       |
| Organochlorines               |                                 |       |             |      |        |       |            |      |        |       |            |      |         |        |            |       |
| EPA 8081A                     | DDD(p,p')                       |       |             | 2    |        |       | 1          |      |        |       | 3          | 1    |         |        |            |       |
| EPA 8081A                     | DDE(p,p')                       |       |             | 2    |        |       | 1          |      |        |       | 3          | 1    |         |        |            |       |
| EPA 8081A                     | DDT(p,p')                       |       |             | 2    |        |       | 1          |      |        |       | 3          | 1    |         |        |            |       |
| EPA 8081A                     | Dicofol                         |       |             | 2    |        |       | 1          |      |        |       | 3          | 1    |         |        |            |       |



| METHOD             | ANALYTE            | 2008  |             |      | 2009   |       |            | 2010 |        |       | 2011       |      |         |        |            |       |
|--------------------|--------------------|-------|-------------|------|--------|-------|------------|------|--------|-------|------------|------|---------|--------|------------|-------|
|                    |                    | STORM | IRRIGATION* | FALL | WINTER | STORM | IRRIGATION | FALL | WINTER | STORM | IRRIGATION | FALL | WINTER* | STORM* | IRRIGATION | FALL* |
| EPA 8081A          | Dieldrin           |       |             | 2    |        |       | 1          |      |        |       | 3          | 1    |         |        |            |       |
| EPA 8081A          | Endrin             |       |             | 2    |        |       | 1          |      |        |       | 3          | 1    |         |        |            |       |
| EPA 8081A          | Methoxychlor       |       |             | 2    |        |       | 1          |      |        |       | 3          | 1    |         |        |            |       |
| Group A Pesticides |                    |       |             |      |        |       |            |      |        |       |            |      |         |        |            |       |
| EPA 8081A          | Aldrin             |       |             | 2    |        |       | 1          |      |        |       | 3          | 1    |         |        |            |       |
| EPA 8081A          | Chlordane          |       |             | 2    |        |       | 1          |      |        |       | 3          | 1    |         |        |            |       |
| EPA 8081A          | Endosulfan I       |       |             | 2    |        |       | 1          |      |        |       | 3          | 1    |         |        |            |       |
| EPA 8081A          | Endosulfan II      |       |             | 2    |        |       | 1          |      |        |       | 3          | 1    |         |        |            |       |
| EPA 8081A          | HCH, alpha         |       |             | 2    |        |       | 1          |      |        |       | 3          | 1    |         |        |            |       |
| EPA 8081A          | HCH, beta          |       |             | 2    |        |       | 1          |      |        |       | 3          | 1    |         |        |            |       |
| EPA 8081A          | HCH, delta         |       |             | 2    |        |       | 1          |      |        |       | 3          | 1    |         |        |            |       |
| EPA 8081A          | HCH, gamma         |       |             | 2    |        |       | 1          |      |        |       | 3          | 1    |         |        |            |       |
| EPA 8081A          | Heptachlor         |       |             | 2    |        |       | 1          |      |        |       | 3          | 1    |         |        |            |       |
| EPA 8081A          | Heptachlor epoxide |       |             | 2    |        |       | 1          |      |        |       | 3          | 1    |         |        |            |       |
| EPA 8081A          | Toxaphene          |       |             | 2    |        |       | 1          |      |        |       | 3          | 1    |         |        |            |       |
| Organophosphates   |                    |       |             |      |        |       |            |      |        |       |            |      |         |        |            |       |
| EPA 8141A          | Azinphos methyl    |       |             | 2    |        |       | 6          | 1    | 1      | 1     | 5          | 1    |         |        |            |       |
| EPA 8141A          | Chlorpyrifos       |       |             | 2    |        |       | 6          | 1    | 1      | 1     | 5          | 1    |         |        | 2          |       |
| EPA 8141A          | Demeton-s          |       |             | 2    |        |       | 6          | 1    | 1      | 1     | 5          | 1    |         |        |            |       |
| EPA 8141A          | Diazinon           |       |             | 2    |        |       | 6          | 1    | 1      | 1     | 5          | 1    |         |        |            |       |
| EPA 8141A          | Dichlorvos         |       |             | 2    |        |       | 6          | 1    | 1      | 1     | 5          | 1    |         |        |            |       |
| EPA 8141A          | Dimethoate         |       |             | 2    |        |       | 6          | 1    | 1      | 1     | 5          | 1    |         |        |            |       |
| EPA 8141A          | Disulfoton         |       |             | 2    |        |       | 6          | 1    | 1      | 1     | 5          | 1    |         |        |            |       |
| EPA 8141A          | Malathion          |       |             | 2    |        |       | 6          | 1    | 1      | 1     | 5          | 1    |         |        |            |       |
| EPA 8321A          | Methamidophos      |       |             | 2    |        |       | 6          | 1    | 1      | 1     | 2          |      |         |        |            |       |
| EPA 8141A          | Methidathion       |       |             | 2    |        |       | 6          | 1    | 1      | 1     | 5          | 1    |         |        |            |       |
| EPA 8141A          | Molinate           |       |             |      |        |       |            |      |        |       |            |      |         |        |            |       |
| EPA 8141A          | Parathion, Methyl  |       |             | 2    |        |       | 6          | 1    | 1      | 1     | 5          | 1    |         |        |            |       |
| EPA 8141A          | Phorate            |       |             | 2    |        |       | 6          | 1    |        | 1     | 5          | 1    |         |        |            |       |
| EPA 8141A          | Phosmet            |       |             | 2    |        |       | 6          | 1    | 1      | 1     | 5          | 1    |         |        |            |       |

| METHOD             | ANALYTE                  | 2008  |             |      | 2009   |       |            |      | 2010   |       |            |      | 2011    |        |            |       |
|--------------------|--------------------------|-------|-------------|------|--------|-------|------------|------|--------|-------|------------|------|---------|--------|------------|-------|
|                    |                          | STORM | IRRIGATION* | FALL | WINTER | STORM | IRRIGATION | FALL | WINTER | STORM | IRRIGATION | FALL | WINTER* | STORM* | IRRIGATION | FALL* |
| EPA 8141A          | Thiobencarb              |       |             |      |        |       |            |      |        |       |            |      |         |        |            |       |
| EPA 8141A          | Trifluralin              |       |             | 2    |        |       | 6          | 1    | 1      | 1     | 5          | 1    |         |        |            |       |
| Triazines          |                          |       |             |      |        |       |            |      |        |       |            |      |         |        |            |       |
| EPA 547M           | Glyphosate               |       |             | 2    |        |       | 1          |      |        |       | 3          | 1    |         |        |            |       |
| EPA 549.2M         | Paraquat dichloride      |       |             | 2    |        |       | 1          |      |        |       | 3          | 1    |         |        |            |       |
| EPA 619            | Atrazine                 |       |             | 2    |        |       | 6          | 1    | 1      | 1     | 5          | 1    |         |        |            |       |
| EPA 619            | Cyanazine                |       |             | 2    |        |       | 6          | 1    | 1      | 1     | 5          | 1    |         |        |            |       |
| EPA 619            | Simazine                 |       |             | 2    |        |       | 6          | 1    | 1      | 1     | 5          | 1    |         |        |            |       |
| Metals (Total)     |                          |       |             |      |        |       |            |      |        |       |            |      |         |        |            |       |
| EPA 200.8          | Arsenic                  |       |             | 2    |        |       | 1          |      |        |       | 3          | 1    |         |        |            |       |
| EPA 200.8          | Boron                    |       |             | 2    |        |       | 6          | 1    | 1      | 1     | 5          | 1    |         |        |            |       |
| EPA 200.8          | Cadmium                  |       |             | 2    |        |       | 1          |      |        |       | 3          | 1    |         |        |            |       |
| EPA 200.8          | Copper                   |       |             | 2    |        |       | 6          | 1    | 1      | 1     | 5          | 1    |         |        |            |       |
| EPA 200.8          | Lead                     |       |             | 2    |        |       | 1          |      |        |       | 3          | 1    |         |        |            |       |
| EPA 200.8          | Molybdenum               |       |             | 2    |        |       | 1          |      |        |       | 3          | 1    |         |        |            |       |
| EPA 200.8          | Nickel                   |       |             | 2    |        |       | 6          | 1    | 1      | 1     | 5          | 1    |         |        |            |       |
| EPA 200.8          | Selenium                 |       |             | 2    |        |       | 6          | 1    | 1      | 1     | 5          | 1    |         |        |            |       |
| EPA 200.8          | Zinc                     |       |             | 2    |        |       | 6          | 1    | 1      | 1     | 5          | 1    |         |        |            |       |
| Metals (Dissolved) |                          |       |             |      |        |       |            |      |        |       |            |      |         |        |            |       |
| EPA 200.8          | Cadmium                  |       |             | 2    |        |       | 1          |      |        |       | 3          | 1    |         |        |            |       |
| EPA 200.8          | Copper                   |       |             | 2    |        |       | 6          | 1    | 1      | 1     | 5          | 1    |         |        |            |       |
| EPA 200.8          | Lead                     |       |             | 2    |        |       | 1          |      |        |       | 3          | 1    |         |        |            |       |
| EPA 200.8          | Nickel                   |       |             | 2    |        |       | 6          | 1    | 1      | 1     | 5          | 1    |         |        |            |       |
| EPA 200.8          | Zinc                     |       |             | 2    |        |       | 6          | 1    | 1      | 1     | 5          | 1    |         |        |            |       |
| Nutrients          |                          |       |             |      |        |       |            |      |        |       |            |      |         |        |            |       |
| SM 2340 C          | Hardness as CaCO3        |       |             | 2    |        |       | 6          | 1    | 1      | 1     | 5          | 1    |         |        |            |       |
| EPA 300.0          | Nitrate as N             |       |             |      |        |       |            |      |        |       |            |      |         |        |            |       |
| EPA 350.2          | Ammonia as N             |       |             | 2    |        |       | 6          | 1    | 1      | 1     | 5          | 1    |         |        |            |       |
| EPA 351.3          | Nitrogen, Total Kjeldahl |       |             | 2    |        |       | 1          |      |        |       | 3          | 1    |         |        |            |       |
| EPA 353.2          | Nitrate + Nitrite as N   |       |             | 2    |        |       | 6          | 1    | 1      | 1     | 5          | 1    |         |        |            |       |

| METHOD           | ANALYTE                          | 2008  |             |      | 2009   |       |            |      | 2010   |       |            |      | 2011    |        |            |       |
|------------------|----------------------------------|-------|-------------|------|--------|-------|------------|------|--------|-------|------------|------|---------|--------|------------|-------|
|                  |                                  | STORM | IRRIGATION* | FALL | WINTER | STORM | IRRIGATION | FALL | WINTER | STORM | IRRIGATION | FALL | WINTER* | STORM* | IRRIGATION | FALL* |
| EPA 354.1        | Nitrite as N                     |       |             |      |        |       |            |      |        |       |            |      |         |        |            |       |
| EPA 365.2        | OrthoPhosphate as P              |       |             | 2    |        |       | 1          |      |        |       | 3          | 1    |         |        |            |       |
| EPA 365.2        | Phosphate as P                   |       |             | 2    |        |       | 6          | 1    | 1      | 1     | 5          | 1    |         |        |            |       |
| Toxicity         |                                  |       |             |      |        |       |            |      |        |       |            |      |         |        |            |       |
| EPA 821/R-02-012 | <i>Ceriodaphnia dubia</i>        |       |             | 2    |        |       | 6          | 1    | 1      | 1     | 5          | 1    |         |        |            |       |
| EPA 821/R-02-012 | <i>Pimephales promelas</i>       |       |             | 2    |        |       | 6          | 1    | 1      | 1     | 5          | 1    |         |        |            |       |
| EPA 821/R-02-013 | <i>Selenastrum capricornutum</i> |       |             | 2    |        |       | 6          | 1    | 1      | 1     | 5          | 1    |         |        |            |       |
| EPA 600/R-99-064 | <i>Hyalella azteca</i>           |       |             |      |        |       | 2          |      | 1      |       | 1          |      |         |        |            |       |

\*Site not sampled during the 2008 irrigation season, and 2011 winter, storm, and fall seasons.

**Table X-4. Lateral 2 ½ near Keyes Rd site subwatershed Management Plan Monitoring schedule (2011).**

| SITE NAME                 | SAMPLE DATE | MONITORING TYPE | CHLORPYRIFOS |
|---------------------------|-------------|-----------------|--------------|
| Lateral 2 ½ near Keyes Rd | 19-Apr-11   | MPM             | X            |
| Lateral 2 ½ near Keyes Rd | 12-Jul-11   | MPM             | X            |

X – Constituent sampled for Management Plan Monitoring (MPM)

### Exceedance History

Samples collected from Lateral 2 ½ near Keyes Rd since October 2008 through 2011 exceeded WQTLs for field parameters, nutrients, *E. coli*, and pesticides and toxicity has occurred. These exceedances include pH (5), ammonia (1), nitrate + nitrite (1), *E. coli* (2), chlorpyrifos (3), HCH (1), and delta (1). Toxicity to *S. capricornutum* (1) and to *H. azteca* sediment (1) occurred (Table X-5). The single exceedance in 2011 was of the pH WQTL (1).

Exceedances are based on WQTLs listed in the introduction to the ESJWQC Management Plan. The highest priority constituent in the Lateral 2 ½ near Keyes Rd subwatershed is chlorpyrifos (A/B).

**Table X-5. Lateral 2 ½ near Keyes Rd site subwatershed exceedances (2008-2011).**

The WQTL used to evaluate the data are listed in the header after the analyte.

| SITE NAME                 | SEASON     | SAMPLE DATE | pH, <6.5 AND > 8.5 UNITS | AMMONIA <sup>1</sup> , >1.5 MG/L | NITRATE + NITRITE AS N, >10 MG/L | E. COLI, >235 MPN/100 ML | CHLORPYRIFOS, >0.015 µG/L | HCH, DELTA, >0.0039 µG/L | S. CAPRICORNUTUM, (% CONTROL) | H. AZTECA, (% CONTROL) |
|---------------------------|------------|-------------|--------------------------|----------------------------------|----------------------------------|--------------------------|---------------------------|--------------------------|-------------------------------|------------------------|
| Lateral 2 ½ near Keyes Rd | Fall       | 10/21/2008  | 9.57                     |                                  |                                  | 280                      |                           |                          |                               |                        |
| Lateral 2 ½ near Keyes Rd | Fall       | 11/11/2008  | 9.09                     | 0.65 (0.57)                      |                                  | 370                      |                           | 0.013                    |                               |                        |
| Lateral 2 ½ near Keyes Rd | Irrigation | 4/21/2009   | 9.2                      |                                  |                                  |                          |                           |                          |                               | 90                     |
| Lateral 2 ½ near Keyes Rd | Irrigation | 5/19/2009   |                          |                                  |                                  |                          |                           |                          | 56                            |                        |
| Lateral 2 ½ near Keyes Rd | Irrigation | 7/21/2009   |                          |                                  |                                  |                          | 0.049                     |                          |                               |                        |
| Lateral 2 ½ near Keyes Rd | Irrigation | 8/18/2009   |                          |                                  | 15                               |                          |                           |                          |                               |                        |
| Lateral 2 ½ near Keyes Rd | Fall       | 10/20/2009  | 8.68                     |                                  |                                  |                          |                           |                          |                               |                        |
| Lateral 2 ½ near Keyes Rd | Storm      | 4/20/2010   |                          |                                  |                                  |                          | 0.076                     |                          |                               |                        |
| Lateral 2 ½ near Keyes Rd | Irrigation | 7/20/2010   |                          |                                  |                                  |                          | 0.061                     |                          |                               |                        |
| Lateral 2 ½ near Keyes Rd | Irrigation | 4/19/2011   | 8.71                     |                                  |                                  |                          |                           |                          |                               |                        |
| Constituent Priority      |            |             | E                        | NP                               | NP                               | E                        | A/B                       | NP                       | NP                            | NP                     |

<sup>1</sup>Ammonia WQTL variable based on pH and temperature.

NP – Not Prioritized; less than two exceedances within three consecutive monitoring years and currently no TMDL.

## 2008-2011 Management Plan Monitoring Results

Chlorpyrifos is the only high priority management plan constituent in the Lateral 2 ½ near Keyes Rd subwatershed. The first exceedance occurred in July 2009, and chlorpyrifos was subsequently added to the Lateral 2 ½ management plan. Two more exceedances occurred the following year during Assessment Monitoring in April and July 2010. Management Plan Monitoring for chlorpyrifos occurred during 2011, and no chlorpyrifos was detected (Table X-6). Chlorpyrifos MPM will continue during 2012 in April and July.

**Table X-6. Lateral 2 ½ near Keyes Rd site subwatershed monitoring results for high priority constituents (2010-2011).**

Exceedance values are in bold.

| MONTH:                              |                     | JAN     | FEB     | MAR     | APR          | MAY     | JUN     | JUL          | AUG     | SEP     | OCT      | NOV      | DEC      |
|-------------------------------------|---------------------|---------|---------|---------|--------------|---------|---------|--------------|---------|---------|----------|----------|----------|
| <b>2010 NM<br/>(near Keyes Rd)</b>  | Date                | 1/19/10 | 2/23/10 | 3/23/10 | 4/20/10      | 5/18/10 | 6/15/10 | 7/20/10      | 8/17/10 | 9/14/10 | 10/19/10 | 11/16/10 | 12/14/10 |
|                                     | Chlorpyrifos (µg/L) | Dry     | Dry     | <0.003  | <b>0.076</b> | <0.003  | <0.003  | <b>0.061</b> | 0.013   | <0.003  | <0.003   | Dry      | Dry      |
| <b>2011 MPM<br/>(near Keyes Rd)</b> | Date                | NA      | NA      | NA      | 4/19/11      | NA      | NA      | 7/12/11      | NA      | NA      | NA       | NA       | NA       |
|                                     | Chlorpyrifos (µg/L) | NA      | NA      | NA      | <0.003       | NA      | NA      | <0.003       | NA      | NA      | NA       | NA       | NA       |

MPM – Management Plan Monitoring (see Table 4 for MPM schedule)

NA – Not applicable. No monitoring occurred on this date for this constituent.

NM – Normal Monitoring

## Load Calculations

Loads have been calculated for all chlorpyrifos detections in the site subwatershed based on the following formula (Table X-7):

$$\text{Load} = \text{Discharge (cfs)} \times 28.317\text{L/ft}^3 \times \text{Concentration (mg/L} \times 1000 \text{ or } \mu\text{g/L)}.$$

The load values for constituents in this report represent instantaneous loads only. These values should not be used to extrapolate loading over any period of time (e.g. weekly, monthly, seasonal or annual). The primary purpose for reporting instantaneous loads is to provide a normalization of the concentrations by flow for various constituents at the time the samples were collected.

**Table X-7. Lateral 2 ½ near Keyes Rd site subwatershed instantaneous load calculations for chlorpyrifos.**

Sorted by analyte and date.

| SAMPLE SITE                 | ANALYTE NAME | SAMPLE DATE | DISCHARGE CFS | CONCENTRATION µG/L | LOADING RATE µG/SEC |
|-----------------------------|--------------|-------------|---------------|--------------------|---------------------|
| Lateral 2 1/2 near Keyes Rd | Chlorpyrifos | 04/20/10    | 10.7          | 0.076              | 23.03               |
| Lateral 2 1/2 near Keyes Rd | Chlorpyrifos | 07/20/10    | 9             | 0.061              | 15.55               |
| Lateral 2 1/2 near Keyes Rd | Chlorpyrifos | 08/17/10    | 31.92         | 0.013              | 11.75               |

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## Source Identification and Outreach

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The Coalition focuses its efforts on applied pesticides and considers past monitoring results and associated PUR data to address source identification and determine an outreach strategy. During 2011, the Coalition conducted additional MPM during the months when exceedances historically occurred to better characterize water quality in the subwatershed. The Coalition also reviews PUR data to determine the most frequent crop type and timing associated with pesticide applications. From these actions, the Coalition derived an outreach strategy, which is detailed in the following sections.

In the Coalition's approved Management Plan, the Lateral 2 ½ near Keyes Rd subwatershed is a high priority subwatershed as of 2011 and will remain as such through 2013. The Coalition will actively engage in grower outreach and education to address the Lateral 2 ½ management plan's highest priority constituent, chlorpyrifos. The Coalition organized grower meetings and mailings to educate growers about management practices and their importance in achieving acceptable water quality. Grower meetings with targeted members began in the fall of 2010 and continued through the fall of 2011 to inform growers about management practices as well as to assess current and expected future implementation of additional management practices. Follow up with the targeted members who were recommended practices will occur in the winter and/or spring of 2012 (depending on the timing of the initial contact with the grower) to determine what additional management practices were implemented in the subwatershed. Management Plan Monitoring will continue through 2013 as necessary to assess the effect of outreach on water quality.

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### *Priority A/B Constituents*

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Chlorpyrifos is the only A/B constituent for the Lateral 2 ½ subwatershed.

#### **Chlorpyrifos**

Chlorpyrifos exceeded the WQTL three times in this subwatershed (July 2009, and April and July 2010, Table X-5).

Deciduous fruit and nut trees dominate the land use in the Lateral 2 ½ subwatershed. Chlorpyrifos can be applied to orchards during both the dormant and irrigation seasons, but peak use often occurs during the latter summer months for almond hull split applications and walnut codling moth applications.

In addition, there are a few row crops immediately upstream of the sampling site and chlorpyrifos can be applied to row crops throughout the season.

To determine an outreach strategy, the Coalition reviews PUR data for the number of monthly chlorpyrifos applications and pounds of active ingredient applied, and the acres treated (Table X-8, Figure X-2). Chlorpyrifos use in the Lateral 2 ½ near Keyes Rd subwatershed peaked in 2008 (12,040 lbs AI) and since decreased. Applications of chlorpyrifos are primarily during the irrigation months in the subwatershed, but dormant sprays also occur. Large numbers of applications occurred in the

subwatershed throughout the years, and it appears that the ratio of pounds of AI applied to acres treated is relatively high in Lateral 2 ½ near Keyes Rd subwatershed compared to other subwatersheds in the Coalition region. Chlorpyrifos is primarily applied to walnut and almond orchards in the subwatershed, but also to a variety of row crops (Table X-9). Lorsban is the most common chlorpyrifos-containing product used in the subwatershed.

**Table X-8. Lateral 2 ½ near Keyes Rd site subwatershed chlorpyrifos applications, lbs AI applied, and acres treated by month (2008-2011).**

PUR data available through November 2011 for Stanislaus County. If month is not included in table, no applications were made.

| MONTH/YEAR      | NUMBER OF CHLORPYRIFOS APPLICATIONS | POUNDS OF AI APPLIED | ACRES TREATED |
|-----------------|-------------------------------------|----------------------|---------------|
| January, 2008   | 18                                  | 281.2                | 150.5         |
| March, 2008     | 22                                  | 508.5                | 773.5         |
| April, 2008     | 2                                   | 80.9                 | 40.5          |
| May, 2008       | 72                                  | 3126.4               | 1619.3        |
| June, 2008      | 21                                  | 621.8                | 355.0         |
| July, 2008      | 117                                 | 5326.0               | 3150.7        |
| August, 2008    | 48                                  | 1670.6               | 1012.3        |
| September, 2008 | 6                                   | 59.1                 | 59.3          |
| October, 2008   | 5                                   | 82.0                 | 79.8          |
| December, 2008  | 10                                  | 283.7                | 148.0         |
| January, 2009   | 8                                   | 382.6                | 203.5         |
| February, 2009  | 6                                   | 583.8                | 306.0         |
| March, 2009     | 13                                  | 890.2                | 425.0         |
| April, 2009     | 8                                   | 353.3                | 269.4         |
| May, 2009       | 65                                  | 2960.1               | 1465.4        |
| June, 2009      | 10                                  | 375.1                | 192.1         |
| July, 2009      | 120                                 | 4961.8               | 3062.5        |
| August, 2009    | 34                                  | 1205.6               | 816.3         |
| September, 2009 | 10                                  | 46.9                 | 131.5         |
| December, 2009  | 2                                   | 76.6                 | 43.6          |
| February, 2010  | 1                                   | 76.0                 | 38.0          |
| March, 2010     | 21                                  | 535.4                | 1044.6        |
| April, 2010     | 9                                   | 360.4                | 201.0         |
| May, 2010       | 34                                  | 1306.5               | 778.5         |
| June, 2010      | 43                                  | 1930.0               | 1036.7        |
| July, 2010      | 89                                  | 3066.2               | 1942.9        |
| August, 2010    | 42                                  | 1404.1               | 941.7         |
| September, 2010 | 16                                  | 368.6                | 569.7         |
| October, 2010   | 4                                   | 14.8                 | 10.6          |
| January, 2011   | 8                                   | 131.4                | 68.5          |
| February, 2011  | 1                                   | 2.3                  | 0.2           |
| March, 2011     | 13                                  | 166.5                | 327.5         |
| April, 2011     | 2                                   | 62.3                 | 204.0         |
| May, 2011       | 47                                  | 1929.2               | 1012.0        |
| June, 2011      | 15                                  | 443.4                | 224.0         |
| July, 2011      | 63                                  | 2098.3               | 1313.4        |
| August, 2011    | 36                                  | 1044.7               | 837.2         |
| September, 2011 | 16                                  | 494.0                | 298.8         |
| October, 2011   | 4                                   | 58.0                 | 3424.0        |

| MONTH/YEAR               | NUMBER OF CHLORPYRIFOS APPLICATIONS | POUNDS OF AI APPLIED | ACRES TREATED  |
|--------------------------|-------------------------------------|----------------------|----------------|
| <b>Summaries by Year</b> |                                     |                      |                |
| 2008 Total               | 321                                 | 12040.3              | 7388.8         |
| 2009 Total               | 276                                 | 11835.9              | 6915.3         |
| 2010 Total               | 259                                 | 9061.9               | 6563.7         |
| 2011 Total               | 205                                 | 6430.2               | 7709.6         |
| <b>Total</b>             | <b>1061</b>                         | <b>39368.4</b>       | <b>28577.4</b> |



**Figure X-2. Lateral 2 ½ near Keyes Rd site subwatershed lbs chlorpyrifos applied by month (2008-2011).**

Asterisk (\*) denotes months with exceedances. PUR data available through November 2011 for Stanislaus County.

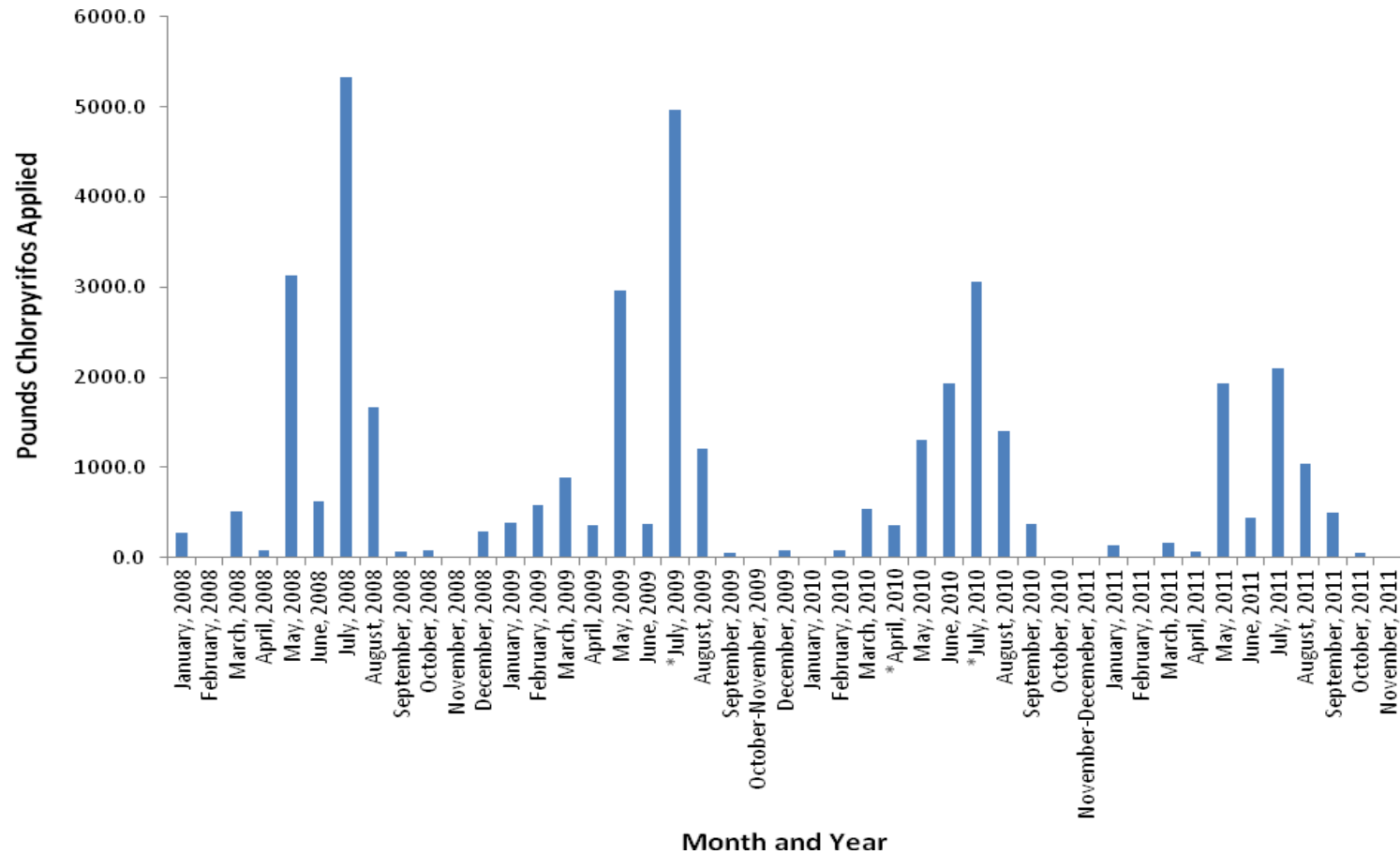


**Table X-9. Lateral 2 ½ near Keyes Rd site subwatershed chlorpyrifos PUR data (2008-2011).**

PUR data available through November 2011 for Stanislaus County.

| CHEMICAL NAME | COMMODITY                               | PRODUCT NAME                                     | LBS AI APPLIED |
|---------------|-----------------------------------------|--------------------------------------------------|----------------|
| CHLORPYRIFOS  | ALFALFA (FORAGE - FODDER) (ALFALFA HAY) | CHLORPYRIFOS 4E AG                               | 18.9           |
|               |                                         | COBALT                                           | 404.0          |
|               |                                         | GOVERN 4E INSECTICIDE                            | 18.9           |
|               |                                         | LOCK-ON INSECTICIDE                              | 376.1          |
|               |                                         | LORSBAN 4E-HF                                    | 67.5           |
|               |                                         | LORSBAN ADVANCED                                 | 32.4           |
|               |                                         | LORSBAN-4E                                       | 168.6          |
|               |                                         | NUFOS 4E                                         | 744.9          |
|               |                                         | WARHAWK                                          | 96.5           |
|               | ALMOND                                  | CHLORPYRIFOS 4E AG                               | 146.4          |
|               |                                         | GOVERN 4E INSECTICIDE                            | 2009.7         |
|               |                                         | LORSBAN 4E INSECTICIDE                           | 236.6          |
|               |                                         | LORSBAN 4E-HF                                    | 895.4          |
|               |                                         | LORSBAN ADVANCED                                 | 2507.2         |
|               |                                         | LORSBAN-4E                                       | 4178.5         |
|               |                                         | NUFOS 4E                                         | 1223.2         |
|               |                                         | WARHAWK                                          | 260.6          |
|               |                                         | WHIRLWIND                                        | 406.4          |
|               | APPLE                                   | LORSBAN 4E INSECTICIDE                           | 300.9          |
|               |                                         | LORSBAN-4E                                       | 148.1          |
|               |                                         | NUFOS 4E                                         | 723.9          |
|               | CHERRY                                  | LORSBAN 4E-HF                                    | 46.4           |
|               |                                         | LORSBAN ADVANCED                                 | 58.2           |
|               | CORN (FORAGE - FODDER)                  | DREXEL CHLORPYRIFOS 4E-AG                        | 85.2           |
|               |                                         | GOVERN 4E INSECTICIDE                            | 57.6           |
|               |                                         | LORSBAN 4E-HF                                    | 285.6          |
|               |                                         | LORSBAN ADVANCED                                 | 75.1           |
|               |                                         | LORSBAN-4E                                       | 159.1          |
|               |                                         | NUFOS 4E                                         | 881.5          |
|               | GRAPES (WINE)                           | WARHAWK                                          | 264.3          |
|               |                                         | LORSBAN ADVANCED                                 | 435.7          |
|               | N-GRNHS GRWN PLANTS IN CONTAINERS       | DURSBAN 50W INSECTICIDE IN WATER SOLUBLE PACKETS | 8.7            |
|               | N-OUTDR CONTAINER/FLD GRWN PLANTS       | DURSBAN 50W INSECTICIDE IN WATER SOLUBLE PACKETS | 61.1           |
|               | OP-VINE                                 | DURSBAN 50W INSECTICIDE IN WATER SOLUBLE PACKETS | 17.6           |
|               |                                         | DURSBAN PRO                                      |                |
|               |                                         | WHITMIRE PT 1325 ME DURAGUARD                    | 2.3            |
|               | PEACH                                   | LORSBAN 4E INSECTICIDE                           | 89.8           |
|               |                                         | LORSBAN 4E-HF                                    | 24.9           |
|               |                                         | LORSBAN ADVANCED                                 | 199.1          |
|               |                                         | LORSBAN-4E                                       | 205.4          |
|               | SWEET POTATO                            | LORSBAN 15G GRANULAR INSECTICIDE                 | 347.4          |
|               |                                         | LORSBAN ADVANCED                                 | 157.8          |
|               | WALNUT (ENGLISH WALNUT, PERSIAN WALNUT) | CHLORPYRIFOS 4E AG                               | 65.7           |
|               |                                         | GOVERN 4E INSECTICIDE                            | 950.4          |
|               |                                         | LORSBAN 4E INSECTICIDE                           | 993.0          |
|               |                                         | LORSBAN 4E-HF                                    | 918.4          |
|               |                                         | LORSBAN ADVANCED                                 | 6274.4         |

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| CHEMICAL NAME                                       | COMMODITY                               | PRODUCT NAME | LBS AI APPLIED |
|-----------------------------------------------------|-----------------------------------------|--------------|----------------|
| CHLORPYRIFOS                                        | WALNUT (ENGLISH WALNUT, PERSIAN WALNUT) | LORSBAN-4E   | 7099.5         |
|                                                     |                                         | NUFOS 4E     | 3596.1         |
|                                                     |                                         | WARHAWK      | 193.4          |
|                                                     |                                         | WHIRLWIND    | 850.3          |
|                                                     |                                         |              |                |
| ALFALFA-Total Pounds Chlorpyrifos Applied           |                                         |              | 1927.8         |
| ALMOND-Total Pounds Chlorpyrifos Applied            |                                         |              | 11863.9        |
| APPLE-Total Pounds Chlorpyrifos Applied             |                                         |              | 1172.9         |
| CHERRY-Total Pounds Chlorpyrifos Applied            |                                         |              | 104.6          |
| CORN-Total Pounds Chlorpyrifos Applied              |                                         |              | 1808.3         |
| GRAPES-Total Pounds Chlorpyrifos Applied            |                                         |              | 435.7          |
| N-GRNHS CONTAINER-Total Pounds Chlorpyrifos Applied |                                         |              | 8.7            |
| N-OUTDR CONTAINER-Total Pounds Chlorpyrifos Applied |                                         |              | 61.1           |
| OP-VINE-Total Pounds Chlorpyrifos Applied           |                                         |              | 20.0           |
| PEACH-Total Pounds Chlorpyrifos Applied             |                                         |              | 519.1          |
| SWEET POTATO-Total Pounds Chlorpyrifos Applied      |                                         |              | 505.2          |
| WALNUT-Total Pounds Chlorpyrifos Applied            |                                         |              | 20941.2        |
| Total Pounds Chlorpyrifos Applied (2008-2011)       |                                         |              | 39368.4        |

The chlorpyrifos in Lateral 2 ½ waterway are most likely the primary result of tailwater transporting chlorpyrifos from fields to the drain. Chlorpyrifos concentrations were well above the WQTL, indicating it is unlikely that spray drift was the sole cause, although it may have contributed. As discussed above, PUR data indicate large numbers of applications and large amounts of AI were applied throughout the subwatershed prior to the 2009 and 2010 exceedances, hence the use of chlorpyrifos is subwatershed-wide and not limited to a few growers.

Focused outreach to reduce the offsite movement of chlorpyrifos in this subwatershed includes providing information to growers regarding the proper management of irrigation tailwater, in both orchards and on fields with row crops. Growers were encouraged to review their operation to determine if irrigation return flows are managed properly and install management practices where necessary. Orchards operators are encouraged to evaluate their application methods to minimize spray drift.

Coalition outreach since 2007 has included grower meetings and the mailing/distribution of information such as available funding for management practice implementation. A complete list of coalition outreach during 2011 is provided in the Actions Taken to Address Water Quality Exceedances section of the 2012 AMR (Table 46, page 142). The Coalition has focused outreach to growers whose parcels are in the direct drainage area of the subwatershed and who have applied chlorpyrifos. From these criteria, the Coalition compiled a targeted list of growers.

The Coalition completed individual meetings with targeted growers in the third priority subwatersheds during the fall of 2010 through 2011. Although meetings focused mainly on chlorpyrifos exceedances,

all water quality results were reviewed and discussed including *E. coli* and pH. The Coalition contacted 25 members accounting for 1,826 acres of direct drainage.

Grower surveys completed at the meetings documenting members' current practices and indicating which recommended practices growers anticipate implementing in the upcoming years were compiled and assessed by the Coalition in the Third Priority Subwatersheds Summary of Management Practices section of this report. The Coalition believes growers will be able to implement recommended practices by the irrigation season of 2012. Follow ups with targeted growers who were recommended additional management practices are scheduled to occur in 2012 to determine what additional management practices were implemented in 2011 and/or are planned for 2012.

Management Plan Monitoring will continue in 2012 at Lateral 2 ½ near Keyes Rd during months of historical exceedances. The Coalition plans to conduct MPM through 2013 to evaluate improvements in water quality as recommended management practice implementation occurs.

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### *Priority E Constituents*

The priority E constituents listed under the Lateral 2 ½ near Keyes Rd management plan are *E. coli* and pH.

Although these constituents will remain low priority, the Coalition will continue to collect monitoring data as a part of Assessment Monitoring and/or MPM. Field parameters such as pH will be collected during every event, Assessment and/or MPM. *E. coli* will be monitored during Assessment Monitoring as scheduled in 2028 through 2029. The priority E constituents are discussed during individual contacts and will continue to be discussed at annual grower meetings.

The Coalition petitioned to remove *E. coli* from the Lateral 2 ½ near Keyes Rd management plan in a letter to the Regional Board on January 6, 2012. Regardless, the Coalition plans to participate in a focus group along with other Coalitions and Regional Board staff to develop a joint Work Plan to address *E. coli* exceedances by determining the potential agricultural sources of *E. coli* and identifying management practices to prevent discharges to surface waters.

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### *Evaluation*

Lateral 2 ½ near Keyes Rd is a third priority site subwatershed and is in its second year of focused outreach (2011-2013).

The Coalition's strategy for the Lateral 2 ½ subwatershed is to focus on providing information on a subwatershed level to growers to review their operation and determine if irrigation return flows are managed properly. The Coalition targeted growers whose agricultural practices may result in the discharge or drift of pesticides into the waterway and who applied chlorpyrifos. Outreach includes

grower notification, management practice outreach and education, tracking of management practice implementation, and providing information on special studies of management practice efficacy.

Individual grower surveys documenting current management practice implementations and assessing future planned implementations have been completed and returned to the Coalition representing 100% of targeted growers. The Third Priority Subwatersheds Summary of Management Practices section of this report summarizes the results of these contacts. The Coalition plans to conduct follow up contacts with all targeted growers to assess the implementation of new management practices. The Coalition will report on newly implemented management practices in the 2013 MPUR.

In 2012, MPM is scheduled to continue for high priority constituents to aid in the evaluation of newly implemented management practices.

Monitoring for *E. coli* has resulted in zero exceedances for two or more consecutive years of monitoring during months of past exceedances. A letter was submitted to the Regional Board on January 6, 2012 petitioning to remove the constituent from the active Lateral 2 ½ near Keyes Rd management plan.

## XI. LIVINGSTON DRAIN @ ROBIN AVE

### Management Plan Constituents

#### Priority A/B

- Chlorpyrifos

#### Priority C

- Copper

#### Priority D

- *Selenastrum capricornutum* water column toxicity

#### Priority E

- *E. coli*
- Lead
- pH

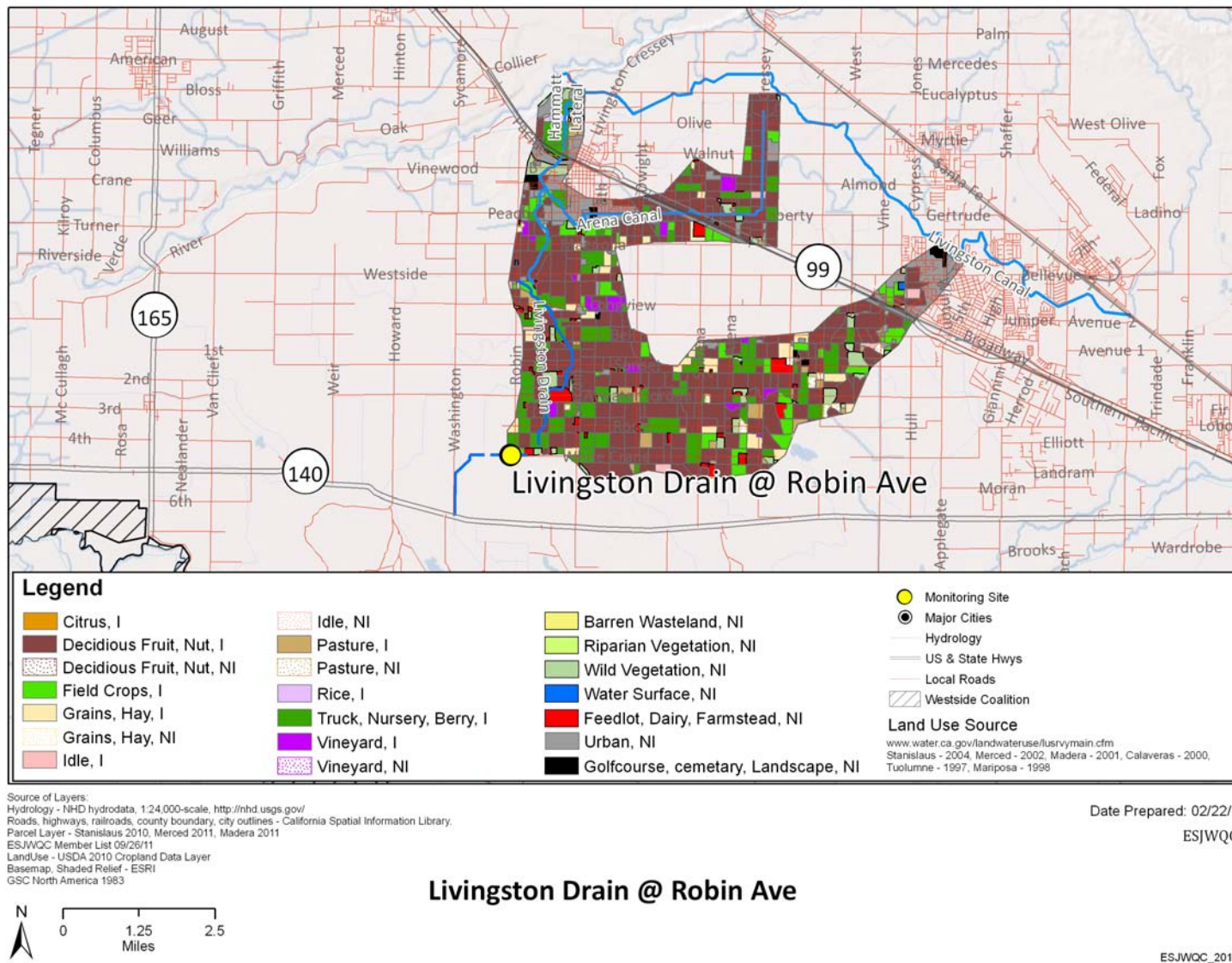
### Description of Livingston Drain @ Robin Avenue Site Subwatershed

Livingston Drain @ Robin Ave (11,670 irrigated acres) – This site subwatershed is located in the west, central portion of the Coalition region in Merced County, west of the towns Atwater and Livingston (Table XI-1). Water from Hammatt Lateral and Arena Canal drain into Livingston Drain. Arena Canal receives storm water from the city of Livingston as well as water from Livingston Canal. The agriculture is almost entirely orchards with a small amount of truck crops. Several dairies are present in the subwatershed as well (Figure XI-1).

**Table XI-1. Livingston Drain @ Robin Ave site subwatershed sampling location coordinates.**

| SITE NAME                    | STATION CODE | TARGET LAT | TARGET LONG |
|------------------------------|--------------|------------|-------------|
| Livingston Drain @ Robin Ave | 535XLDARA    | 37.3169    | -120.7423   |

Figure XI-1. Livingston Drain @ Robin Ave site subwatershed land use map.



## Subwatershed Monitoring History

Monitoring within the Livingston Drain subwatershed was initiated in the irrigation season of 2007 and continued through 2008 (Table XI-2). Livingston Drain @ Robin Ave is an Assessment Monitoring location within the Merced River @ Santa Fe Zone (Zone 4). Assessment Monitoring is scheduled to resume at the site in 2021 through 2022. Sampling did not occur in 2009 and 2010. Only MPM occurred in 2011 and will continue through 2013. The constituents sampled at this location from 2007 through 2011 are listed in Table XI-3.

Management Plan Monitoring occurred for copper during 2008 (May-July and September). When the site became a high priority subwatershed, MPM resumed for chlorpyrifos in 2011 (January and June-August), copper (January, February, May-July, and September), lead (January and February), and *S. capricornutum* toxicity (February-May, Table XI-4).

Livingston Drain is not considered impaired on California's 2008-2010 303d List of Impaired Waterbodies; however, the downstream waterbody (Bear Creek from Bear Valley to San Joaquin River, Mariposa and Merced Counties) is listed for *E. coli* and unknown water column toxicity.

**Table XI-2. Livingston Drain @ Robin Avenue site subwatershed sampling events per season and year (including MPM).**

| YEAR | SEASON     | EVENTS SAMPLED | EVENTS NOT SAMPLED <sup>1</sup> | TOTAL |
|------|------------|----------------|---------------------------------|-------|
| 2004 | Irrigation | NA             | NA                              | NA    |
| 2005 | Storm      | NA             | NA                              | NA    |
|      | Irrigation | NA             | NA                              | NA    |
| 2006 | Storm      | NA             | NA                              | NA    |
|      | Irrigation | NA             | NA                              | NA    |
| 2007 | Storm      | NA             | NA                              | NA    |
|      | Irrigation | 5              | 0                               | 5     |
| 2008 | Storm      | 2              | 0                               | 2     |
|      | Irrigation | 10             | 0                               | 10    |
|      | Fall       | NA             | NA                              | NA    |
| 2009 | Winter     | NA             | NA                              | NA    |
|      | Storm      | NA             | NA                              | NA    |
|      | Irrigation | NA             | NA                              | NA    |
|      | Fall       | NA             | NA                              | NA    |
| 2010 | Winter     | NA             | NA                              | NA    |
|      | Storm      | NA             | NA                              | NA    |
|      | Irrigation | NA             | NA                              | NA    |
|      | Fall       | NA             | NA                              | NA    |
| 2011 | Winter     | 0              | 1                               | 1     |
|      | Storm      | 0              | 1                               | 1     |
|      | Irrigation | 6              | 0                               | 6     |
|      | Fall       | NA             | NA                              | NA    |

<sup>1</sup> If an event was not sampled during scheduled monitoring, the site was dry.

NA – Not applicable. This site was not scheduled for sampling during this season/year.



**Table XI-3. Livingston Drain @ Robin Ave site subwatershed analyses per sampling season and year.**

Only environmental samples with a sample replicate and lab replicate number of one are listed.

| METHOD                        | ANALYTE               | 2007       | 2008  |            |        | 2009          | 2010          | 2011   |       |            |        |
|-------------------------------|-----------------------|------------|-------|------------|--------|---------------|---------------|--------|-------|------------|--------|
|                               |                       | IRRIGATION | STORM | IRRIGATION | FALL * | WINTER-FALL * | WINTER-FALL * | WINTER | STORM | IRRIGATION | FALL * |
| Field and Physical Parameters |                       |            |       |            |        |               |               |        |       |            |        |
| EPA 110.2                     | Color                 | 5          | 2     | 6          |        |               |               |        |       |            |        |
| EPA 160.1                     | Dissolved Solids      | 5          | 2     | 6          |        |               |               |        |       |            |        |
| EPA 160.2                     | Suspended Solids      |            |       |            |        |               |               |        |       |            |        |
| EPA 180.1                     | Turbidity             | 5          | 2     | 6          |        |               |               |        |       |            |        |
| EPA 405.1                     | BOD                   | 1          |       |            |        |               |               |        |       |            |        |
| EPA 415.1                     | Total Organic Carbon  | 5          | 2     | 6          |        |               |               |        |       |            |        |
| SM 9223                       | <i>E. coli</i>        | 5          | 2     | 6          |        |               |               |        |       |            |        |
| NA                            | Dissolved Oxygen      | 6          | 2     | 12         |        |               |               |        |       | 6          |        |
| NA                            | Specific Conductivity | 6          | 2     | 12         |        |               |               |        |       | 6          |        |
| NA                            | pH                    | 6          | 2     | 12         |        |               |               |        |       | 6          |        |
| Carbamates                    |                       |            |       |            |        |               |               |        |       |            |        |
| EPA 8321A                     | Aldicarb              | 5          | 2     | 6          |        |               |               |        |       |            |        |
| EPA 8321A                     | Carbaryl              | 5          | 2     | 6          |        |               |               |        |       |            |        |
| EPA 8321A                     | Carbofuran            | 5          | 2     | 6          |        |               |               |        |       |            |        |
| EPA 8321A                     | Diuron                | 5          | 2     | 6          |        |               |               |        |       |            |        |
| EPA 8321A                     | Linuron               | 5          | 2     | 6          |        |               |               |        |       |            |        |
| EPA 8321A                     | Methiocarb            | 5          | 2     | 6          |        |               |               |        |       |            |        |
| EPA 8321A                     | Methomyl              | 5          | 2     | 6          |        |               |               |        |       |            |        |
| EPA 8321A                     | Oxamyl                | 5          | 2     | 6          |        |               |               |        |       |            |        |
| Organochlorines               |                       |            |       |            |        |               |               |        |       |            |        |
| EPA 8081A                     | DDD(p,p')             | 5          | 2     | 6          |        |               |               |        |       |            |        |
| EPA 8081A                     | DDE(p,p')             | 5          | 2     | 6          |        |               |               |        |       |            |        |
| EPA 8081A                     | DDT(p,p')             | 5          | 2     | 6          |        |               |               |        |       |            |        |
| EPA 8081A                     | Dicofol               | 5          | 2     | 6          |        |               |               |        |       |            |        |
| EPA 8081A                     | Dieldrin              | 5          | 2     | 6          |        |               |               |        |       |            |        |
| EPA 8081A                     | Endrin                | 5          | 2     | 6          |        |               |               |        |       |            |        |
| EPA 8081A                     | Methoxychlor          | 5          | 2     | 6          |        |               |               |        |       |            |        |
| Organophosphates              |                       |            |       |            |        |               |               |        |       |            |        |
| EPA 8141A                     | Azinphos methyl       | 5          | 2     | 6          |        |               |               |        |       |            |        |
| EPA 8141A                     | Chlorpyrifos          | 5          | 2     | 6          |        |               |               |        |       | 3          |        |
| EPA 8141A                     | Demeton-s             |            |       |            |        |               |               |        |       |            |        |
| EPA 8141A                     | Diazinon              | 5          | 2     | 6          |        |               |               |        |       |            |        |
| EPA 8141A                     | Dichlorvos            |            |       |            |        |               |               |        |       |            |        |
| EPA 8141A                     | Dimethoate            | 5          | 2     | 6          |        |               |               |        |       |            |        |
| EPA 8141A                     | Disulfoton            | 5          | 2     | 6          |        |               |               |        |       |            |        |
| EPA 8141A                     | Malathion             | 5          | 2     | 6          |        |               |               |        |       |            |        |
| EPA 8321A                     | Methamidophos         | 5          | 2     | 6          |        |               |               |        |       |            |        |
| EPA 8141A                     | Methidathion          | 5          | 2     | 6          |        |               |               |        |       |            |        |
| EPA 8141A                     | Molinate              | 5          | 2     | 6          |        |               |               |        |       |            |        |
| EPA 8141A                     | Parathion, Methyl     | 5          | 2     | 6          |        |               |               |        |       |            |        |
| EPA 8141A                     | Phorate               | 5          | 2     | 6          |        |               |               |        |       |            |        |

| METHOD             | ANALYTE                           | 2007       | 2008  |            |       |              | 2009         | 2010   | 2011  |            |       |  |
|--------------------|-----------------------------------|------------|-------|------------|-------|--------------|--------------|--------|-------|------------|-------|--|
|                    |                                   | IRRIGATION | STORM | IRRIGATION | FALL* | WINTER-FALL* | WINTER-FALL* | WINTER | STORM | IRRIGATION | FALL* |  |
| EPA 8141A          | Phosmet                           | 5          | 2     | 6          |       |              |              |        |       |            |       |  |
| EPA 8141A          | Thiobencarb                       | 5          | 2     | 6          |       |              |              |        |       |            |       |  |
| Pyrethroids        |                                   |            |       |            |       |              |              |        |       |            |       |  |
| EPA 8081A          | Bifenthrin                        | 5          | 2     | 6          |       |              |              |        |       |            |       |  |
| EPA 8081A          | Cyfluthrin, total                 | 5          | 2     | 6          |       |              |              |        |       |            |       |  |
| EPA 8081A          | Cyhalothrin, lambda, total        | 5          | 2     | 6          |       |              |              |        |       |            |       |  |
| EPA 8081A          | Cypermethrin, total               | 5          | 2     | 6          |       |              |              |        |       |            |       |  |
| EPA 8081A          | Esfenvalerate/ Fenvalerate, total | 5          | 2     | 6          |       |              |              |        |       |            |       |  |
| EPA 8081A          | Permethrin, total                 | 5          | 2     | 6          |       |              |              |        |       |            |       |  |
| Triazines          |                                   |            |       |            |       |              |              |        |       |            |       |  |
| EPA 547M           | Glyphosate                        | 5          | 2     | 6          |       |              |              |        |       |            |       |  |
| EPA 549.2M         | Paraquat dichloride               | 5          | 2     | 6          |       |              |              |        |       |            |       |  |
| EPA 619            | Atrazine                          | 5          | 2     | 6          |       |              |              |        |       |            |       |  |
| EPA 619            | Cyanazine                         | 5          | 2     | 6          |       |              |              |        |       |            |       |  |
| EPA 619            | Simazine                          | 5          | 2     | 6          |       |              |              |        |       |            |       |  |
| Metals (Total)     |                                   |            |       |            |       |              |              |        |       |            |       |  |
| EPA 200.8          | Arsenic                           | 5          | 2     | 6          |       |              |              |        |       |            |       |  |
| EPA 200.8          | Boron                             | 5          | 2     | 6          |       |              |              |        |       |            |       |  |
| EPA 200.8          | Cadmium                           | 5          | 2     | 6          |       |              |              |        |       |            |       |  |
| EPA 200.8          | Copper                            | 5          | 2     | 10         |       |              |              |        |       | 4          |       |  |
| EPA 200.8          | Lead                              | 5          | 2     | 6          |       |              |              |        |       |            |       |  |
| EPA 200.8          | Nickel                            | 5          | 2     | 6          |       |              |              |        |       |            |       |  |
| EPA 200.8          | Selenium                          | 5          | 2     | 6          |       |              |              |        |       |            |       |  |
| EPA 200.8          | Zinc                              | 5          | 2     | 6          |       |              |              |        |       |            |       |  |
| Metals (Dissolved) |                                   |            |       |            |       |              |              |        |       |            |       |  |
| EPA 200.8          | Cadmium                           |            |       |            |       |              |              |        |       |            |       |  |
| EPA 200.8          | Copper                            |            |       |            |       |              |              |        |       | 4          |       |  |
| EPA 200.8          | Lead                              |            |       |            |       |              |              |        |       |            |       |  |
| EPA 200.8          | Nickel                            |            |       |            |       |              |              |        |       |            |       |  |
| EPA 200.8          | Zinc                              |            |       |            |       |              |              |        |       |            |       |  |
| Nutrients          |                                   |            |       |            |       |              |              |        |       |            |       |  |
| SM 2340 C          | Hardness as CaCO3                 | 5          | 2     | 10         |       |              |              |        |       | 4          |       |  |
| EPA 300.0          | Nitrate as N                      | 5          | 2     | 6          |       |              |              |        |       |            |       |  |
| EPA 350.2          | Ammonia as N                      | 5          | 2     | 6          |       |              |              |        |       |            |       |  |
| EPA 351.3          | Nitrogen, Total Kjeldahl          | 5          | 2     | 6          |       |              |              |        |       |            |       |  |
| EPA 353.2          | Nitrate + Nitrite as N            |            |       |            |       |              |              |        |       |            |       |  |
| EPA 354.1          | Nitrite as N                      | 5          | 2     | 6          |       |              |              |        |       |            |       |  |
| EPA 365.2          | OrthoPhosphate as P               | 5          | 2     | 6          |       |              |              |        |       |            |       |  |
| EPA 365.2          | Phosphate as P                    | 5          | 2     | 6          |       |              |              |        |       |            |       |  |
| Toxicity           |                                   |            |       |            |       |              |              |        |       |            |       |  |
| EPA 821/R-02-012   | Ceriodaphnia dubia                | 5          | 2     | 6          |       |              |              |        |       |            |       |  |
| EPA 821/R-02-012   | Pimephales promelas               | 5          | 2     | 6          |       |              |              |        |       |            |       |  |
| EPA 821/R-02-013   | Selenastrum capricornutum         | 5          | 2     | 8          |       |              |              |        |       | 2          |       |  |
| EPA 600/R-99-064   | Hyalella azteca                   | 1          |       | 1          |       |              |              |        |       |            |       |  |

\*Site not sampled during the 2008 fall season, 2009 and 2010 sampling years, and 2011 fall season.

**Table XI-4. Livingston Drain @ Robin Ave site subwatershed Management Plan Monitoring schedule (2008-2011).**

| SITE NAME                    | SAMPLE DATE | MONITORING TYPE | COPPER | LEAD | CHLORPYRIFOS | S. CAPRICORNUTUM |
|------------------------------|-------------|-----------------|--------|------|--------------|------------------|
| Livingston Drain @ Robin Ave | 7-May-08    | A               | X      |      |              |                  |
| Livingston Drain @ Robin Ave | 3-Jun-08    | A               | X      |      |              |                  |
| Livingston Drain @ Robin Ave | 8-Jul-08    | A               | X      |      |              |                  |
| Livingston Drain @ Robin Ave | 9-Sep-08    | A               | X      |      |              |                  |
| Livingston Drain @ Robin Ave | 18-Jan-11   | MPM             | X      | X    | X            |                  |
| Livingston Drain @ Robin Ave | 17-Feb-11   | MPM             | X      | X    |              | X                |
| Livingston Drain @ Robin Ave | 19-Apr-11   | MPM             |        |      |              | X                |
| Livingston Drain @ Robin Ave | 17-May-11   | MPM             | X      |      |              | X                |
| Livingston Drain @ Robin Ave | 21-Jun-11   | MPM             | X      |      | X            |                  |
| Livingston Drain @ Robin Ave | 19-Jul-11   | MPM             | X      |      | X            |                  |
| Livingston Drain @ Robin Ave | 16-Aug-11   | MPM             |        |      | X            |                  |
| Livingston Drain @ Robin Ave | 13-Sep-11   | MPM             | X      |      |              |                  |

A – Additional sampling

X – Constituent sampled for Management Plan Monitoring (MPM)

## Exceedance History

Livingston Drain samples from 2007 through 2011 have exceeded the WQTLs for DO (1), pH (11), nitrate (1), *E. coli* (2), dissolved copper (2), total copper (9), lead (2), and chlorpyrifos (4). Toxicity to *S. capricornutum* occurred four times (Table XI-5). Two exceedances of copper occurred in 2011.

Exceedances are based on WQTLs listed in the introduction to the ESJWQC Management Plan. The constituents of highest concern in the Livingston Drain subwatershed are chlorpyrifos (A/B), copper (C), and *S. capricornutum* toxicity (D).

**Table XI-5. Livingston Drain @ Robin Ave site subwatershed exceedances (2007-2011).**

The WQTL used to evaluate the data are listed in the header after the analyte.

| SITE NAME                    | SEASON         | SAMPLE DATE | OXYGEN, DISSOLVED, >7 MG/L | pH, <6.5 AND > 8.5 UNITS | NITRATE AS N, >10 MG/L | E. COLI, >235 MPN/100 ML | COPPER, DISSOLVED <sup>1</sup> µG/L | COPPER, TOTAL <sup>2</sup> , >1,300 µG/L | LEAD, TOTAL <sup>1</sup> , >15 µG/L | CHLORPYRIFOS, > 0.015 µG/L | S. CAPRICORNUTUM, (% CONTROL) |
|------------------------------|----------------|-------------|----------------------------|--------------------------|------------------------|--------------------------|-------------------------------------|------------------------------------------|-------------------------------------|----------------------------|-------------------------------|
| Livingston Drain @ Robin Ave | Irrigation     | 5/15/2007   |                            | 8.95                     |                        |                          |                                     | 18 (13.2)                                |                                     |                            |                               |
| Livingston Drain @ Robin Ave | Irrigation     | 6/19/2007   |                            |                          |                        |                          |                                     | 16 (4.4)                                 |                                     |                            |                               |
| Livingston Drain @ Robin Ave | Irrigation     | 7/17/2007   |                            | 8.82                     |                        |                          |                                     | 7.8 (5.3)                                |                                     |                            |                               |
| Livingston Drain @ Robin Ave | Irrigation     | 8/14/2007   |                            |                          |                        |                          |                                     |                                          |                                     | 0.016                      |                               |
| Livingston Drain @ Robin Ave | Irrigation     | 9/11/2007   |                            | 8.57                     |                        |                          |                                     | 14 (6.4)                                 |                                     |                            |                               |
| Livingston Drain @ Robin Ave | Storm          | 1/24/2008   |                            |                          |                        | 1700                     |                                     | 6.7 (3.1)                                | 2.4 (0.6)                           | 0.02                       |                               |
| Livingston Drain @ Robin Ave | Storm          | 2/26/2008   | 5.68                       |                          |                        |                          |                                     | 15 (4.1)                                 | 1.1 (0.9)                           |                            | 61                            |
| Livingston Drain @ Robin Ave | Irrigation     | 4/22/2008   |                            |                          |                        |                          |                                     |                                          |                                     |                            | 58                            |
| Livingston Drain @ Robin Ave | Irrigation, RS | 4/29/2008   |                            |                          |                        |                          |                                     |                                          |                                     |                            | 63                            |
| Livingston Drain @ Robin Ave | Irrigation     | 5/20/2008   |                            | 8.79                     |                        |                          |                                     |                                          |                                     |                            | 62                            |
| Livingston Drain @ Robin Ave | Irrigation, RS | 5/27/2008   |                            | 8.68                     |                        |                          |                                     |                                          |                                     |                            |                               |
| Livingston Drain @ Robin Ave | Irrigation     | 6/3/2008    |                            | 8.61                     |                        |                          |                                     |                                          |                                     |                            |                               |
| Livingston Drain @ Robin Ave | Irrigation     | 6/17/2008   |                            | 8.97                     | 11                     |                          |                                     | 45 (13)                                  |                                     | 0.23                       |                               |
| Livingston Drain @ Robin Ave | Irrigation     | 7/8/2008    |                            | 8.97                     |                        |                          |                                     | 110 (5.7)                                |                                     |                            |                               |
| Livingston Drain @ Robin Ave | Irrigation     | 7/22/2008   |                            |                          |                        | 440                      |                                     | 17 (16.9)                                |                                     | 0.025                      |                               |
| Livingston Drain @ Robin Ave | Irrigation     | 8/19/2008   |                            |                          |                        |                          |                                     |                                          |                                     |                            |                               |
| Livingston Drain @ Robin Ave | Sediment       | 8/28/2008   |                            | 8.67                     |                        |                          |                                     |                                          |                                     |                            |                               |
| Livingston Drain @ Robin Ave | Irrigation     | 9/9/2008    |                            | 8.72                     |                        |                          |                                     |                                          |                                     |                            |                               |
| Livingston Drain @ Robin Ave | Irrigation     | 9/23/2008   |                            | 9.02                     |                        |                          |                                     |                                          |                                     |                            |                               |
| Livingston Drain @ Robin Ave | Irrigation     | 7/19/2011   |                            |                          |                        |                          | 2.6 (1.67)                          |                                          |                                     |                            |                               |
| Livingston Drain @ Robin Ave | Irrigation     | 9/13/2011   |                            |                          |                        |                          | 1.7 (1.25)                          |                                          |                                     |                            |                               |
| Constituent Priority         |                |             | NP                         | E                        | NP                     | E                        | C                                   | C                                        | E                                   | A/B                        | D                             |

<sup>1</sup>Dissolved metals not analyzed until October 2008; WQTL variable based on hardness.

<sup>2</sup>Total metal WQTL variable based on hardness.

NP – Not Prioritized; less than two exceedances within three consecutive monitoring years and currently no TM

RS – Resampling due to toxicity

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## 2007-2011 Management Plan Monitoring Results

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All monitoring results for high priority management plan constituents in the Livingston Drain @ Robin Ave subwatershed are listed in Table XI-6, which includes chlorpyrifos, copper, lead, and *S. capricornutum* toxicity.

Chlorpyrifos first exceeded the WQTL in 2007 (August) and was subsequently added to the Livingston Drain management plan. However, no MPM was scheduled for the constituent in 2008. Normal Monitoring resulted in three exceedances of chlorpyrifos during 2008 (January, June, and July). Management Plan Monitoring occurred in 2011 during months of past exceedances and no chlorpyrifos was detected (Table XI-6).

Copper exceedances occurred four times during 2007 Normal Monitoring, and it was added to the Livingston Drain management plan. Additional MPM and Normal Monitoring occurred in 2008 resulted in copper exceedances during January, February, June and July (Normal Monitoring and additional MPM in July, Table XI-6). Two copper exceedances occurred during 2011 MPM.

There were two lead exceedances at Livingston Drain; the exceedances occurred during 2008 (January and February), and consequently lead was added to the Livingston Drain management plan. Because lead is not applied by agriculture, it is a lower priority (E) within the Livingston Drain management plan, and MPM for the constituent is not required. However, the Coalition decided to conduct MPM for lead in 2011 (January and February) in part because, as mentioned above, metals are now analyzed separately for total and dissolved fractions which allows the Coalition to more accurately characterize water quality. There were no exceedances of the lead WQTL in samples collected during 2011 MPM (Table XI-6).

Toxicity to *S. capricornutum* occurred three times during 2008 and the constituent was added to the Livingston Drain management plan. Management Plan Monitoring during 2011 did not find any instances of *S. capricornutum* toxicity (Table XI-6).

Management Plan Monitoring will be conducted during 2012 for all the above constituents during months of historical exceedances.

**Table XI-6. Livingston Drain @ Robin Ave site subwatershed monitoring results for high priority constituents (2008-2011).**

Exceedance values are in bold. Resampling (RS) due to toxicity not included in table.

|                                     | MONTH:                                       | JAN         | FEB       | APR     | MAY     | JUN         | JUL          | AUG     | SEP        |
|-------------------------------------|----------------------------------------------|-------------|-----------|---------|---------|-------------|--------------|---------|------------|
| <b>2008 MPM A<br/>(@ Robin Ave)</b> | Date                                         | NA          | NA        | NA      | 5/7/08  | 6/3/08      | 7/8/08       | NA      | 9/9/08     |
|                                     | Copper, total (µg/L)                         | NA          | NA        | NA      | 6.9     | 9.2         | <b>110</b>   | NA      | 5.3        |
| <b>2008 NM<br/>(@ Robin Ave)</b>    | Date                                         | 1/24/08     | 2/26/08   | 4/22/08 | 5/20/08 | 6/17/08     | 7/22/08      | 8/19/08 | 9/23/08    |
|                                     | Chlorpyrifos (µg/L)                          | <b>0.02</b> | <0.003    | <0.003  | <0.003  | <b>0.23</b> | <b>0.025</b> | <0.003  | 0.0051     |
|                                     | Copper, total (µg/L)                         | <b>6.7</b>  | <b>15</b> | 8.7     | 7.1     | <b>45</b>   | <b>17</b>    | 5.2     | 4.7        |
| <b>2011 MPM<br/>(@ Robin Ave)</b>   | Date                                         | 1/18/11     | 2/17/11   | 4/19/11 | 5/17/11 | 6/21/11     | 7/19/11      | 8/16/11 | 9/13/11    |
|                                     | Chlorpyrifos (µg/L)                          | Dry         | NA        | NA      | NA      | <0.003      | <0.003       | <0.003  | NA         |
|                                     | Copper, dissolved (µg/L)                     | Dry         | Dry       | NA      | 2       | 2.4         | <b>2.6</b>   | NA      | <b>1.7</b> |
|                                     | Copper, total (µg/L)                         | Dry         | Dry       | NA      | 3.3     | 4.8         | 4.2          | NA      | 2.8        |
|                                     | Lead, dissolved (µg/L)                       | Dry         | Dry       | NA      | NA      | NA          | NA           | NA      | NA         |
|                                     | Lead, total (µg/L)                           | Dry         | Dry       | NA      | NA      | NA          | NA           | NA      | NA         |
|                                     | <i>S. capricornutum</i> toxicity (% Control) | NA          | Dry       | 452     | 606     | NA          | NA           | NA      | NA         |

A – Additional MPM conducted in 2008 only.

MPM – Management Plan Monitoring (see Table 4 for MPM schedule)

NA – Not applicable. No monitoring occurred on this date for this constituent.

NM – Normal Monitoring

### Load Calculations

Loads have been calculated for all chlorpyrifos and copper detections in the site subwatershed based on the following formula (Table XI-7):

$$\text{Load} = \text{Discharge (cfs)} \times 28.317\text{L/ft}^3 \times \text{Concentration (mg/L} \times 1000 \text{ or } \mu\text{g/L)}.$$

The load values for constituents in this report represent instantaneous loads only. These values should not be used to extrapolate loading over any period of time (e.g. weekly, monthly, seasonal or annual). The primary purpose for reporting instantaneous loads is to provide a normalization of the concentrations by flow for various constituents at the time the samples were collected.

**Table XI-7. Livingston Drain @ Robin Ave site subwatershed instantaneous load calculations for chlorpyrifos and copper.**

Sorted by analyte and date.

| SAMPLE SITE                   | ANALYTE NAME | SAMPLE DATE | DISCHARGE CFS | CONCENTRATION µG/L | LOADING RATE µG/SEC |
|-------------------------------|--------------|-------------|---------------|--------------------|---------------------|
| Livingston Drain @ Robin Ave  | Chlorpyrifos | 07/17/07    | 1.4           | 0.011              | 0.44                |
| Livingston Drain @ Robin Ave  | Chlorpyrifos | 08/14/07    | 7.64          | 0.016              | 3.46                |
| Livingston Drain @ Robin Ave  | Chlorpyrifos | 01/24/08    | 7.13          | 0.02               | 4.04                |
| Livingston Drain @ Robin Ave  | Chlorpyrifos | 06/17/08    | 2.91          | 0.015              | 1.24                |
| Livingston Drain @ Robin Ave* | Chlorpyrifos | 06/17/08    | 2.91          | 0.23               | 18.95               |
| Livingston Drain @ Robin Ave  | Chlorpyrifos | 07/22/08    | 3.09          | 0.025              | 2.19                |
| Livingston Drain @ Robin Ave  | Chlorpyrifos | 09/23/08    | 1.93          | 0.0051             | 0.28                |

| SAMPLE SITE                   | ANALYTE NAME | SAMPLE DATE | DISCHARGE CFS | CONCENTRATION µG/L | LOADING RATE µG/SEC |
|-------------------------------|--------------|-------------|---------------|--------------------|---------------------|
| Livingston Drain @ Robin Ave  | Copper       | 05/15/07    | 8.94          | 18                 | 4556.77             |
| Livingston Drain @ Robin Ave  | Copper       | 06/19/07    | 2.25          | 16                 | 1019.41             |
| Livingston Drain @ Robin Ave  | Copper       | 07/17/07    | 1.4           | 7.8                | 309.22              |
| Livingston Drain @ Robin Ave  | Copper       | 08/14/07    | 7.64          | 7                  | 1514.39             |
| Livingston Drain @ Robin Ave  | Copper       | 09/11/07    | 5.11          | 14                 | 2025.80             |
| Livingston Drain @ Robin Ave  | Copper       | 01/24/08    | 7.13          | 6.7                | 1352.73             |
| Livingston Drain @ Robin Ave  | Copper       | 02/26/08    | 0.19          | 15                 | 80.70               |
| Livingston Drain @ Robin Ave* | Copper       | 02/26/08    | 0.19          | 18                 | 96.84               |
| Livingston Drain @ Robin Ave  | Copper       | 04/22/08    | 1.07          | 8.7                | 263.60              |
| Livingston Drain @ Robin Ave  | Copper       | 05/07/08    | 1.67          | 6.9                | 326.30              |
| Livingston Drain @ Robin Ave  | Copper       | 05/20/08    | 4.1           | 7.1                | 824.31              |
| Livingston Drain @ Robin Ave  | Copper       | 06/03/08    | 1.58          | 9.2                | 411.62              |
| Livingston Drain @ Robin Ave* | Copper       | 06/17/08    | 2.91          | 6                  | 494.41              |
| Livingston Drain @ Robin Ave  | Copper       | 06/17/08    | 2.91          | 45                 | 3708.11             |
| Livingston Drain @ Robin Ave  | Copper       | 07/08/08    | 0             | 110                | 0                   |
| Livingston Drain @ Robin Ave  | Copper       | 07/22/08    | 3.09          | 17                 | 1487.49             |
| Livingston Drain @ Robin Ave  | Copper       | 08/19/08    | 3.09          | 5.2                | 455.00              |
| Livingston Drain @ Robin Ave  | Copper       | 09/09/08    | 2.45          | 5.3                | 367.70              |
| Livingston Drain @ Robin Ave  | Copper       | 09/23/08    | 1.93          | 4.7                | 256.86              |
| Livingston Drain @ Robin Ave  | Copper       | 05/17/11    | 11.78         | 3.3                | 1100.80             |
| Livingston Drain @ Robin Ave  | Copper       | 06/21/11    | 4.99          | 4.8                | 678.25              |
| Livingston Drain @ Robin Ave  | Copper       | 07/19/11    | 27.51         | 4.2                | 3271.80             |
| Livingston Drain @ Robin Ave  | Copper       | 09/13/11    | 16.93         | 2.8                | 1342.34             |
| Livingston Drain @ Robin Ave  | Copper (D)   | 05/17/11    | 11.78         | 2                  | 667.15              |
| Livingston Drain @ Robin Ave  | Copper (D)   | 06/21/11    | 4.99          | 2.4                | 339.12              |
| Livingston Drain @ Robin Ave  | Copper (D)   | 07/19/11    | 27.51         | 2.6                | 2025.40             |
| Livingston Drain @ Robin Ave  | Copper (D)   | 09/13/11    | 16.93         | 1.7                | 814.99              |

\*Field Duplicate

## Source Identification and Outreach

The Coalition focuses its efforts on applied pesticides and considers past monitoring results and associated PUR data to address source identification and determine an outreach strategy. During 2008, the Coalition conducted additional MPM during the months when exceedances historically occurred to better characterize water quality in the subwatershed. Management Plan Monitoring occurred at the site during 2011. The Coalition also reviews PUR data to determine the most frequent crop type and timing associated with pesticide applications. From these actions, the Coalition derived an outreach strategy, which is detailed in the following sections.

In the Coalition's approved Management Plan, the Livingston Drain @ Robin Ave subwatershed is a high priority as of 2011 and will remain as such through 2013. The Coalition will actively engage in grower outreach and education to address the Livingston Drain management plan's highest priority constituents. The Coalition organized grower meetings and mailings to educate growers about management practices and their importance in achieving acceptable water quality. Grower meetings with targeted members occurred in the fall of 2010 and fall of 2011 to inform growers about

management practices as well as to assess current and expected future implementation of additional management practices. Follow up with the targeted members who received recommendations for management practices will occur in 2012 to determine if additional management practices were implemented. Management Plan Monitoring will continue through 2013 as necessary to assess the effect of outreach on water quality.

### *Priority A/B Constituents*

Chlorpyrifos is the only A/B constituent for the Livingston Drain subwatershed.

#### **Chlorpyrifos**

The WQTL for chlorpyrifos (0.015 µg/L) was exceeded four times in this subwatershed: three times during the irrigation season and once during a storm event (Table XI-5).

The Livingston Drain subwatershed is predominantly orchards during dormant sprays in the winter and throughout the irrigation season. Peak use often occurs during the latter summer months prior to almond and walnut harvests, but that trend does not appear true for the Livingston Drain subwatershed.

To determine an outreach strategy, the Coalition reviewed PUR data from the Livingston Drain subwatershed for the number of monthly chlorpyrifos applications, pounds of active ingredient applied, and the acres treated (Table XI -8, Figure XI-2). Chlorpyrifos use in the subwatershed peaked in 2007 (2,335 lbs AI) and declined since, although growers still apply relatively large amounts of chlorpyrifos to relatively small acreages. Applications used to occur mostly in the summer months in the subwatershed, but in recent years there were several more applications earlier in the irrigation season in April. Regardless, exceedances in the waterway do not always coincide with heavy use of chlorpyrifos, indicating mechanisms other than spray drift may be responsible for transporting chlorpyrifos offsite. Chlorpyrifos is primarily applied to almond orchards and sweet potato crops in the subwatershed (Table XI-9).

**Table XI-8. Livingston Drain @ Robin Ave site subwatershed chlorpyrifos applications, lbs AI applied, and acres treated by month (2007-2011).**

PUR data available through October 2011 for Merced County. If month is not included in table, no applications were made.

| MONTH/YEAR      | NUMBER OF CHLORPYRIFOS | POUNDS OF AI APPLIED | ACRES TREATED |
|-----------------|------------------------|----------------------|---------------|
| January, 2007   | 2                      | 49.0                 | 49.0          |
| February, 2007  | 8                      | 159.5                | 169.0         |
| March, 2007     | 1                      | 59.5                 | 85.0          |
| April, 2007     | 5                      | 181.4                | 93.5          |
| May, 2007       | 11                     | 372.4                | 196.5         |
| June, 2007      | 1                      | 18.6                 | 20.0          |
| July, 2007      | 18                     | 720.8                | 407.3         |
| August, 2007    | 17                     | 608.7                | 439.5         |
| September, 2007 | 1                      | 28.1                 | 15.0          |
| October, 2007   | 1                      | 37.2                 | 20.0          |
| March, 2008     | 2                      | 54.5                 | 57.8          |



| MONTH/YEAR               | NUMBER OF CHLORPYRIFOS | POUNDS OF AI APPLIED | ACRES TREATED  |
|--------------------------|------------------------|----------------------|----------------|
| April, 2008              | 5                      | 232.4                | 117.3          |
| May, 2008                | 16                     | 688.0                | 351.7          |
| June, 2008               | 5                      | 83.0                 | 41.0           |
| July, 2008               | 8                      | 359.5                | 325.0          |
| August, 2008             | 19                     | 535.5                | 444.5          |
| September, 2008          | 2                      | 97.5                 | 195.0          |
| April, 2009              | 2                      | 116.0                | 58.0           |
| May, 2009                | 4                      | 212.2                | 105.0          |
| June, 2009               | 1                      | 40.0                 | 20.0           |
| August, 2009             | 18                     | 665.9                | 642.0          |
| April, 2010              | 6                      | 705.4                | 624.0          |
| May, 2010                | 3                      | 135.0                | 68.0           |
| June, 2010               | 1                      | 9.0                  | 40.0           |
| July, 2010               | 6                      | 195.6                | 147.0          |
| August, 2010             | 9                      | 248.2                | 222.6          |
| April, 2011              | 7                      | 1147.4               | 779.0          |
| May, 2011                | 9                      | 237.2                | 119.0          |
| June, 2011               | 1                      | 60.3                 | 123.0          |
| July, 2011               | 1                      | 21.6                 | 11.5           |
| August, 2011             | 9                      | 287.9                | 311.9          |
| September, 2011          | 2                      | 57.6                 | 38.8           |
| <b>Summaries by Year</b> |                        |                      |                |
| 2007 Total               | 65                     | 2235.1               | 1,494.8        |
| 2008 Total               | 57                     | 2050.5               | 1,532.3        |
| 2009 Total               | 25                     | 1034.1               | 825.0          |
| 2010 Total               | 25                     | 1293.2               | 1,101.6        |
| 2011 Total               | 29                     | 1811.9               | 1,383.2        |
| <b>Total</b>             | <b>201</b>             | <b>8424.9</b>        | <b>6,336.9</b> |

**Figure XI-2. Livingston Drain @ Robin Ave site subwatershed lbs chlorpyrifos applied by month (2007-2011).**

Asterisk (\*) denotes months with exceedances. PUR data available through October 2011 for Merced County.

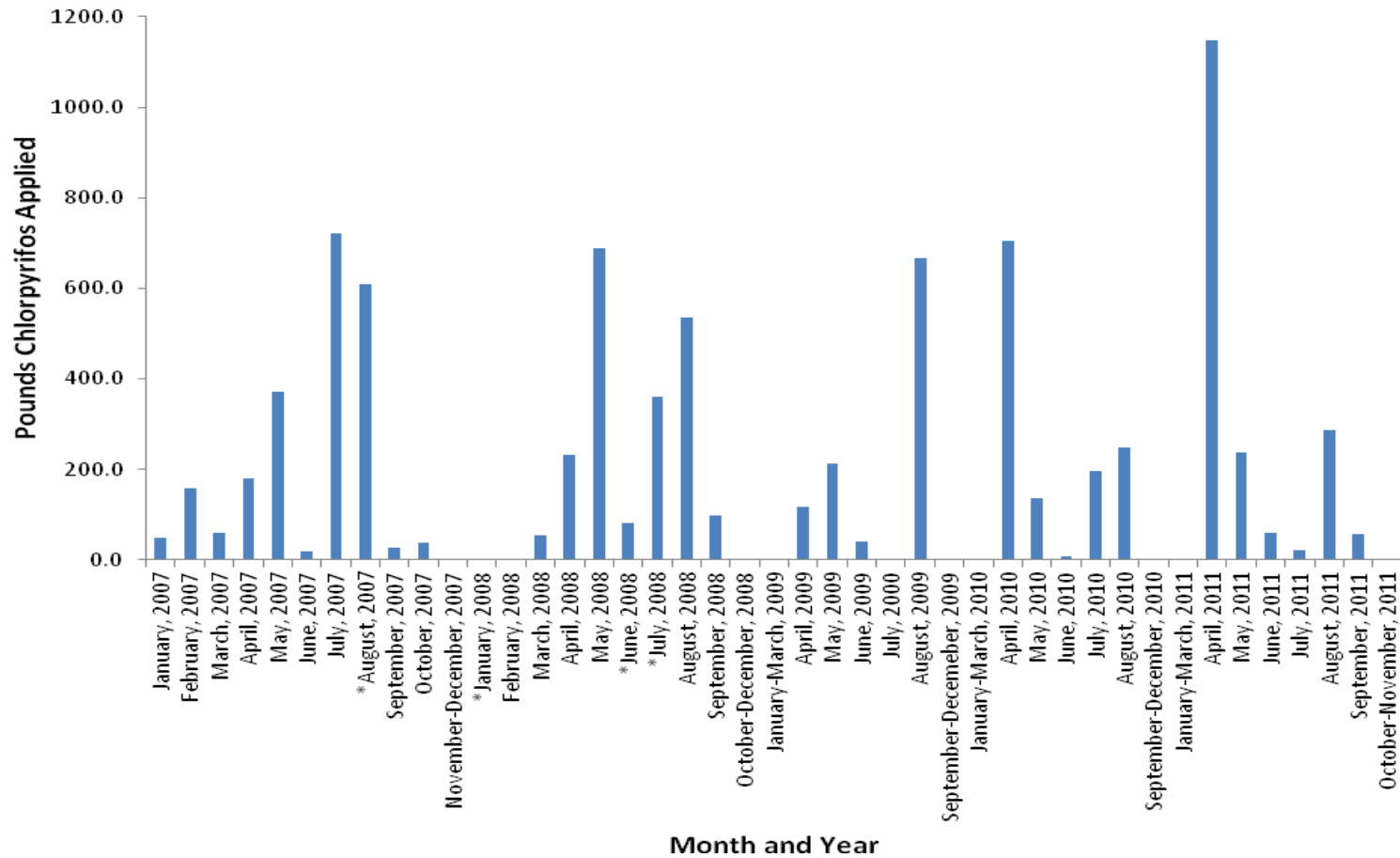


**Table XI-9. Livingston Drain @ Robin Ave site subwatershed chlorpyrifos PUR data (2007-2011).**

PUR data available through October 2011 for Merced County.

| CHEMICAL NAME                                  | COMMODITY                               | PRODUCT NAME                     | LBS AI APPLIED |
|------------------------------------------------|-----------------------------------------|----------------------------------|----------------|
| CHLORPYRIFOS                                   | ALFALFA (FORAGE - FODDER) (ALFALFA HAY) | LOCK-ON INSECTICIDE              | 77.6           |
|                                                |                                         | LORSBAN-4E                       | 175.6          |
|                                                | ALMOND                                  | CHLORPYRIFOS 4E AG               | 797.4          |
|                                                |                                         | GOVERN 4E INSECTICIDE            | 1728.3         |
|                                                |                                         | LORSBAN 4E-HF                    | 298.3          |
|                                                |                                         | LORSBAN ADVANCED                 | 469.7          |
|                                                |                                         | LORSBAN-4E                       | 1075.9         |
|                                                |                                         | WARHAWK                          | 957.0          |
|                                                |                                         | CORN (FORAGE - FODDER)           | LORSBAN 4E-HF  |
|                                                | NUFOS 4E                                |                                  | 20.3           |
|                                                | PEACH                                   | LORSBAN-4E                       | 49.0           |
|                                                | SWEET POTATO                            | CHLORPYRIFOS 4E AG               | 33.8           |
|                                                |                                         | GOVERN 4E INSECTICIDE            | 329.5          |
|                                                |                                         | LORSBAN 15G GRANULAR INSECTICIDE | 1714.7         |
|                                                |                                         | LORSBAN-4E                       | 87.3           |
|                                                | WALNUT (ENGLISH WALNUT, PERSIAN WALNUT) | LORSBAN 4E-HF                    | 147.5          |
|                                                |                                         | LORSBAN ADVANCED                 | 193.4          |
|                                                |                                         | LORSBAN-4E                       | 108.1          |
|                                                |                                         | NUFOS 4E                         | 69.1           |
|                                                |                                         |                                  |                |
| ALFALFA-Total Pounds Chlorpyrifos Applied      |                                         |                                  | 253.2          |
| ALMOND-Total Pounds Chlorpyrifos Applied       |                                         |                                  | 5326.7         |
| CORN-Total Pounds Chlorpyrifos Applied         |                                         |                                  | 112.5          |
| PEACH-Total Pounds Chlorpyrifos Applied        |                                         |                                  | 49.0           |
| SWEET POTATO-Total Pounds Chlorpyrifos Applied |                                         |                                  | 2165.2         |
| WALNUT-Total Pounds Chlorpyrifos Applied       |                                         |                                  | 518.2          |
| Total Pounds Chlorpyrifos Applied (2007-2011)  |                                         |                                  | 8424.9         |

The chlorpyrifos concentrations found in Livingston Drain @ Robin Ave are most likely the result of irrigation tailwater and storm water runoff transporting chlorpyrifos to the creek. Because the chlorpyrifos concentrations were well above the WQTL and exceedances did not always coincide with peak application periods, it is unlikely that exceedances were solely the result of spray drift. The management of chlorpyrifos in this subwatershed included providing information to growers regarding proper management of irrigation tailwater and storm water. Because some exceedances did coincide with several applications, orchard operators were also encouraged to implement additional spray drift management practices.

Since 2007, general Coalition outreach included grower meetings and the mailing/distribution of information. A complete list of coalition outreach during 2011 is provided in the Actions Taken to Address Water Quality Exceedances section of the 2012 AMR (Table 46, page 142). Focused outreach was directed at growers whose parcels are in the direct drainage area of the subwatershed and who applied chlorpyrifos. From these criteria, the Coalition compiled a list of targeted growers.

The Coalition completed individual meetings with targeted growers in the third priority subwatersheds during the fall seasons of 2010 and 2011. Although meetings focused mainly on chlorpyrifos exceedances, all water quality results are reviewed and discussed including copper, *S. capricornutum* toxicity, *E. coli*, lead, and pH. The Coalition contacted 11 members accounting for 335 acres of targeted direct drainage.

Grower surveys completed at the meetings documenting members' current practices and indicating which recommended practices growers anticipate implementing in the upcoming years have been compiled and assessed by the Coalition in the Third Priority Subwatersheds Summary of Management Practices section of this report. The Coalition anticipates some growers were able to begin to implement management practices in 2011 whereas some growers will begin to implement recommended practices during the irrigation season of 2012, depending upon when their initial contact meeting occurred. Follow up meetings with targeted growers who received recommendations for practices will occur in the winter and/or spring of 2012 to determine what additional management practices were implemented in the subwatershed.

Management Plan Monitoring will continue in 2012 at Livingston Drain @ Robin Ave during months of historical exceedances. The Coalition plans to conduct MPM through 2013 to evaluate improvements in water quality as recommended management practice implementation occurs.

### *Priority C Constituent*

Copper is the only priority C constituent listed for the Livingston Drain @ Robin Ave subwatershed management plan.

#### **Copper**

There were nine exceedances of the copper WQTL within the Livingston Drain subwatershed (Table XI-5). The 2008 (February) copper exceedance coincided with toxicity to *S. capricornutum*, however algae toxicity also occurred during 2008 (April and May) when there were no copper exceedances.

Copper is an algaecide and fungicide often applied to orchards and vineyards. Copper can be applied throughout the year but its peak application periods are prior to and during the dormant season and early in the irrigation season. Copper is also heavily used by dairies, and the Livingston Drain subwatershed contains relatively several dairies (Figure XI-1). Often copper is applied via ground application, thus mismanaged irrigation tailwater is a more likely source than spray drift.

To determine an outreach strategy, the Coalition reviewed PUR data for the number of monthly copper applications, pounds of active ingredient applied, and acres treated (Table XI-10, Figure XI-3). Pesticide Use Report data indicate copper use began in the subwatershed in 2007 (16,218 lbs AI) and declined since, although the amount applied in 2011 (15,828 lbs AI) was the greatest since 2007. Copper applications typically occur during December through February, although several applications occurred

during July 2011. Exceedances in Livingston Drain do not always coincide with applications in the subwatershed.

The largest amount of copper applied from 2006 through 2011 was associated with almonds (49,277 lbs AI), peaches (8,341 lbs AI) and grapes (6,880 lbs AI). The most common product containing copper used within this subwatershed is Kocide (Table XI-11).

**Table XI-10. Livingston Drain @ Robin Ave site subwatershed copper applications, lbs AI applied, and acres treated by month (2007-2011).**

PUR data available through October 2011 for Merced County. If month is not included in table, no applications were made.

| MONTH/YEAR               | NUMBER OF COPPER APPLICATIONS | POUNDS OF AI APPLIED | ACRES TREATED  |
|--------------------------|-------------------------------|----------------------|----------------|
| January, 2007            | 66                            | 11202.4              | 3072.0         |
| February, 2007           | 43                            | 1938.0               | 1026.9         |
| March, 2007              | 22                            | 828.8                | 565.8          |
| July, 2007               | 3                             | 419.7                | 126.5          |
| November, 2007           | 2                             | 38.7                 | 18.0           |
| December, 2007           | 11                            | 1789.9               | 309.5          |
| January, 2008            | 65                            | 8532.3               | 1659.8         |
| February, 2008           | 54                            | 4523.7               | 1720.3         |
| March, 2008              | 18                            | 355.2                | 431.8          |
| July, 2008               | 3                             | 270.0                | 126.5          |
| January, 2009            | 49                            | 9281.7               | 1897.0         |
| February, 2009           | 37                            | 1904.0               | 891.9          |
| March,, 2009             | 6                             | 86.0                 | 160.0          |
| April, 2009              | 3                             | 72.4                 | 84.0           |
| June, 2009               | 2                             | 191.2                | 64.0           |
| August, 2009             | 2                             | 220.0                | 95.2           |
| September, 2009          | 4                             | 455.8                | 229.4          |
| October, 2009            | 4                             | 468.0                | 202.6          |
| November, 2009           | 5                             | 615.9                | 266.6          |
| January, 2010            | 38                            | 3262.2               | 842.0          |
| February, 2010           | 57                            | 3799.3               | 1492.0         |
| March, 2010              | 15                            | 351.5                | 443.0          |
| April, 2010              | 3                             | 158.9                | 46.0           |
| July, 2010               | 5                             | 502.6                | 198.5          |
| August, 2010             | 3                             | 375.0                | 126.5          |
| January, 2011            | 46                            | 7177.4               | 1814.7         |
| February, 2011           | 41                            | 2757.2               | 1189.5         |
| March, 2011              | 7                             | 477.0                | 215.0          |
| April, 2011              | 1                             | 318.5                | 35.0           |
| July, 2011               | 48                            | 4786.1               | 1676.2         |
| September, 2011          | 1                             | 155.9                | 67.5           |
| October, 2011            | 1                             | 155.9                | 67.5           |
| <b>Summaries by Year</b> |                               |                      |                |
| 2007 Total               | 147                           | 16217.5              | 5118.7         |
| 2008 Total               | 140                           | 13681.2              | 3938.3         |
| 2009 Total               | 112                           | 13294.9              | 3890.7         |
| 2010 Total               | 121                           | 8449.5               | 3148.0         |
| 2011 Total               | 145                           | 15828.0              | 5065.4         |
| <b>Total</b>             | <b>665</b>                    | <b>67471.2</b>       | <b>21161.0</b> |

**Figure XI-3. Livingston Drain @ Robin Ave site subwatershed lbs copper applied by month (2007-2011).**

Asterisk (\*) denotes months with exceedances. PUR data available through October 2011 for Merced County.

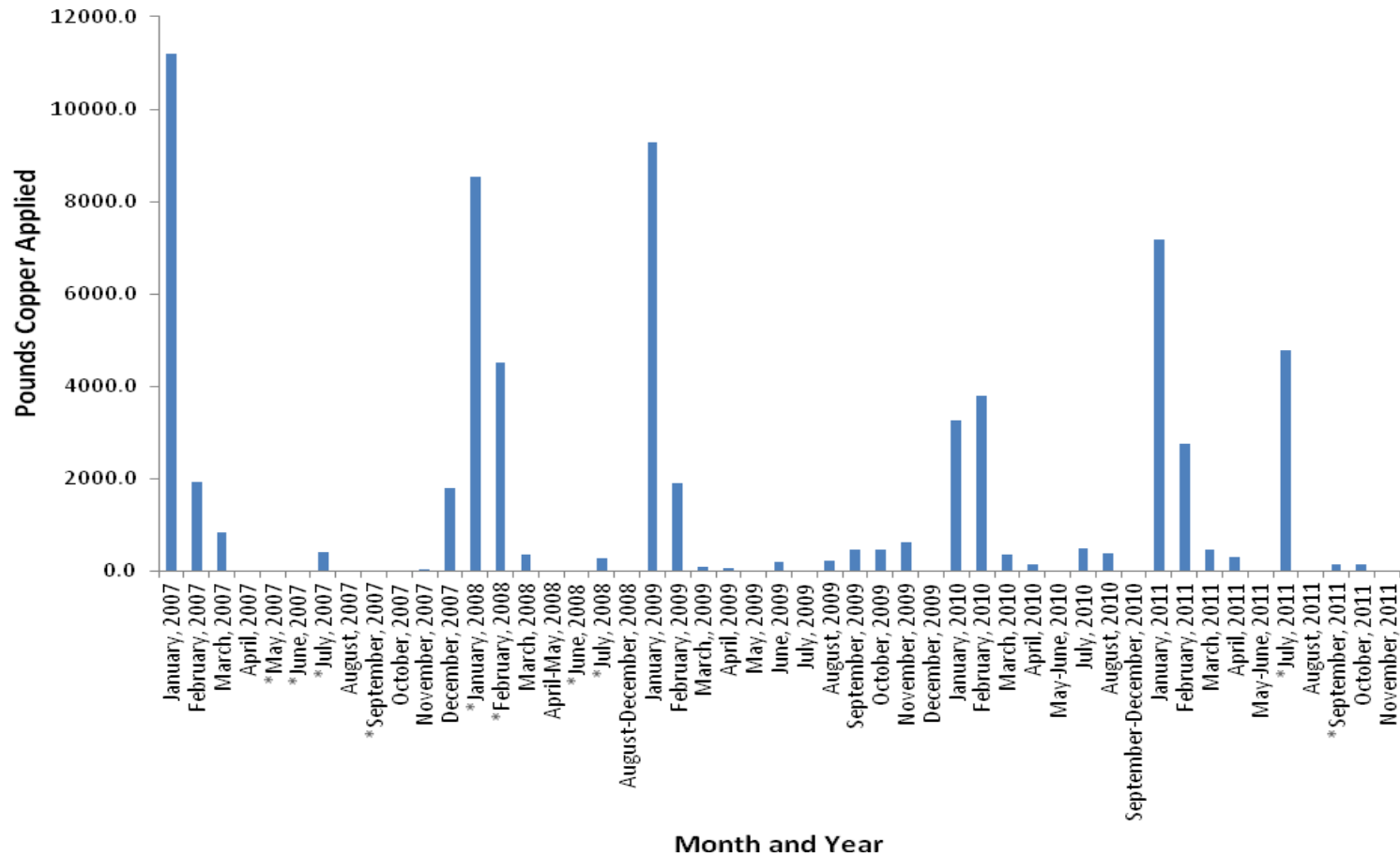


**Table XI-11. Livingston Drain @ Robin Ave site subwatershed copper PUR data (2007-2011).**

PUR data available through October 2011 for Merced County.

| CHEMICAL NAME | COMMODITY                                        | PRODUCT NAME                             | LBS AI APPLIED |
|---------------|--------------------------------------------------|------------------------------------------|----------------|
| COPPER        | ALMOND                                           | BASIC COPPER 53                          | 5658.0         |
|               |                                                  | CHAMP DP                                 | 89.9           |
|               |                                                  | CHAMP DRY PRILL                          | 10.9           |
|               |                                                  | CHAMP WG                                 | 29.3           |
|               |                                                  | CHAMPION WETTABLE POWDER                 | 45.0           |
|               |                                                  | CLEAN CROP C-O-C-S WDG                   | 178.0          |
|               |                                                  | CUPROFIX DISPERSS                        | 33.2           |
|               |                                                  | CUPROFIX ULTRA 40 DISPERSS               | 12686.0        |
|               |                                                  | DUPONT GX-569 FUNGICIDE/BACTERICIDE      | 212.1          |
|               |                                                  | DUPONT KOCIDE 2000 FUNGICIDE/BACTERICIDE | 9286.5         |
|               |                                                  | DUPONT KOCIDE 3000 FUNGICIDE/BACTERICIDE | 877.3          |
|               |                                                  | DUPONT KOCIDE DF FUNGICIDE/BACTERICIDE   | 585.8          |
|               |                                                  | KOCIDE 2000                              | 1334.7         |
|               |                                                  | KOCIDE DF                                | 425.5          |
|               |                                                  | NORDOX                                   | 1019.7         |
|               |                                                  | NORDOX 75 WG                             | 12389.5        |
|               |                                                  | NU-COP 50 WP                             | 590.6          |
|               |                                                  | NU-COP 50DF                              | 3825.0         |
|               | GRAPES                                           | DUPONT KOCIDE 3000 FUNGICIDE/BACTERICIDE | 31.3           |
|               | GRAPES (WINE)                                    | CLEAN CROP C-O-C-S 15 SULFUR 25 DUST     | 554.7          |
|               |                                                  | COCS 15 SULFUR 25 DUST                   | 82.5           |
|               |                                                  | IAP COPPER SULFUR 15-25 DUST             | 1121.3         |
|               |                                                  | NORDOX 75 WG                             | 304.1          |
|               |                                                  | WIL-DRY                                  | 4786.1         |
|               | NECTARINE                                        | CHAMP WG                                 | 92.4           |
|               |                                                  | CHAMPION WETTABLE POWDER                 | 207.9          |
|               | N-OUTDR CONTAINER/FLD GRWN PLANTS                | DUPONT KOCIDE DF FUNGICIDE/BACTERICIDE   | 0.4            |
|               | N-OUTDR GRWN TRNSPLNT/PRPGTV MTRL                | CHAMPION WETTABLE POWDER                 | 311.9          |
|               |                                                  | NU-COP 50 WP                             | 1759.7         |
|               | PEACH                                            | CHAMP WG                                 | 249.5          |
|               |                                                  | CHAMPION WETTABLE POWDER                 | 271.0          |
|               |                                                  | CUPROFIX ULTRA 40 DISPERSS               | 177.8          |
|               |                                                  | DUPONT KOCIDE 2000 FUNGICIDE/BACTERICIDE | 3204.8         |
|               |                                                  | KOCIDE 101                               | 840.8          |
|               |                                                  | KOCIDE 2000                              | 443.4          |
|               |                                                  | NORDOX                                   | 45.1           |
|               |                                                  | NORDOX 75 WG                             | 2887.0         |
|               |                                                  | NU-COP 50DF                              | 221.8          |
|               | PLUM (INCLUDES WILD PLUMS FOR HUMAN CONSUMPTION) | CHAMP WG                                 | 55.4           |
|               |                                                  | CHAMPION WETTABLE POWDER                 | 46.2           |
|               | SWEET POTATO                                     | NORDOX 75 WG                             | 30.2           |
|               | WALNUT (ENGLISH WALNUT, PERSIAN WALNUT)          | BASIC COPPER 53                          | 318.5          |
|               |                                                  | DUPONT KOCIDE 2000 FUNGICIDE/BACTERICIDE | 150.6          |

| CHEMICAL<br>NAME | COMMODITY | PRODUCT NAME                             | LBS AI<br>APPLIED |
|------------------|-----------|------------------------------------------|-------------------|
|                  |           | ALMOND-Total Pounds Copper Applied       | 49276.8           |
|                  |           | GRAPES-Total Pounds Copper Applied       | 6880.1            |
|                  |           | NECTARINE-Total Pounds Copper Applied    | 300.3             |
|                  |           | N-OUTDR-Total Pounds Copper Applied      | 2071.9            |
|                  |           | PEACH-Total Pounds Copper Applied        | 8341.2            |
|                  |           | PLUM-Total Pounds Copper Applied         | 101.6             |
|                  |           | SWEET POTATO-Total Pounds Copper Applied | 30.2              |
|                  |           | WALNUT-Total Pounds Copper Applied       | 469.1             |
|                  |           | Total Pounds Copper Applied (2007-2011)  | 67471.2           |

The Coalition included growers with the potential to drain and applying copper in their targeted grower contact list. The Coalition continued with its Management Plan strategy outlined above under the chlorpyrifos outreach section when conducting individual contacts. Growers were advised to consider irrigation tailwater and storm water management to prevent copper from entering the waterway with runoff. Orchard and vineyard operators were encouraged to implement additional spray drift management practices.

### *Priority D Constituents*

Water column toxicity to *S. capricornutum* is the only priority D constituent in the Livingston Drain @ Robin Ave subwatershed.

#### ***S. capricornutum toxicity***

Algae toxicity occurred three times at Livingston Drain in 2008 (February, April and May), and toxicity was persistent once in the resample collected one week later (April 2008). Copper coincided with the 2008 (February) toxicity, but no metals or herbicides were detected above their WQTL during the 2008 (April and May) events. Toxicity Identification Evaluations were not conducted on any of the toxic samples.

Although the exact cause of toxicity could not be isolated, the Coalition believes management practices that prevent irrigation return flows and storm water runoff from carrying agricultural constituents to the waterways is the most effective way to eliminate *S. capricornutum* toxicity. The Coalition will continue with outreach as explained above under the chlorpyrifos section to address the toxicity.

### *Priority E Constituents*

The priority E constituents listed under the Livingston Drain subwatershed management plan are *E. coli*, pH and lead.

The Coalition conducted MPM for lead in 2011 and no exceedances of the WQTL occurred. The Coalition believes this may be because the Coalition is now analyzing separately for total and dissolved fractions of metals which allows for more complete and accurate characterization of water quality. The Coalition plans to continue MPM for lead to evaluate if the constituent is still impairing water quality.



Although lead is not applied by agriculture, it is possible that offsite movement of irrigation tailwater is mobilizing sediment bound lead and transporting the metal to the waterbody. Therefore, the Coalition's strategy described above should address potential agriculture-induced movement of lead to waterways.

Although the other priority E constituents will remain low priority, the Coalition will continue to collect monitoring data as a part of Assessment Monitoring and/or MPM. Field parameters such as pH will be monitored during every event, during Assessment Monitoring and/or MPM. *E. coli* and lead will be monitored during Assessment Monitoring as scheduled in 2021 through 2022. In addition, lead will continue to be monitored during MPM. The priority E constituents are discussed during individual contacts and will continue to be discussed at annual grower meetings.

The Coalition also plans to participate in a focus group along with other Coalitions and Regional Board staff to develop a joint Work Plan to address *E. coli* exceedances by determining the potential agricultural sources of *E. coli* and identifying management practices to prevent discharges to surface waters.

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### Evaluation

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Livingston Drain @ Robin Ave is a third priority site subwatershed within the ESJWQC and is in its second year of focused outreach (2011-2013).

The Coalition's strategy for the Livingston Drain subwatershed is to focus on providing information on a subwatershed level to growers to review their operation and determine if irrigation return flows and storm water are managed properly. The Coalition targeted growers whose agricultural practices may result in the discharge or drift of pesticides into the waterway and who applied chlorpyrifos and/or copper. Outreach efforts include grower notification, management practice outreach and education, tracking of management practice implementation, and providing information on special studies of management practice efficacy.

All individual grower surveys documenting current management practice implementations and assessing future planned implementations were completed and returned to the Coalition representing 100% of targeted growers. The Third Priority Subwatersheds Summary of Management Practices section of this report summarizes the results of these contacts. The Coalition plans to conduct follow up contacts targeted growers who received recommendations for additional management practices in 2012. The Coalition will report on newly implemented management practices in the 2013 MPUR.

In 2012, MPM is scheduled to continue during months of past exceedances.

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## HIGH PRIORITY SITE SUBWATERSHEDS (2012-2014)

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## XII. BLACK RASCAL CREEK @ YOSEMITE RD

### Management Plan Constituents

#### Priority A/B

- Chlorpyrifos

#### Priority D

- *Ceriodaphnia dubia* water column toxicity

#### Priority E

- DO
- *E. coli*
- Lead
- pH

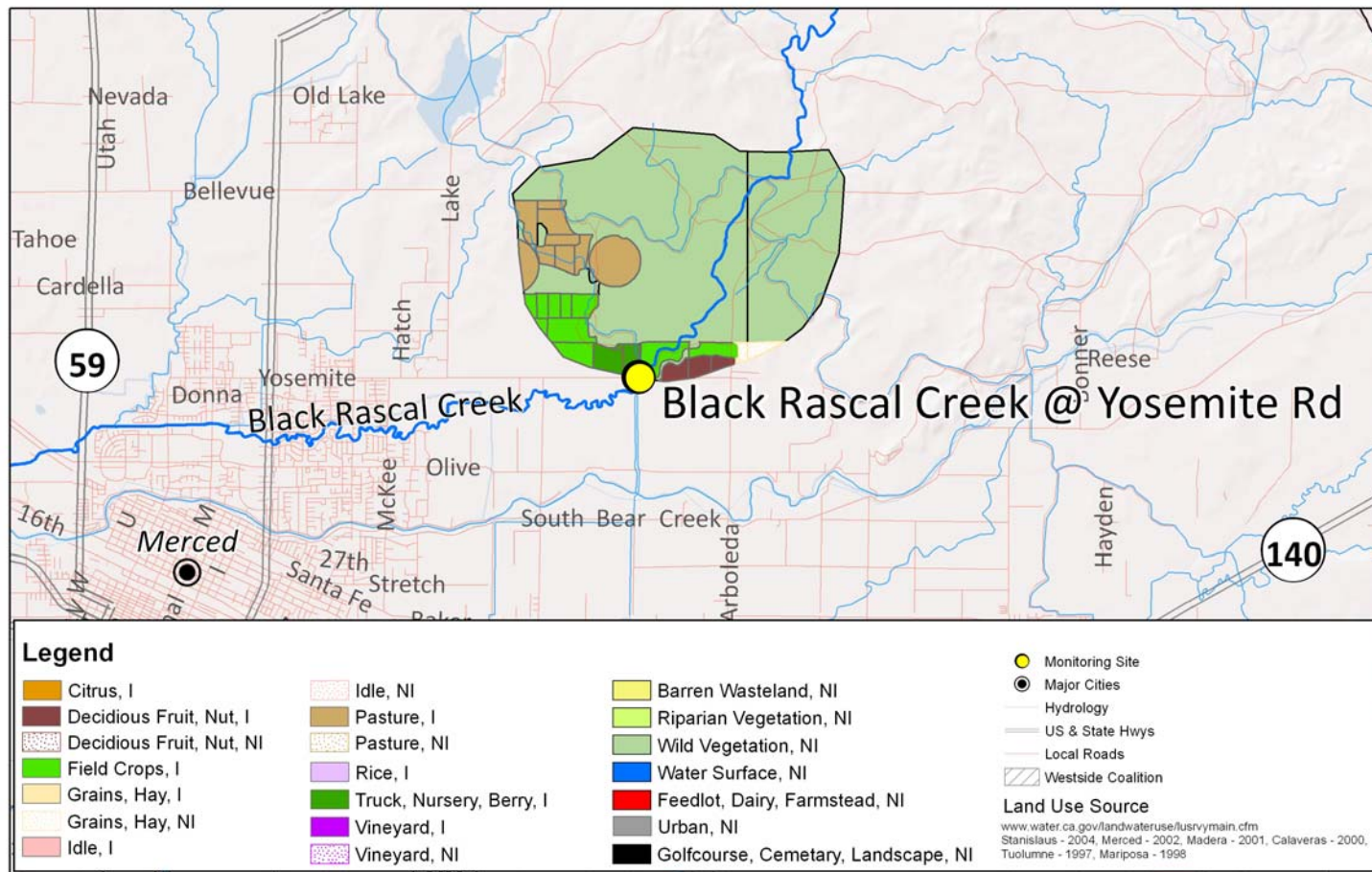
### Description of Black Rascal Creek Site Subwatershed

Black Rascal Creek @ Yosemite Rd (997 irrigated acres) –This site subwatershed is located just to the north of the Bear Creek site subwatershed and to the east of the city of Merced (Table XII-1). The headwaters of Black Rascal Creek are located in the Sierra foothills. The primary agriculture in the site subwatershed is pasture and field crops, with small amounts of orchards (Figure XII-1).

**Table XII-1. Black Rascal @ Yosemite Rd site subwatershed sampling location coordinates.**

| SITE NAME                        | STATION CODE | TARGET LATITUDE | TARGET LONGITUDE |
|----------------------------------|--------------|-----------------|------------------|
| Black Rascal Creek @ Yosemite Rd | 535BRCA YR   | 37.3321         | -120.3947        |

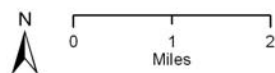
Figure XII-1. Black Rascal Creek @ Yosemite Rd site subwatershed land use map.



Source of Layers:  
 Hydrology - NHD hydrodata, 1:24,000-scale, <http://nhd.usgs.gov/>  
 Roads, highways, railroads, county boundary, city outlines - California Spatial Information Library  
 TRS - Teale Public Land Survey System, Pub. date. 20090101, California Spatial Information Library  
 Parcel Layer - Stanislaus 2010, Merced 2011, Madera 2011  
 Basemap, Shaded Relief - ESRI  
 GSC North America 1983

Date Prepared: 08/10/11

ESJWQC



**Black Rascal Creek @ Yosemite Rd**

ESJWQC MPUR, April 1, 2012

Appendix I

## Subwatershed Monitoring History

Monitoring was initiated at Black Rascal Creek @ Yosemite Rd during the irrigation season of 2006 and continued through the irrigation season of 2008 (Table XII-2). Under the 2008 MRPP, Black Rascal Creek @ Yosemite Rd is within the Merced River @ Santa Fe Zone (Zone 4) and is scheduled for Assessment Monitoring in 2025 through 2026. Sampling at Black Rascal Creek @ Yosemite Rd did not occur during 2009, 2010 nor 2011. The constituents sampled at this location from 2006 through 2008 are listed in Table XII-3.

Management Plan Monitoring occurred during the irrigation season in 2008 for *C. dubia* toxicity (May, July and August) and chlorpyrifos (May, July, August and September, Table XII-4). Since Black Rascal Creek is a fourth priority subwatershed, MPM is scheduled to resume during 2012.

Black Rascal Creek is not considered impaired on California's 2008-2010 303d List of Impaired Waterbodies; however, the downstream waterbody (Bear Creek from Bear Valley to San Joaquin River, Mariposa and Merced Counties) is listed for *E. coli* and unknown water column toxicity.

**Table XII-2. Black Rascal Creek @ Yosemite Rd site subwatershed sampling events per season and year (including MPM).**

| YEAR | SEASON     | EVENTS SAMPLED | EVENTS NOT SAMPLED <sup>1</sup> | TOTAL |
|------|------------|----------------|---------------------------------|-------|
| 2006 | Storm      | NA             | NA                              | NA    |
|      | Irrigation | 5              | 0                               | 5     |
| 2007 | Storm      | 2              | 0                               | 2     |
|      | Irrigation | 6              | 0                               | 6     |
| 2008 | Storm      | 2              | 0                               | 2     |
|      | Irrigation | 10             | 0                               | 10    |
|      | Fall       | NA             | NA                              | NA    |
| 2009 | Winter     | NA             | NA                              | NA    |
|      | Storm      | NA             | NA                              | NA    |
|      | Irrigation | NA             | NA                              | NA    |
|      | Fall       | NA             | NA                              | NA    |
| 2010 | Winter     | NA             | NA                              | NA    |
|      | Storm      | NA             | NA                              | NA    |
|      | Irrigation | NA             | NA                              | NA    |
|      | Fall       | NA             | NA                              | NA    |
| 2011 | Winter     | NA             | NA                              | NA    |
|      | Storm      | NA             | NA                              | NA    |
|      | Irrigation | NA             | NA                              | NA    |
|      | Fall       | NA             | NA                              | NA    |

<sup>1</sup>If an event was not sampled during scheduled monitoring, the site was dry.

NA – Not applicable. This site was not scheduled for sampling during this season/year.

**Table XII-3. Black Rascal Creek @ Yosemite Rd site subwatershed analyses per sampling season and year.**

Only environmental samples with a sample replicate and lab replicate of one are listed.

| METHOD                        | ANALYTE               | 2006    |            | 2007  |            | 2008  |            |       | 2009          | 2010          | 2011          |
|-------------------------------|-----------------------|---------|------------|-------|------------|-------|------------|-------|---------------|---------------|---------------|
|                               |                       | STORM * | IRRIGATION | STORM | IRRIGATION | STORM | IRRIGATION | FALL* | WINTER-FALL * | WINTER-FALL * | WINTER-FALL * |
| Field and Physical Parameters |                       |         |            |       |            |       |            |       |               |               |               |
| NA                            | Dissolved Oxygen      |         | 5          | 3     | 10         | 3     | 12         |       |               |               |               |
| NA                            | Specific Conductivity |         | 5          | 3     | 10         | 3     | 12         |       |               |               |               |
| NA                            | pH                    |         | 5          | 3     | 10         | 3     | 12         |       |               |               |               |
| EPA 110.2                     | Color                 |         | 5          | 2     | 6          | 2     | 6          |       |               |               |               |
| EPA 160.1                     | Dissolved Solids      |         | 5          | 2     | 6          | 2     | 6          |       |               |               |               |
| EPA 160.2                     | Suspended Solids      |         |            |       |            |       |            |       |               |               |               |
| EPA 180.1                     | Turbidity             |         | 5          | 2     | 6          | 2     | 6          |       |               |               |               |
| EPA 415.1                     | Total Organic Carbon  |         | 5          | 2     | 6          | 2     | 6          |       |               |               |               |
| SM 9223                       | <i>E. coli</i>        |         | 5          | 2     | 6          | 2     | 6          |       |               |               |               |
| EPA 405.1                     | BOD                   |         | 1          | 2     | 2          |       |            |       |               |               |               |
| Carbamates                    |                       |         |            |       |            |       |            |       |               |               |               |
| EPA 8321A                     | Aldicarb              |         | 5          | 2     | 6          | 2     | 6          |       |               |               |               |
| EPA 8321A                     | Carbaryl              |         | 5          | 2     | 6          | 2     | 6          |       |               |               |               |
| EPA 8321A                     | Carbofuran            |         | 5          | 2     | 6          | 2     | 6          |       |               |               |               |
| EPA 8321A                     | Diuron                |         | 5          | 2     | 6          | 2     | 6          |       |               |               |               |
| EPA 8321A                     | Linuron               |         | 5          | 2     | 6          | 2     | 6          |       |               |               |               |
| EPA 8321A                     | Methiocarb            |         | 5          | 2     | 6          | 2     | 6          |       |               |               |               |
| EPA 8321A                     | Methomyl              |         | 5          | 2     | 6          | 2     | 6          |       |               |               |               |
| EPA 8321A                     | Oxamyl                |         | 5          | 2     | 6          | 2     | 6          |       |               |               |               |
| Organochlorines               |                       |         |            |       |            |       |            |       |               |               |               |
| EPA 8081A                     | DDD(p,p')             |         | 5          | 2     | 6          | 2     | 6          |       |               |               |               |
| EPA 8081A                     | DDE(p,p')             |         | 5          | 2     | 6          | 2     | 6          |       |               |               |               |
| EPA 8081A                     | DDT(p,p')             |         | 5          | 2     | 6          | 2     | 6          |       |               |               |               |
| EPA 8081A                     | Dicofol               |         | 5          | 2     | 6          | 2     | 6          |       |               |               |               |
| EPA 8081A                     | Dieldrin              |         | 5          | 2     | 6          | 2     | 6          |       |               |               |               |
| EPA 8081A                     | Endrin                |         | 5          | 2     | 6          | 2     | 6          |       |               |               |               |
| EPA 8081A                     | Methoxychlor          |         | 5          | 2     | 6          | 2     | 6          |       |               |               |               |
| Organophosphates              |                       |         |            |       |            |       |            |       |               |               |               |
| EPA 8141A                     | Azinphos methyl       |         | 5          | 2     | 6          | 2     | 6          |       |               |               |               |
| EPA 8141A                     | Chlorpyrifos          |         | 5          | 2     | 6          | 2     | 10         |       |               |               |               |
| EPA 8141A                     | Demeton-s             |         |            |       |            |       |            |       |               |               |               |
| EPA 8141A                     | Diazinon              |         | 5          | 2     | 6          | 2     | 6          |       |               |               |               |
| EPA 8141A                     | Dichlorvos            |         |            |       |            |       |            |       |               |               |               |
| EPA 8141A                     | Dimethoate            |         | 5          | 2     | 6          | 2     | 6          |       |               |               |               |
| EPA 8141A                     | Disulfoton            |         | 5          | 2     | 6          | 2     | 6          |       |               |               |               |
| EPA 8141A                     | Malathion             |         | 5          | 2     | 6          | 2     | 6          |       |               |               |               |
| EPA 8321A                     | Methamidophos         |         | 5          | 2     | 6          | 2     | 6          |       |               |               |               |
| EPA 8141A                     | Methidathion          |         | 5          | 2     | 6          | 2     | 6          |       |               |               |               |
| EPA 8141A                     | Molinate              |         | 5          | 2     | 6          | 2     | 6          |       |               |               |               |
| EPA 8141A                     | Parathion, Methyl     |         | 5          | 2     | 6          | 2     | 6          |       |               |               |               |
| EPA 8141A                     | Phorate               |         | 5          | 2     | 6          | 2     | 6          |       |               |               |               |

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| METHOD                | ANALYTE                           | 2006    |            | 2007  |            | 2008  |            |        | 2009          | 2010          | 2011          |
|-----------------------|-----------------------------------|---------|------------|-------|------------|-------|------------|--------|---------------|---------------|---------------|
|                       |                                   | STORM * | IRRIGATION | STORM | IRRIGATION | STORM | IRRIGATION | FALL * | WINTER-FALL * | WINTER-FALL * | WINTER-FALL * |
| EPA 8141A             | Phosmet                           |         | 5          | 2     | 6          | 2     | 6          |        |               |               |               |
| EPA 8141A             | Thiobencarb                       |         | 5          | 2     | 6          | 2     | 6          |        |               |               |               |
| EPA 8141A             | Trifluralin                       |         |            |       |            |       |            |        |               |               |               |
| <b>Pyrethroids</b>    |                                   |         |            |       |            |       |            |        |               |               |               |
| EPA 8081A             | Bifenthrin                        |         | 5          | 2     | 6          | 2     | 6          |        |               |               |               |
| EPA 8081A             | Cyfluthrin, total                 |         | 5          | 2     | 6          | 2     | 6          |        |               |               |               |
| EPA 8081A             | Cyhalothrin, lambda, total        |         | 5          | 2     | 6          | 2     | 6          |        |               |               |               |
| EPA 8081A             | Cypermethrin, total               |         | 5          | 2     | 6          | 2     | 6          |        |               |               |               |
| EPA 8081A             | Esfenvalerate/ Fenvalerate, total |         | 5          | 2     | 6          | 2     | 6          |        |               |               |               |
| EPA 8081A             | Permethrin, total                 |         | 5          | 2     | 6          | 2     | 6          |        |               |               |               |
| <b>Triazines</b>      |                                   |         |            |       |            |       |            |        |               |               |               |
| EPA 547M              | Glyphosate                        |         | 5          | 2     | 6          | 2     | 6          |        |               |               |               |
| EPA 549.2M            | Paraquat dichloride               |         | 5          | 2     | 6          | 2     | 6          |        |               |               |               |
| EPA 619               | Atrazine                          |         | 5          | 2     | 6          | 2     | 6          |        |               |               |               |
| EPA 619               | Cyanazine                         |         | 5          | 2     | 6          | 2     | 6          |        |               |               |               |
| EPA 619               | Simazine                          |         | 5          | 2     | 6          | 2     | 6          |        |               |               |               |
| <b>Metals (Total)</b> |                                   |         |            |       |            |       |            |        |               |               |               |
| EPA 200.8             | Arsenic                           |         |            |       |            |       | 6          |        |               |               |               |
| EPA 200.8             | Boron                             |         |            |       |            |       | 6          |        |               |               |               |
| EPA 200.8             | Cadmium                           |         |            |       |            |       | 6          |        |               |               |               |
| EPA 200.8             | Copper                            |         |            |       |            |       | 6          |        |               |               |               |
| EPA 200.8             | Lead                              |         |            |       |            |       | 6          |        |               |               |               |
| EPA 200.8             | Molybdenum                        |         |            |       |            |       |            |        |               |               |               |
| EPA 200.8             | Nickel                            |         |            |       |            |       | 6          |        |               |               |               |
| EPA 200.8             | Selenium                          |         |            |       |            |       | 6          |        |               |               |               |
| EPA 200.8             | Zinc                              |         |            |       |            |       | 6          |        |               |               |               |
| <b>Nutrients</b>      |                                   |         |            |       |            |       |            |        |               |               |               |
| SM 2340 C             | Hardness as CaCO3                 |         |            |       |            |       | 6          |        |               |               |               |
| EPA 300.0             | Nitrate as N                      |         |            | 1     |            |       | 6          |        |               |               |               |
| EPA 350.2             | Ammonia as N                      |         |            |       |            |       | 6          |        |               |               |               |
| EPA 351.3             | Nitrogen, Total Kjeldahl          |         |            |       |            |       | 6          |        |               |               |               |
| EPA 354.1             | Nitrite as N                      |         |            | 1     |            |       | 6          |        |               |               |               |
| EPA 353.2             | Nitrate + Nitrite as N            |         |            |       |            |       |            |        |               |               |               |
| EPA 365.2             | OrthoPhosphate as P               |         |            | 1     |            |       | 6          |        |               |               |               |
| EPA 365.2             | Phosphate as P                    |         |            |       |            |       | 6          |        |               |               |               |
| <b>Toxicity</b>       |                                   |         |            |       |            |       |            |        |               |               |               |
| EPA 821/R-02-012      | <i>Ceriodaphnia dubia</i>         |         | 5          | 2     | 9          | 2     | 9          |        |               |               |               |
| EPA 821/R-02-012      | <i>Pimephales promelas</i>        |         | 5          | 2     | 6          | 2     | 6          |        |               |               |               |
| EPA 821/R-02-013      | <i>Selenastrum capricornutum</i>  |         | 5          | 2     | 6          | 3     | 6          |        |               |               |               |
| EPA 600/R-99-064      | <i>Hyalella azteca</i>            |         | 1          | 1     | 1          | 1     | 2          |        |               |               |               |

\*Site not sampled during the 2008 fall season, and 2009, 2010, and 2011 sampling years.

**Table XII-4. Black Rascal Creek @ Yosemite Rd site subwatershed Management Plan Monitoring schedule (2008).**

| SITE NAME                        | SAMPLE DATE | MONITORING TYPE | CHLORPYRIFOS | C. DUBIA |
|----------------------------------|-------------|-----------------|--------------|----------|
| Black Rascal Creek @ Yosemite Rd | 7-May-08    | A               | X            | X        |
| Black Rascal Creek @ Yosemite Rd | 8-July-08   | A               | X            | X        |
| Black Rascal Creek @ Yosemite Rd | 5-Aug-08    | A               | X            | X        |
| Black Rascal Creek @ Yosemite Rd | 9-Sep-08    | A               | X            |          |

A – Additional sampling

X – Constituent sampled for Management Plan Monitoring (MPM)



## Exceedance History

Samples collected from Black Rascal Creek @ Yosemite Rd from 2005 through 2011 exceeded the WQTLs for field parameters, *E. coli*, pesticides, and metals (Table XII-5). Toxicity in the water column to *C. dubia* and *S. capricornutum* and sediment toxicity to *H. azteca* also occurred (Table XII-5).

Constituents that exceeded their respective WQTLs in this subwatershed include: DO (17), pH (2), *E. coli* (11), chlorpyrifos (4), total copper (1), and lead (2). Toxicity to *C. dubia* (3), two of which demonstrated persistent toxicity in the resampling events, to *S. capricornutum* (1), and toxicity to *H. azteca* sediment (1) occurred (Table XII-5).

Exceedances are based on WQTLs listed in the introduction to the ESJWQC Management Plan. The highest priority constituents in the Black Rascal Creek @ Yosemite Rd subwatershed are chlorpyrifos (A/B) and toxicity to *C. dubia* (D).

**Table XII-5. Black Rascal Creek@ Yosemite Rd site subwatershed exceedances (2006-2008).**

The WQTL used to evaluate the data are listed in the header after the analyte.

| SITE NAME                        | SEASON     | SAMPLE DATE | OXYGEN, DISSOLVED, <7mg/L | pH, <6.5 AND > 8.5 UNITS | <i>E. coli</i> , >235 MPN/100 mL | COPPER, TOTAL <sup>1</sup> , >1,300 µg/L | LEAD, TOTAL <sup>1</sup> , >15 µg/L | CHLORPYRIFOS, >0.015 µg/L | <i>C. DUBIA</i> , (% CONTROL) | <i>S. CAPRICORNUTUM</i> , (% CONTROL) | <i>H. AZTECA</i> , (% CONTROL) |
|----------------------------------|------------|-------------|---------------------------|--------------------------|----------------------------------|------------------------------------------|-------------------------------------|---------------------------|-------------------------------|---------------------------------------|--------------------------------|
| Black Rascal Creek @ Yosemite Rd | Irrigation | 5/18/2006   | 5.41                      |                          | 2400                             |                                          |                                     | 0.033                     |                               |                                       |                                |
| Black Rascal Creek @ Yosemite Rd | Irrigation | 6/14/2006   |                           |                          | 490                              |                                          |                                     |                           |                               |                                       |                                |
| Black Rascal Creek @ Yosemite Rd | Irrigation | 7/12/2006   | 5.53                      |                          |                                  |                                          |                                     |                           |                               |                                       |                                |
| Black Rascal Creek @ Yosemite Rd | Irrigation | 8/9/2006    | 5.65                      |                          |                                  |                                          |                                     |                           |                               |                                       |                                |
| Black Rascal Creek @ Yosemite Rd | Irrigation | 9/12/2006   | 5.56                      |                          |                                  |                                          |                                     |                           |                               |                                       |                                |
| Black Rascal Creek @ Yosemite Rd | Storm      | 2/12/2007   |                           |                          | 2400                             |                                          |                                     |                           |                               |                                       |                                |
| Black Rascal Creek @ Yosemite Rd | Storm      | 3/1/2007    |                           |                          | 2400                             |                                          |                                     |                           |                               |                                       |                                |
| Black Rascal Creek @ Yosemite Rd | Irrigation | 5/29/2007   | 3.93                      |                          | 770                              |                                          |                                     |                           | 20                            |                                       |                                |
| Black Rascal Creek @ Yosemite Rd | Irrigation | 6/26/2007   | 6.95                      |                          |                                  |                                          |                                     |                           |                               |                                       |                                |
| Black Rascal Creek @ Yosemite Rd | Irrigation | 7/24/2007   |                           |                          | 580                              |                                          |                                     | 3.7                       | 0                             |                                       |                                |
| Black Rascal Creek @ Yosemite Rd | Irrigation | 7/31/2007   |                           |                          |                                  |                                          |                                     |                           | 0                             |                                       |                                |
| Black Rascal Creek @ Yosemite Rd | Irrigation | 8/21/2007   | 6.42                      |                          |                                  |                                          |                                     | 0.12                      | 0                             |                                       |                                |
| Black Rascal Creek @ Yosemite Rd | Irrigation | 8/23/2007   | 5.69                      |                          |                                  |                                          |                                     |                           |                               |                                       |                                |
| Black Rascal Creek @ Yosemite Rd | Irrigation | 8/28/2007   | 6.18                      |                          |                                  |                                          |                                     |                           | 0                             |                                       |                                |
| Black Rascal Creek @ Yosemite Rd | Irrigation | 9/18/2007   |                           |                          |                                  |                                          |                                     | 0.031                     |                               |                                       |                                |
| Black Rascal Creek @ Yosemite Rd | Storm      | 1/24/2008   |                           |                          | >2400                            |                                          |                                     |                           |                               |                                       |                                |

| SITE NAME                        | SEASON     | SAMPLE DATE | OXYGEN, DISSOLVED, <7MG/L | PH, <6.5 AND > 8.5 UNITS | E. COLI, >235 MPN/100 ML | COPPER, TOTAL <sup>1</sup> , >1,300 µG/L | LEAD, TOTAL <sup>1</sup> , >15 µG/L | CHLORPYRIFOS, >0.015 µG/L | C. DUBIA, (% CONTROL) | S. CAPRICORNUTUM, (% CONTROL) | H. AZTECA, (% CONTROL) |
|----------------------------------|------------|-------------|---------------------------|--------------------------|--------------------------|------------------------------------------|-------------------------------------|---------------------------|-----------------------|-------------------------------|------------------------|
| Black Rascal Creek @ Yosemite Rd | Storm      | 2/25/2008   |                           |                          | >2400                    |                                          |                                     |                           |                       | 38                            |                        |
| Black Rascal Creek @ Yosemite Rd | Irrigation | 4/29/2008   |                           | 8.8                      | 770                      | 8 (7.7)                                  | 2.4 (2.39)                          |                           |                       |                               |                        |
| Black Rascal Creek @ Yosemite Rd | Irrigation | 5/27/2008   |                           |                          | 920                      |                                          |                                     |                           |                       |                               |                        |
| Black Rascal Creek @ Yosemite Rd | Irrigation | 6/24/2008   |                           |                          | 490                      |                                          |                                     |                           |                       |                               |                        |
| Black Rascal Creek @ Yosemite Rd | Irrigation | 7/8/2008    | 2.30                      |                          |                          |                                          |                                     |                           |                       |                               |                        |
| Black Rascal Creek @ Yosemite Rd | Irrigation | 7/29/2008   | 4.49                      |                          |                          |                                          |                                     |                           |                       |                               |                        |
| Black Rascal Creek @ Yosemite Rd | Irrigation | 8/5/2008    | 5.58                      |                          |                          |                                          |                                     |                           |                       |                               |                        |
| Black Rascal Creek @ Yosemite Rd | Irrigation | 8/26/2008   | 2.58                      |                          |                          |                                          |                                     |                           |                       |                               |                        |
| Black Rascal Creek @ Yosemite Rd | Sediment   | 8/28/2008   | 2.26                      |                          |                          |                                          |                                     |                           |                       |                               | 63                     |
| Black Rascal Creek @ Yosemite Rd | Irrigation | 9/9/2008    | 4.18                      |                          |                          |                                          |                                     |                           |                       |                               |                        |
| Black Rascal Creek @ Yosemite Rd | Irrigation | 9/30/2008   | 3.75                      | 5                        |                          |                                          | 1.3 (0.75)                          |                           |                       |                               |                        |
| Black Rascal Creek @ Yosemite Rd | Sediment   | 10/2/2008   | 5.05                      |                          |                          |                                          |                                     |                           |                       |                               |                        |
| Constituent Priority             |            |             | E                         | E                        | E                        | NP                                       | E                                   | A/B                       | D                     | NP                            | NP                     |

<sup>1</sup>Total metal WQTL variable based on hardness.

NP – Not Prioritized; less than two exceedances within three consecutive monitoring years and currently no TMDL.

## 2007-2011 Management Plan Monitoring Results

Monitoring results for high priority management plan constituents in the Black Rascal Creek subwatershed, which are chlorpyrifos, *C. dubia* toxicity and lead, are listed in Table XII-6.

The chlorpyrifos and *C. dubia* toxicity in Black Rascal Creek appear to be associated. Chlorpyrifos first exceeded the WQTL in 2006 (May), but since the chlorpyrifos and diazinon TMDL for the Lower San Joaquin River was not approved, it was not added to the Black Rascal Creek management plan until after 2007 when three more chlorpyrifos exceedances occurred (July, August and September). *C. dubia* toxicity occurred for the first time in the subwatershed in 2007 (May, July, and August). Additional MPM was scheduled for chlorpyrifos in 2008 (May, July, August and September) and *C. dubia* toxicity (May, July, and August), and there were no exceedances of chlorpyrifos or instances of *C. dubia* toxicity during MPM or Normal Monitoring (Table XII-6). The site has not been sampled since 2008; however, MPM is scheduled in 2012 for chlorpyrifos (May, July, August and September) and *C. dubia* toxicity (May, July, and August).

Two exceedances of lead occurred in the subwatershed, during April and September 2008. Accordingly, lead was added to the Black Rascal Creek management plan the following year. Because lead is not applied by agriculture, it is a lower priority (E) constituent, and MPM for the constituent is not required. However, the Coalition decided to schedule MPM for lead in 2012 (April and September) in part because metals are now analyzed separately for total and dissolved fractions which allows for more accurate characterization of water quality.

**Table XII-6. Black Rascal Creek @ Yosemite Rd site subwatershed monitoring results for high priority constituents (2008).**

Exceedance values are in bold. Resampling (RS) due to toxicity not included in table.

| MONTH:            |                                      | APRIL     | MAY       | JUNE      | JULY      | AUGUST    | SEPTEMBER |
|-------------------|--------------------------------------|-----------|-----------|-----------|-----------|-----------|-----------|
| <b>2008 NM</b>    | Date                                 | 4/29/2008 | 5/27/2008 | 6/24/2008 | 7/29/2008 | 8/26/2008 | 9/30/2008 |
|                   | Chlorpyrifos (µg/L)                  | 0.0078    | <0.003    | <0.003    | <0.003    | <0.003    | <0.003    |
|                   | <i>C. dubia</i> toxicity (% Control) | 100       | 100       | 100       | 100       | 100       | 100       |
| <b>2008 MPM A</b> | Date                                 | NA        | 5/7/2008  | NA        | 7/8/2008  | 8/5/2008  | 9/9/2008  |
|                   | Chlorpyrifos (µg/L)                  | NA        | <0.003    | NA        | <0.003    | <0.003    | <0.003    |
|                   | <i>C. dubia</i> toxicity (% Control) | NA        | 100       | NA        | 100       | 100       | NA        |

A – Additional MPM conducted in 2008 only.

MPM – Management Plan Monitoring (see Table 4 for MPM schedule)

NA – No monitoring occurred on this date for this constituent.

NM – Normal Monitoring

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## Load Calculations

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Loads have been calculated for all chlorpyrifos detections in the site subwatershed based on the following formula (Table XII-7):

$$\text{Load} = \text{Discharge (cfs)} \times 28.317\text{L/ft}^3 \times \text{Concentration (mg/L} \times 1000 \text{ or } \mu\text{g/L)}.$$

The load values for constituents in this report represent instantaneous loads only. These values should not be used to extrapolate loading over any period of time (e.g. weekly, monthly, seasonal or annual). The primary purpose for reporting instantaneous loads is to provide a normalization of the concentrations by flow for various constituents at the time the samples were collected.

**Table XII-7. Black Rascal Creek @ Yosemite Rd site subwatershed instantaneous load calculations for chlorpyrifos.**

Sorted by analyte and date.

| SITE NAME                        | ANALYTE NAME | SAMPLE DATE | DISCHARGE CFS | CONCENTRATION $\mu\text{G/L}$ | LOADING RATE $\mu\text{G/SEC}$ |
|----------------------------------|--------------|-------------|---------------|-------------------------------|--------------------------------|
| Black Rascal Creek @ Yosemite Rd | Chlorpyrifos | 07/24/07    | 0             | 3.7                           | 0.00                           |
| Black Rascal Creek @ Yosemite Rd | Chlorpyrifos | 08/21/07    | 0             | 0.12                          | 0.00                           |
| Black Rascal Creek @ Yosemite Rd | Chlorpyrifos | 09/18/07    | 0             | 0.031                         | 0.00                           |
| Black Rascal Creek @ Yosemite Rd | Chlorpyrifos | 02/25/08    | 61.02         | 0.0057                        | 9.85                           |
| Black Rascal Creek @ Yosemite Rd | Chlorpyrifos | 04/29/08    | 0.04          | 0.0078                        | 0.01                           |

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## Source Identification and Outreach

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The Coalition focuses its efforts on applied pesticides and considers past monitoring results and associated PUR data to address source identification and determine an outreach strategy. The two highest priority management plan constituents in Black Rascal Creek, chlorpyrifos (A/B) and *C. dubia* toxicity (D) are both prioritized due to exceedances that occurred during 2007 monitoring. To better characterize water quality in the subwatershed, the Coalition conducted additional MPM in 2008 during months of past exceedances. In an effort to determine the most frequent crop type and timing associated with chlorpyrifos applications, the Coalition also reviews PUR data. From these actions, the Coalition derived an outreach strategy, which is detailed in the following sections.

In the Coalition's approved Management Plan, the Black Rascal Creek subwatershed is a high priority subwatershed as of 2012 and will remain so through 2014. The Coalition will actively engage in grower outreach and education to address the highest priority constituents in the Black Rascal Creek management plan. The Coalition began to organize grower meetings and mailings to educate growers about management practices and their importance in achieving acceptable water quality. Individual grower meetings with targeted members are planned to inform growers about management practices as well as to assess current and expected future implementation of additional management practices.

### Priority A/B Constituents

Chlorpyrifos is the only A/B constituent listed in the Black Rascal Creek subwatershed management plan.

#### Chlorpyrifos

The WQTL for chlorpyrifos (0.015 µg/L) was exceeded at this site four times in the past, once during 2006 and three times during the summer of 2007 (Table XII-5). Two of the 2007 exceedances, July and August, were associated with *C. dubia* toxicity.

The three exceedances in 2007 are believed to all be the result of a single application by a single grower. When samples were collected from Black Rascal Creek on July 24, 2007, there was no flow in the waterway due a beaver dam immediately downstream (Table XII-7). The measured concentration (3.6 µg/L) of chlorpyrifos in 2007 (July) samples was more than 200 times the WQTL. Given the extremely high environmental concentration and since PUR data would not be available for several months, the Coalition sent representatives to visit the grower immediately upstream of the sampling location to inquire about recent applications. Representatives learned that the grower had applied chlorpyrifos to an almond orchard adjacent to the creek in July, but the grower followed labeling instructions and waited the appropriate number of days before flood irrigating the orchard. The grower did report, however, there was some irrigation drainage from the orchard directly to the creek. The Coalition believes that, because of the absence of flow, the chlorpyrifos remained in the creek until sampling occurred on July 27. Chlorpyrifos exceedances occurred again in 2007 (August and September) monitoring (0.12 and 0.031 µg/L, respectively). Because the beaver dam was still present during August and September resulting in little to no flow, and since there were no applications of pesticides in the subwatershed after July 22, 2007, the Coalition believes the August and September 2007 chlorpyrifos exceedances were also a result of the single application to the adjacent almond orchard in July.

Since Black Rascal Creek @ Yosemite Rd was scheduled to become a high priority subwatershed in 2012, the Coalition reviewed PUR data to determine a strategy for outreach. The Coalition assessed the number of monthly chlorpyrifos applications, pounds of active ingredient applied, and the acres treated and found that no applications of chlorpyrifos have occurred in the Black Rascal Creek subwatershed since 2008 (Table XII-8, Figure XII-2). Chlorpyrifos was applied to almond and walnut orchards and use peaked in 2007 when the exceedance occurred, but there has only been one chlorpyrifos application (Table XII-9) since. There were very few growers who previously applied chlorpyrifos and it appears all have stopped using the chemical.

**Table XII-8. Black Rascal Creek @ Yosemite Rd site subwatershed chlorpyrifos applications, lbs AI applied, and acres treated by month (2006-2011).**

If month is not included in table, no applications were made. No chlorpyrifos PUR data reported for 2009-2011.

| MONTH/YEAR               | NUMBER OF CHLORPYRIFOS APPLICATIONS | POUNDS OF AI APPLIED | ACRES TREATED |
|--------------------------|-------------------------------------|----------------------|---------------|
| May, 2006                | 2                                   | 173.3                | 91.0          |
| August, 2006             | 1                                   | 20.1                 | 20.0          |
| May, 2007                | 2                                   | 113.4                | 61.0          |
| July, 2007               | 4                                   | 351.5                | 174.0         |
| August, 2007             | 1                                   | 39.9                 | 20.0          |
| June, 2008               | 1                                   | 60.0                 | 30.0          |
| <b>Summaries by Year</b> |                                     |                      |               |
| 2006 Total               | 3                                   | 193.4                | 111.0         |
| 2007 Total               | 7                                   | 504.7                | 255.0         |
| 2008 Total               | 1                                   | 60.0                 | 30.0          |
| <b>Total</b>             | <b>11</b>                           | <b>758.1</b>         | <b>396.0</b>  |

**Figure XII-2. Black Rascal Creek @ Yosemite Rd site subwatershed lbs chlorpyrifos applied by month (2006-2011).**

Asterisk (\*) denotes months with exceedances. No chlorpyrifos PUR data reported for 2009-2011.

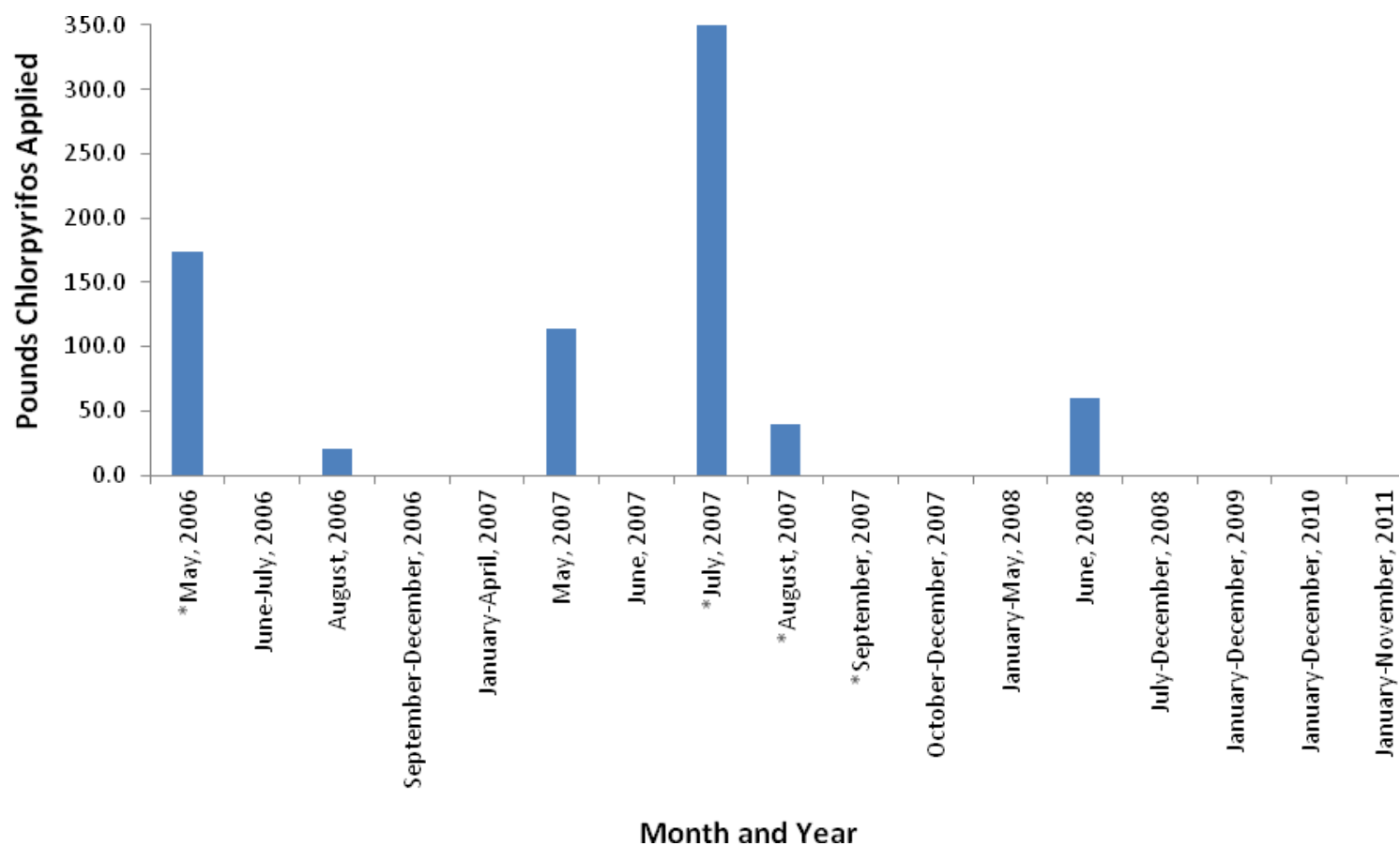


**Table XII-9. Black Rascal Creek @ Yosemite Rd site subwatershed chlorpyrifos PUR data (2006-2011).**

No chlorpyrifos PUR data reported for 2009-2011.

| CHEMICAL NAME                                 | COMMODITY                               | PRODUCT NAME           | LBS AI APPLIED |
|-----------------------------------------------|-----------------------------------------|------------------------|----------------|
| CHLORPYRIFOS                                  | ALMOND                                  | GOVERN 4E INSECTICIDE  | 351.5          |
|                                               | WALNUT (ENGLISH WALNUT, PERSIAN WALNUT) | LORSBAN 4E INSECTICIDE | 20.1           |
|                                               |                                         | LORSBAN 4E-HF          | 101.7          |
|                                               |                                         | LORSBAN-4E             | 284.9          |
| ALMOND - Total Pounds Chlorpyrifos Applied    |                                         |                        | 351.5          |
| WALNUT - Total Pounds Chlorpyrifos Applied    |                                         |                        | 406.6          |
| Total Pounds Chlorpyrifos Applied (2006-2011) |                                         |                        | 758.1          |

The Coalition believes that chlorpyrifos exceedances that occurred in the past in the Black Rascal Creek subwatershed are likely the result of a single or a few grower's irrigation tailwater. The 2006 May exceedance of chlorpyrifos was well above the WQTL, which suggests it was most likely the result of irrigation tailwater discharge carrying chlorpyrifos to the creek as opposed to spray drift. All of the chlorpyrifos exceedances in 2007 appear to be the result of a single application by a single grower.

More importantly, PUR data indicate growers in the subwatershed stopped using chlorpyrifos as no applications occurred since 2008. To be sure, the Coalition reviewed the Black Rascal Creek subwatershed and is targeting one grower who applied chlorpyrifos in the past and drains directly to the creek, which accounts for 301 acres of direct drainage in the subwatershed. Monitoring results and PUR data indicate that management of chlorpyrifos in this subwatershed should focus on irrigation return flows. The grower will be advised of methods to improve irrigation and to better manage irrigation tailwater and storm water runoff. In addition, Coalition representatives will discuss and encourage management practices to reduce spray drift. The Coalition recognizes that irrigation and storm water management are often best improved by installation of structural management practices, such as a tailwater return system or drainage basin, which can be expensive. The Coalition is dedicated to providing growers with information about (and include as a part of their discussions) available funding opportunities for management practice implementation.

The Coalition initiated scheduling individual meetings with targeted growers in the fourth priority subwatersheds. Although the meeting with the targeted grower will focus mainly on chlorpyrifos exceedances, all water quality results are reviewed and discussed including *C. dubia* toxicity, and exceedances of DO, *E. coli*, lead, and pH.

Grower surveys completed at the meeting documenting the member's current practices and indicating which recommended practices the grower anticipates implementing in the upcoming years will be compiled and assessed by the Coalition. The Coalition anticipates the grower will be able to implement recommended practices as soon as the irrigation season of 2012, but recognizes that some practices may not be able to be implemented until later. Follow up meetings with the targeted grower will be scheduled after the 2012 irrigation season to determine what additional management practices were implemented.



In 2012, MPM is scheduled at Black Rascal Creek @ Yosemite Rd during months when exceedances occurred historically. The Coalition plans to conduct MPM through 2014 to evaluate improvements in water quality as recommended management practice implementation occurs.

### *Priority D Constituents*

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The only priority D constituent listed in the Black Rascal Creek @ Yosemite Rd subwatershed management plan is water column toxicity to *C. dubia*.

#### ***C. dubia* toxicity**

Toxicity to *C. dubia* occurred three times in the past at Black Rascal Creek @ Yosemite Rd and all toxicities occurred during 2007. The May 29, 2007 *C. dubia* toxicity resulted in 20% survival compared to the control but was not persistent (resample on June 5, 2007 was not toxic). A TIE indicated that an interaction between two or more pyrethroids was most likely the cause of toxicity; however, all six of the pyrethroids that were sampled by the Coalition during the event were below their MDLs. The Coalition noted in its 2007 December Semi-Annual Monitoring Report (SAMR) submitted December 31, 2007 that three pyrethroids were applied prior to the May toxicity, and it is possible that, although the amount of each of these three pyrethroids in the water column was below the MDL, two or more of these chemicals may have acted synergistically to cause *C. dubia* toxicity.

The July 24 and August 21, 2007 toxicities are believed to be caused by the same, single application of chlorpyrifos in July to an almond orchard immediately upstream of the sampling location (discussed above, under the Chlorpyrifos section). The TIEs results from both events indicated that an organophosphate pesticide, such as chlorpyrifos, was responsible for causing the toxicity. Both toxicities were persistent in the resampling event one week after the initial sampling date.

Since the 2007 toxicities were associated with chlorpyrifos, the Coalition's strategy for outreach also addresses *C. dubia* toxicity. In addition, the Coalition will educate growers that the offsite movement of irrigation tailwater is known to carry sediment and sediment-bound pesticides such as pyrethroids. Also important is emphasizing that switching from chlorpyrifos to another product may create different water quality concerns and that ultimately preventing a pesticide from entering surface waterways is the most effective management practice.

### *Priority E Constituents*

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The priority E constituents listed under the Black Rascal Creek @ Yosemite Rd subwatershed management plan are *E. coli*, DO, lead, and pH.

*E. coli* exceeded its WQTL during 11 events, DO during 17 events, and lead and pH each during two events. Black Rascal Creek @ Yosemite Rd was not sampled as a part of the 2006 *E. coli* study, and it is unclear what the source of the *E. coli* might be in the subwatershed.

Black Rascal Creek was monitored for Biological Oxygen Demand (BOD) during the September 2006 (February, March, April) and 2007 July monitoring events in an attempt to better understand the DO dynamics in the waterway. The study did not eliminate nor strongly confirm BOD as the cause of DO exceedances, and the contributing factors to DO exceedances remain unknown at this time.

The Coalition will continue to collect monitoring data for the DO and pH field parameters during each monitoring event. *E. coli* is currently monitored only during Assessment Monitoring events at this site, and Black Rascal Creek will rotate into Assessment Monitoring in 2025-2026. Since the Coalition now monitors both total and dissolved fractions of metals, MPM for lead will occur during 2012 (April and September) to better characterize water quality in the creek with respect to lead. Until these constituents become a higher priority, the Coalition will not attempt to determine their sources. These constituents are also discussed during individual contacts with growers and annual grower meetings. In addition, the Coalition plans to participate in a focus group along with other Coalitions and Regional Board staff to develop a joint Work Plan to address *E. coli* exceedances by determining the potential agricultural sources of *E. coli* and identifying management practices to prevent discharges to surface waters.

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### Evaluation

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Black Rascal Creek @ Yosemite Rd is one of the four fourth priority site subwatersheds within the ESJWQC and is in its first year of focused outreach (2012-2014).

The Coalition will focus its resources on identifying sources of agricultural discharge within this subwatershed that could result in water quality impairments, extending outreach to Coalition members, and setting evaluation goals based on the effectiveness of management practices (by considering changes in water quality over time).

The Coalition's strategy for the Black Rascal Creek subwatershed is to focus on providing information to the single grower determined to have the greatest potential to impact water quality to review their operation and determine if irrigation return flows are managed properly. The Coalition targeted the grower because their crops are located adjacent to the waterway and their agricultural practices may result in the discharge or drift of pesticides, specifically chlorpyrifos, into the waterway. Outreach includes grower notification, management practice outreach and education, tracking of management practice implementation, and providing information on special studies of management practice efficacy.

The single targeted grower will complete an individual survey that documents current management practice and assesses future planned management practices. The Coalition will then assess the results and plan the final stages of outreach including follow up contact with the grower to identify newly implemented practices and future monitoring to evaluate water quality improvement.

In 2012, MPM is scheduled for chlorpyrifos (May, July, August, and September), *C. dubia* toxicity (May, July, and August), and lead (April and September).

### XIII. DEADMAN CREEK @ GURR RD

#### Management Plan Constituents

##### Priority A/B

- Chlorpyrifos

##### Priority C

- Copper

##### Priority D

- *Ceriodaphnia dubia* water column toxicity
- *Pimephales promelas* water column toxicity
- *Selenastrum capricornutum* water column toxicity

##### Priority E

- Ammonia
- Arsenic
- DO
- *E. coli*
- SC
- Total Dissolved Solids

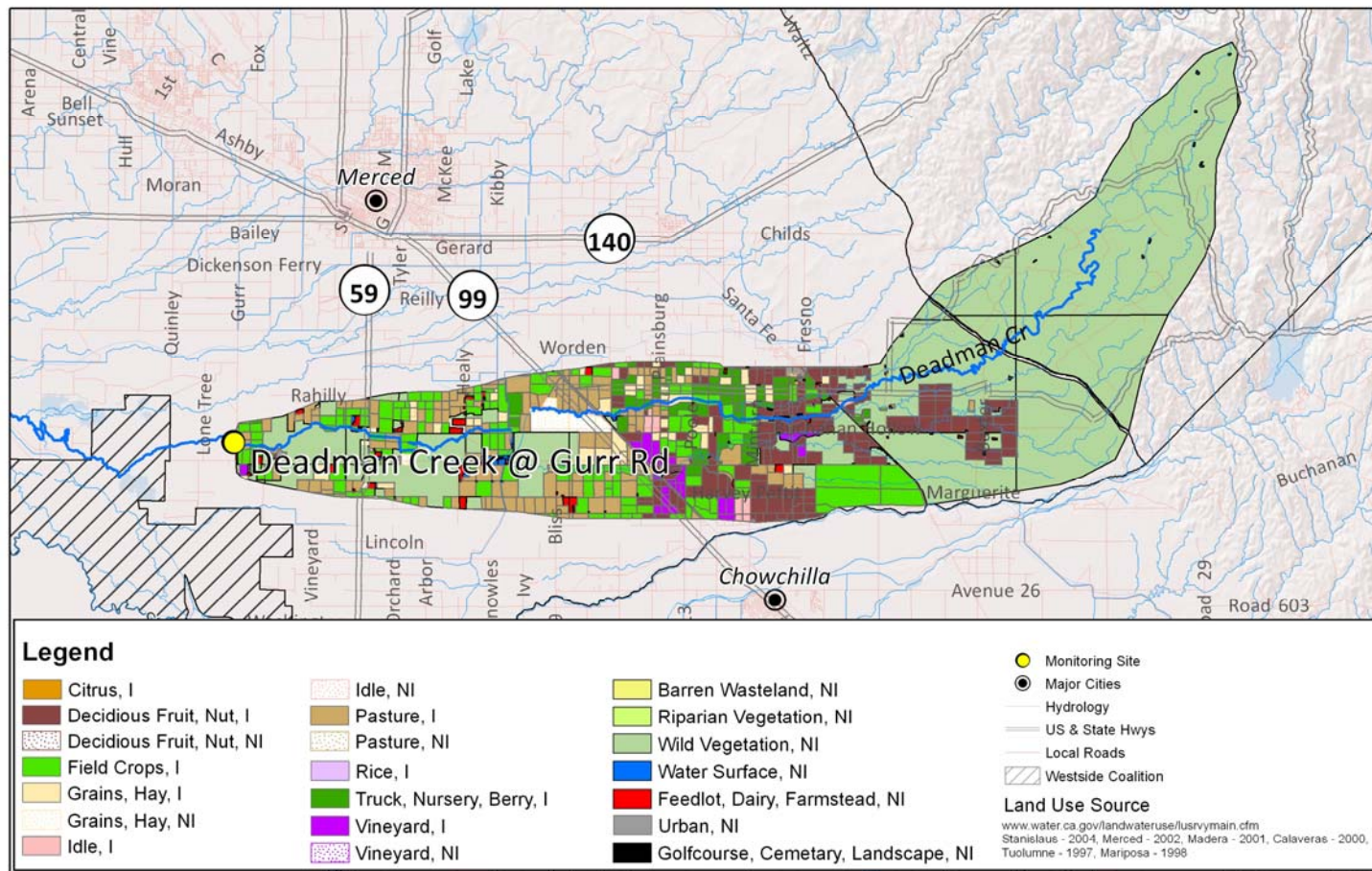
#### Description of Deadman Creek @ Gurr Rd Site Subwatershed

Deadman Creek @ Gurr Rd (40,418 irrigated acres) - Deadman Creek flows out of the Sierra foothills and confluences with Dutchman's Creek in the vicinity of Highway 59 (Table XIII-1). Orchards and row crops are the primary land use within the subwatershed; irrigated pastureland also makes up a relatively large portion of land use (Figure XIII-1).

**Table XIII-1. Deadman Creek @ Gurr Rd site subwatershed sampling location coordinates.**

| SITE NAME               | STATION CODE | TARGET LATITUDE | TARGET LONGITUDE |
|-------------------------|--------------|-----------------|------------------|
| Deadman Creek @ Gurr Rd | 535XDCAGR    | 37.1936         | -120.5612        |

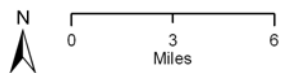
Figure XIII-1. Deadman Creek @ Gurr Rd site subwatershed land use map.



Source of Layers:  
 Hydrology - NHD hydrodata, 1:24,000-scale, <http://nhd.usgs.gov/>  
 Roads, highways, railroads, county boundary, city outlines - California Spatial Information Library  
 TRS - Teale Public Land Survey System, Pub. date: 20050101, California Spatial Information Library  
 Parcel Layer - Stanislaus 2010, Merced 2011, Madera 2011  
 Basemap, Shaded Relief - ESRI  
 GSC North America 1983

Date Prepared: 08/09/11

ESJWQC



Deadman Creek @ Gurr Rd

ESJWQC MPUR, April 1, 2012

Appendix I

## Subwatershed Monitoring History

Monitoring was initiated at Deadman Creek @ Gurr Rd in the irrigation season of 2004. The site was not sampled during 2005 or during the storm season of 2006, but monitoring resumed in the irrigation season of 2006 and continued through 2010 (Table XIII-2). Deadman Creek @ Gurr Rd was the Assessment Monitoring location for the Duck Slough @ Gurr Rd Zone (Zone 5) starting in the fall of 2008 through 2010 and therefore has received five years of consecutive monitoring for Assessment constituents (Table XIII-3). Sampling did not occur at Deadman Creek @ Gurr Rd during 2011. Under the 2008 MRPP, Assessment Monitoring is scheduled for 2017 through 2018.

Management Plan Monitoring was initiated during the 2008 irrigation season for *P. promelas* toxicity (May and June) and copper (April and May, Table XIII-4). Management Plan Monitoring occurred in 2010 during January and February for copper and *S. capricornutum* toxicity (Table XIII-4). Since Deadman Creek @ Gurr Rd is a fourth priority subwatershed, MPM is scheduled for 2012.

Deadman Creek is currently on California's 2008-2010 303d List of Impaired Waterbodies for chlorpyrifos and *E. coli*.

**Table XIII-2. Deadman Creek @ Gurr Rd site subwatershed sampling events per season and year (including MPM).**

| YEAR | SEASON     | EVENTS SAMPLED | EVENTS NOT SAMPLED <sup>1</sup> | TOTAL |
|------|------------|----------------|---------------------------------|-------|
| 2004 | Irrigation | 3              | 0                               | 3     |
| 2005 | Storm      | NA             | NA                              | NA    |
|      | Irrigation | NA             | NA                              | NA    |
| 2006 | Storm      | NA             | NA                              | NA    |
|      | Irrigation | 5              | 0                               | 5     |
| 2007 | Storm      | 2              | 0                               | 2     |
|      | Irrigation | 6              | 0                               | 6     |
| 2008 | Storm      | 3              | 0                               | 3     |
|      | Irrigation | 9              | 0                               | 9     |
|      | Fall       | 2              | 0                               | 2     |
| 2009 | Winter     | 2              | 0                               | 2     |
|      | Storm      | 2              | 0                               | 2     |
|      | Irrigation | 6              | 0                               | 6     |
|      | Fall       | 2              | 0                               | 2     |
| 2010 | Winter     | 1              | 0                               | 1     |
|      | Storm      | 3              | 0                               | 3     |
|      | Irrigation | 5              | 0                               | 5     |
|      | Fall       | 3              | 0                               | 3     |
| 2011 | Winter     | NA             | NA                              | NA    |
|      | Storm      | NA             | NA                              | NA    |
|      | Irrigation | NA             | NA                              | NA    |
|      | Fall       | NA             | NA                              | NA    |

<sup>1</sup>If an event was not sampled during scheduled monitoring, the site was dry.

NA – Not applicable. This site was not scheduled for sampling during this season/year.

**Table XIII-3. Deadman Creek @ Gurr Rd site subwatershed analyses per sampling season and year.**

Only environmental samples with a sample replicate and lab replicate of one are listed.

| METHOD                        | ANALYTE                         | 2004       | 2005              | 2006   |            | 2007  |            | 2008  |            |      | 2009   |       |            |      | 2010   |       |            |      | 2011         |
|-------------------------------|---------------------------------|------------|-------------------|--------|------------|-------|------------|-------|------------|------|--------|-------|------------|------|--------|-------|------------|------|--------------|
|                               |                                 | IRRIGATION | STORM-IRRIGATION* | STORM* | IRRIGATION | STORM | IRRIGATION | STORM | IRRIGATION | FALL | WINTER | STORM | IRRIGATION | FALL | WINTER | STORM | IRRIGATION | FALL | WINTER-FALL* |
| Field and Physical Parameters |                                 |            |                   |        |            |       |            |       |            |      |        |       |            |      |        |       |            |      |              |
| NA                            | Dissolved Oxygen                | 3          |                   |        | 6          | 3     | 9          | 4     | 10         | 2    | 2      | 2     | 6          | 2    | 1      | 3     | 5          | 3    |              |
| NA                            | Specific Conductivity           | 3          |                   |        | 6          | 3     | 9          | 4     | 10         | 2    | 2      | 2     | 6          | 2    | 1      | 3     | 5          | 3    |              |
| NA                            | pH                              | 3          |                   |        | 6          | 3     | 9          | 4     | 10         | 2    | 2      | 2     | 6          | 2    | 1      | 3     | 5          | 3    |              |
| EPA 110.2                     | Color                           | 3          |                   |        | 5          | 2     | 6          | 2     | 6          |      |        |       |            |      |        |       |            |      |              |
| EPA 160.1                     | Dissolved Solids                | 3          |                   |        | 5          | 2     | 6          | 3     | 6          | 2    | 2      | 2     | 6          | 2    | 1      | 3     | 5          | 3    |              |
| EPA 160.2                     | Suspended Solids                |            |                   |        |            |       |            | 1     |            | 2    | 2      | 2     | 6          | 2    | 1      | 3     | 5          | 3    |              |
| EPA 180.1                     | Turbidity                       | 3          |                   |        | 5          | 2     | 6          | 3     | 6          | 2    | 2      | 2     | 6          | 2    | 1      | 3     | 5          | 3    |              |
| EPA 415.1                     | Total Organic Carbon            | 4          |                   |        | 5          | 2     | 6          | 3     | 6          | 2    | 2      | 2     | 6          | 2    | 1      | 3     | 5          | 3    |              |
| SM 9223                       | <i>E. coli</i>                  | 3          |                   |        | 5          | 2     | 6          | 3     | 6          | 2    | 2      | 2     | 6          | 2    | 1      | 3     | 5          | 3    |              |
| Walkley-Black                 | Total Organic Carbon (sediment) |            |                   |        |            |       |            |       |            |      |        |       | 2          |      | 1      |       | 1          |      |              |
| ASTM D422 or ASTM D4464       | Grain size (sediment)           |            |                   |        |            |       |            |       |            |      |        |       | 2          |      | 1      |       | 1          |      |              |
| EPA 405.1                     | BOD                             |            |                   |        | 1          | 2     | 1          |       |            |      |        |       |            |      |        |       |            |      |              |
| Carbamates                    |                                 |            |                   |        |            |       |            |       |            |      |        |       |            |      |        |       |            |      |              |
| EPA 8321A                     | Aldicarb                        |            |                   |        | 5          | 2     | 6          | 3     | 6          | 2    | 2      | 2     | 6          | 2    | 1      | 3     | 5          | 3    |              |
| EPA 8321A                     | Carbaryl                        |            |                   |        | 5          | 2     | 6          | 3     | 6          | 2    | 2      | 2     | 6          | 2    | 1      | 3     | 5          | 3    |              |
| EPA 8321A                     | Carbofuran                      |            |                   |        | 5          | 2     | 6          | 3     | 6          | 2    | 2      | 2     | 6          | 2    | 1      | 3     | 5          | 3    |              |
| EPA 8321A                     | Diuron                          |            |                   |        | 5          | 2     | 6          | 3     | 6          | 2    | 2      | 2     | 6          | 2    | 1      | 3     | 5          | 3    |              |
| EPA 8321A                     | Linuron                         |            |                   |        | 5          | 2     | 6          | 3     | 6          | 2    | 2      | 2     | 6          | 2    | 1      | 3     | 5          | 3    |              |
| EPA 8321A                     | Methiocarb                      |            |                   |        | 5          | 2     | 6          | 3     | 6          | 2    | 2      | 2     | 6          | 2    | 1      | 3     | 5          | 3    |              |
| EPA 8321A                     | Methomyl                        |            |                   |        | 5          | 2     | 6          | 3     | 6          | 2    | 2      | 2     | 6          | 2    | 1      | 3     | 5          | 3    |              |
| EPA 8321A                     | Oxamyl                          |            |                   |        | 5          | 2     | 6          | 3     | 6          | 2    | 2      | 2     | 6          | 2    | 1      | 3     | 5          | 3    |              |
| Organochlorines               |                                 |            |                   |        |            |       |            |       |            |      |        |       |            |      |        |       |            |      |              |
| EPA 8081A                     | DDD(p,p')                       |            |                   |        | 5          | 2     | 6          | 3     | 6          | 2    | 2      | 2     | 1          |      |        |       | 2          | 3    |              |
| EPA 8081A                     | DDE(p,p')                       |            |                   |        | 5          | 2     | 6          | 3     | 6          | 2    | 2      | 2     | 1          |      |        |       | 2          | 3    |              |
| EPA 8081A                     | DDT(p,p')                       |            |                   |        | 5          | 2     | 6          | 3     | 6          | 2    | 2      | 2     | 1          |      |        |       | 2          | 3    |              |
| EPA 8081A                     | Dicofol                         |            |                   |        | 5          | 2     | 6          | 3     | 6          | 2    | 2      | 2     | 1          |      |        |       | 2          | 3    |              |

| METHOD           | ANALYTE         | 2004       | 2005              | 2006   |            | 2007  |            | 2008  |            |      | 2009   |       |            |      | 2010   |       |            |      | 2011         |
|------------------|-----------------|------------|-------------------|--------|------------|-------|------------|-------|------------|------|--------|-------|------------|------|--------|-------|------------|------|--------------|
|                  |                 | IRRIGATION | STORM-IRRIGATION* | STORM* | IRRIGATION | STORM | IRRIGATION | STORM | IRRIGATION | FALL | WINTER | STORM | IRRIGATION | FALL | WINTER | STORM | IRRIGATION | FALL | WINTER-FALL* |
| EPA 8081A        | Dieldrin        |            |                   |        | 5          | 2     | 6          | 3     | 6          | 2    | 2      | 2     | 1          |      |        |       | 2          | 3    |              |
| EPA 8081A        | Endrin          |            |                   |        | 5          | 2     | 6          | 3     | 6          | 2    | 2      | 2     | 1          |      |        |       | 2          | 3    |              |
| EPA 8081A        | Methoxychlor    |            |                   |        | 5          | 2     | 6          | 3     | 6          | 2    | 2      | 2     | 1          |      |        |       | 2          | 3    |              |
| Organophosphates |                 |            |                   |        |            |       |            |       |            |      |        |       |            |      |        |       |            |      |              |
| EPA 8141A        | Azinphos ethyl  | 1          |                   |        |            |       |            |       |            |      |        |       |            |      |        |       |            |      |              |
| EPA 8141A        | Azinphos methyl |            |                   |        | 5          | 2     | 6          | 3     | 6          | 2    | 2      | 2     | 6          | 2    | 1      | 3     | 5          | 3    |              |
| EPA 8141A        | Bolstar         | 1          |                   |        |            |       |            |       |            |      |        |       |            |      |        |       |            |      |              |
| EPA 8141A        | Chlorpyrifos    | 3          |                   |        | 5          | 2     | 6          | 3     | 6          | 2    | 2      | 2     | 6          | 2    | 1      | 3     | 5          | 3    |              |
| EPA 8141A        | Coumaphos       | 1          |                   |        |            |       |            |       |            |      |        |       |            |      |        |       |            |      |              |
| EPA 8141A        | Def             | 1          |                   |        |            |       |            |       |            |      |        |       |            |      |        |       |            |      |              |
| EPA 8141A        | Demeton-s       | 1          |                   |        |            |       |            | 1     |            | 2    | 2      | 2     | 6          | 2    | 1      | 3     | 5          | 3    |              |
| EPA 8141A        | Diazinon        | 3          |                   |        | 5          | 2     | 6          | 3     | 6          | 2    | 2      | 2     | 6          | 2    | 1      | 3     | 5          | 3    |              |
| EPA 8141A        | Dichlorvos      | 1          |                   |        |            |       |            | 1     |            | 2    | 2      | 2     | 6          | 2    | 1      | 3     | 5          | 3    |              |
| EPA 8141A        | Dimethoate      | 1          |                   |        | 5          | 2     | 6          | 3     | 6          | 2    | 2      | 2     | 6          | 2    | 1      | 3     | 5          | 3    |              |
| EPA 8141A        | Disulfoton      | 1          |                   |        | 5          | 2     | 6          | 3     | 6          | 2    | 2      | 2     | 6          | 2    | 1      | 3     | 5          | 3    |              |
| EPA 8141A        | EPN             | 1          |                   |        |            |       |            |       |            |      |        |       |            |      |        |       |            |      |              |
| EPA 8141A        | EPTC            | 1          |                   |        |            |       |            |       |            |      |        |       |            |      |        |       |            |      |              |
| EPA 8141A        | Ethion          | 1          |                   |        |            |       |            |       |            |      |        |       |            |      |        |       |            |      |              |
| EPA 8141A        | Ethoprop        | 1          |                   |        |            |       |            |       |            |      |        |       |            |      |        |       |            |      |              |
| EPA 8141A        | Fenamiphos      | 1          |                   |        |            |       |            |       |            |      |        |       |            |      |        |       |            |      |              |
| EPA 8141A        | Fenchlorphos    | 1          |                   |        |            |       |            |       |            |      |        |       |            |      |        |       |            |      |              |
| EPA 8141A        | Fensulfothion   | 1          |                   |        |            |       |            |       |            |      |        |       |            |      |        |       |            |      |              |
| EPA 8141A        | Fenthion        | 1          |                   |        |            |       |            |       |            |      |        |       |            |      |        |       |            |      |              |
| EPA 8141A        | Malathion       | 1          |                   |        | 5          | 2     | 6          | 3     | 6          | 2    | 2      | 2     | 6          | 2    | 1      | 3     | 5          | 3    |              |
| EPA 8141A        | Merphos         | 1          |                   |        |            |       |            |       |            |      |        |       |            |      |        |       |            |      |              |
| EPA 8321A        | Methamidophos   |            |                   |        | 5          | 2     | 6          | 3     | 6          | 2    | 2      | 2     | 6          | 2    | 1      | 3     | 5          | 3    |              |
| EPA 8141A        | Methidathion    |            |                   |        | 5          | 2     | 6          | 3     | 6          | 2    | 2      | 2     | 6          | 2    | 1      | 3     | 5          | 3    |              |
| EPA 8141A        | Mevinphos       | 1          |                   |        |            |       |            |       |            |      |        |       |            |      |        |       |            |      |              |
| EPA 8141A        | Molinate        |            |                   |        | 5          | 2     | 6          | 2     | 6          |      |        |       |            |      |        |       |            |      |              |
| EPA 8141A        | Naled           | 1          |                   |        |            |       |            |       |            |      |        |       |            |      |        |       |            |      |              |



| METHOD                | ANALYTE                           | 2004       | 2005              | 2006   |            | 2007  |            | 2008  |            |      | 2009   |       |            |      | 2010   |       |            |      | 2011         |
|-----------------------|-----------------------------------|------------|-------------------|--------|------------|-------|------------|-------|------------|------|--------|-------|------------|------|--------|-------|------------|------|--------------|
|                       |                                   | IRRIGATION | STORM-IRRIGATION* | STORM* | IRRIGATION | STORM | IRRIGATION | STORM | IRRIGATION | FALL | WINTER | STORM | IRRIGATION | FALL | WINTER | STORM | IRRIGATION | FALL | WINTER-FALL* |
| EPA 8141A             | Parathion, Ethyl                  | 1          |                   |        |            |       |            |       |            |      |        |       |            |      |        |       |            |      |              |
| EPA 8141A             | Parathion, Methyl                 | 1          |                   |        | 5          | 2     | 6          | 3     | 6          | 2    | 2      | 2     | 6          | 2    | 1      | 3     | 5          | 3    |              |
| EPA 8141A             | Phorate                           | 1          |                   |        | 5          | 2     | 6          | 3     | 6          | 2    | 2      | 2     | 6          | 2    | 1      | 3     | 5          | 3    |              |
| EPA 8141A             | Phosmet                           |            |                   |        | 5          | 2     | 6          | 3     | 6          | 2    | 2      | 2     | 6          | 2    | 1      | 3     | 5          | 3    |              |
| EPA 8141A             | Prowl                             | 1          |                   |        |            |       |            |       |            |      |        |       |            |      |        |       |            |      |              |
| EPA 8141A             | Tetrachlorvinphos                 | 1          |                   |        |            |       |            |       |            |      |        |       |            |      |        |       |            |      |              |
| EPA 8141A             | Thiobencarb                       |            |                   |        | 5          | 2     | 6          | 2     | 6          |      |        |       |            |      |        |       |            |      |              |
| EPA 8141A             | Tokuthion                         | 1          |                   |        |            |       |            |       |            |      |        |       |            |      |        |       |            |      |              |
| EPA 8141A             | Trichloronate                     | 1          |                   |        |            |       |            |       |            |      |        |       |            |      |        |       |            |      |              |
| EPA 8141A             | Trifluralin                       | 1          |                   |        |            |       |            | 1     |            | 2    | 2      | 2     | 6          | 2    | 1      | 3     | 5          | 3    |              |
| <b>Pyrethroids</b>    |                                   |            |                   |        |            |       |            |       |            |      |        |       |            |      |        |       |            |      |              |
| EPA 8081A             | Bifenthrin                        |            |                   |        | 5          | 2     | 6          | 2     | 6          |      |        |       |            |      |        |       |            |      |              |
| EPA 8081A             | Cyfluthrin, total                 |            |                   |        | 5          | 2     | 6          | 2     | 6          |      |        |       |            |      |        |       |            |      |              |
| EPA 8081A             | Cyhalothrin, lambda, total        | 3          |                   |        | 5          | 2     | 6          | 2     | 6          |      |        |       |            |      |        |       |            |      |              |
| EPA 8081A             | Cypermethrin, total               | 3          |                   |        | 5          | 2     | 6          | 2     | 6          |      |        |       |            |      |        |       |            |      |              |
| EPA 8081A             | Esfenvalerate/ Fenvalerate, total | 3          |                   |        | 5          | 2     | 6          | 2     | 6          |      |        |       |            |      |        |       |            |      |              |
| EPA 8081A             | Permethrin, total                 | 3          |                   |        | 5          | 2     | 6          | 2     | 6          |      |        |       |            |      |        |       |            |      |              |
| <b>Triazines</b>      |                                   |            |                   |        |            |       |            |       |            |      |        |       |            |      |        |       |            |      |              |
| EPA 547M              | Glyphosate                        |            |                   |        | 5          | 2     | 6          | 3     | 6          | 2    | 2      | 2     | 1          |      |        |       | 3          | 3    |              |
| EPA 549.2M            | Paraquat dichloride               |            |                   |        | 5          | 2     | 6          | 3     | 6          | 2    | 2      | 2     | 1          |      |        |       | 3          | 3    |              |
| EPA 619               | Atrazine                          |            |                   |        | 5          | 2     | 6          | 3     | 6          | 2    | 2      | 2     | 6          | 2    | 1      | 3     | 5          | 3    |              |
| EPA 619               | Cyanazine                         |            |                   |        | 5          | 2     | 6          | 3     | 6          | 2    | 2      | 2     | 6          | 2    | 1      | 3     | 5          | 3    |              |
| EPA 619               | Simazine                          |            |                   |        | 5          | 2     | 6          | 3     | 6          | 2    | 2      | 2     | 6          | 2    | 1      | 3     | 5          | 3    |              |
| <b>Metals (Total)</b> |                                   |            |                   |        |            |       |            |       |            |      |        |       |            |      |        |       |            |      |              |
| EPA 200.8             | Arsenic                           |            |                   |        | 5          | 2     | 6          | 3     | 6          | 2    | 2      | 2     | 1          |      |        |       | 3          | 3    |              |
| EPA 200.8             | Boron                             |            |                   |        | 5          | 2     | 6          | 3     | 6          | 2    | 2      | 2     | 6          | 2    | 1      | 3     | 5          | 3    |              |
| EPA 200.8             | Cadmium                           |            |                   |        | 5          | 2     | 6          | 3     | 6          | 2    | 2      | 2     | 1          |      |        |       | 3          | 3    |              |
| EPA 200.8             | Copper                            |            |                   |        | 5          | 2     | 6          | 3     | 8          | 2    | 2      | 2     | 6          | 2    | 1      | 3     | 5          | 3    |              |
| EPA 200.8             | Lead                              |            |                   |        | 5          | 2     | 6          | 3     | 6          | 2    | 2      | 2     | 1          |      |        |       | 3          | 3    |              |
| EPA 200.8             | Molybdenum                        |            |                   |        |            |       |            | 1     |            | 2    | 2      | 2     | 1          |      |        |       | 3          | 3    |              |

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Appendix I



| METHOD             | ANALYTE                          | 2004       | 2005              | 2006   |            | 2007  |            | 2008  |            |      | 2009   |       |            |      | 2010   |       |            |      | 2011         |
|--------------------|----------------------------------|------------|-------------------|--------|------------|-------|------------|-------|------------|------|--------|-------|------------|------|--------|-------|------------|------|--------------|
|                    |                                  | IRRIGATION | STORM-IRRIGATION* | STORM* | IRRIGATION | STORM | IRRIGATION | STORM | IRRIGATION | FALL | WINTER | STORM | IRRIGATION | FALL | WINTER | STORM | IRRIGATION | FALL | WINTER-FALL* |
| EPA 200.8          | Nickel                           |            |                   |        | 5          | 2     | 6          | 3     | 6          | 2    | 2      | 2     | 6          | 2    | 1      | 3     | 5          | 3    |              |
| EPA 200.8          | Selenium                         |            |                   |        | 5          | 2     | 2          | 3     | 6          | 2    | 2      | 2     | 6          | 2    | 1      | 3     | 5          | 3    |              |
| EPA 200.8          | Zinc                             |            |                   |        | 5          | 2     | 6          | 3     | 6          | 2    | 2      | 2     | 6          | 2    | 1      | 3     | 5          | 3    |              |
| Metals (Dissolved) |                                  |            |                   |        |            |       |            |       |            |      |        |       |            |      |        |       |            |      |              |
| EPA 200.8          | Cadmium                          |            |                   |        |            |       |            | 1     |            | 2    | 2      | 2     | 1          |      |        |       | 3          | 3    |              |
| EPA 200.8          | Copper                           |            |                   |        |            |       |            | 1     |            | 2    | 2      | 2     | 6          | 2    | 1      | 3     | 5          | 3    |              |
| EPA 200.8          | Lead                             |            |                   |        |            |       |            | 1     |            | 2    | 2      | 2     | 1          |      |        |       | 3          | 3    |              |
| EPA 200.8          | Nickel                           |            |                   |        |            |       |            | 1     |            | 2    | 2      | 2     | 6          | 2    | 1      | 3     | 5          | 3    |              |
| EPA 200.8          | Zinc                             |            |                   |        |            |       |            | 1     |            | 2    | 2      | 2     | 6          | 2    | 1      | 3     | 5          | 3    |              |
| Nutrients          |                                  |            |                   |        |            |       |            |       |            |      |        |       |            |      |        |       |            |      |              |
| SM 2340 C          | Hardness as CaCO3                |            |                   |        | 5          | 2     | 6          | 3     | 8          | 2    | 2      | 2     | 6          | 2    | 1      | 3     | 5          | 3    |              |
| EPA 300.0          | Nitrate as N                     |            |                   |        | 5          | 2     | 6          | 2     | 6          |      |        |       |            |      |        |       |            |      |              |
| EPA 350.2          | Ammonia as N                     |            |                   |        | 5          | 2     | 6          | 3     | 6          | 2    | 2      | 2     | 6          | 2    | 1      | 3     | 5          | 3    |              |
| EPA 351.3          | Nitrogen, Total Kjeldahl         |            |                   |        | 5          | 2     | 6          | 3     | 6          | 2    | 2      | 1     | 1          |      |        |       | 3          | 3    |              |
| EPA 354.1          | Nitrite as N                     |            |                   |        | 5          | 2     | 6          | 2     | 6          |      |        |       |            |      |        |       |            |      |              |
| EPA 353.2          | Nitrate + Nitrite as N           |            |                   |        |            |       |            | 1     |            | 2    | 2      | 2     | 6          | 2    | 1      | 3     | 5          | 3    |              |
| EPA 365.2          | OrthoPhosphate as P              |            |                   |        | 5          | 2     | 6          | 3     | 6          | 2    | 2      | 1     | 1          |      |        |       | 3          | 3    |              |
| EPA 365.2          | Phosphate as P                   |            |                   |        | 5          | 2     | 6          | 3     | 6          | 2    | 2      | 2     | 6          | 2    | 1      | 3     | 5          | 3    |              |
| Toxicity           |                                  |            |                   |        |            |       |            |       |            |      |        |       |            |      |        |       |            |      |              |
| EPA 821/R-02-012   | <i>Ceriodaphnia dubia</i>        | 3          |                   |        | 5          | 2     | 6          | 3     | 6          | 2    | 2      | 2     | 6          | 2    | 1      | 3     | 5          | 3    |              |
| EPA 821/R-02-012   | <i>Pimephales promelas</i>       | 3          |                   |        | 6          | 2     | 7          | 3     | 8          | 2    | 2      | 2     | 6          | 2    | 1      | 3     | 5          | 3    |              |
| EPA 821/R-02-013   | <i>Selenastrum capricornutum</i> | 3          |                   |        | 5          | 2     | 7          | 4     | 6          | 2    | 2      | 2     | 6          | 2    | 1      | 3     | 5          | 3    |              |
| EPA 600/R-99-064   | <i>Hyalella azteca</i>           | 2          |                   |        | 1          | 1     | 1          | 1     | 1          |      |        |       | 2          |      | 1      |       | 1          |      |              |

\*Site not sampled during the 2005 sampling year, 2006 storm season, and 2011 sampling year.

**Table XIII-4. Deadman Creek @ Gurr Rd site subwatershed Management Plan Monitoring schedule (2008-2010).**

| SITE NAME               | SAMPLE DATE | MONITORING TYPE | COPPER | P. PROMELAS | S. CAPRICORNUTUM |
|-------------------------|-------------|-----------------|--------|-------------|------------------|
| Deadman Creek @ Gurr Rd | 29-Apr-08   | A               | X      |             |                  |
| Deadman Creek @ Gurr Rd | 27-May-08   | A               | X      | X           |                  |
| Deadman Creek @ Gurr Rd | 24-Jun-08   | A               |        | X           |                  |
| Deadman Creek @ Gurr Rd | 19-Jan-10   | MPM             | X      |             | X                |
| Deadman Creek @ Gurr Rd | 23-Feb-10   | MPM             | X      |             | X                |

A – Additional sampling

X – Constituent sampled for Management Plan Monitoring (MPM)

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### Exceedance History

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Samples collected from Deadman Creek @ Gurr Rd from 2004 through 2011 exceeded the WQTL for field parameters, *E. coli*, TDS, ammonia, pesticides, and metals, and water column toxicity (Table XIII-5). Constituents that exceeded their respective WQTLs in this subwatershed include DO (27), pH (1), SC (six), TDS (6), *E. coli* (41), ammonia (5), arsenic (11), copper (4), chlorpyrifos (4), DDT (1), dieldrin (1) and malathion (1). Toxicity to *C. dubia* (4), *P. promelas* (7), and *S. capricornutum* (3) occurred (Table XIII-5).

Exceedances are based on WQTLs listed in the introduction to the ESJWQC Management Plan. The highest priority constituents in the Deadman Creek @ Gurr Rd subwatershed are chlorpyrifos (A/B), copper (C), and toxicity to *C. dubia*, *P. promelas* and *S. capricornutum* (D).

**Table XIII-5. Deadman Creek @ Gurr Rd site subwatershed exceedances (2004-2010).**

The WQTL used to evaluate the data are listed in the header after the analyte.

| SITE NAME               | SEASON     | SAMPLE DATE | OXYGEN, DISSOLVED, <7MG/L | PH, <6.5 AND > 8.5 UNITS | SPECIFIC CONDUCTIVITY, >700 µS/cm | TOTAL DISSOLVED SOLIDS, >450 MG/L | AMMONIA <sup>1</sup> , >1.5 MG/L | E. COLI, >235 MPN/100 ML | ARSENIC, >10 µG/L | COPPER, TOTAL <sup>2</sup> , > 1,300 µG/L | CHLORPYRIFOS, >0.015 µG/L | DDT (P,P'), > 0.00059µG/L | DIELDRIN, >0.00014 µG/L | MALATHION, >0 µG/L | C. DUBIA, (% CONTROL) | P. PROMELAS, (% CONTROL) | S. CAPRICORNUTUM, (% CONTROL) |
|-------------------------|------------|-------------|---------------------------|--------------------------|-----------------------------------|-----------------------------------|----------------------------------|--------------------------|-------------------|-------------------------------------------|---------------------------|---------------------------|-------------------------|--------------------|-----------------------|--------------------------|-------------------------------|
| Deadman Creek @ Gurr Rd | Irrigation | 7/31/04     | 6.85                      |                          |                                   |                                   |                                  | 1600                     |                   |                                           |                           |                           |                         |                    |                       |                          |                               |
| Deadman Creek @ Gurr Rd | Irrigation | 8/31/04     |                           |                          |                                   |                                   |                                  | 1600                     |                   |                                           |                           |                           |                         |                    |                       |                          |                               |
| Deadman Creek @ Gurr Rd | Irrigation | 9/29/04     | 6.70                      |                          |                                   |                                   |                                  | 500                      |                   |                                           |                           |                           |                         |                    |                       |                          |                               |
| Deadman Creek @ Gurr Rd | Irrigation | 5/17/06     |                           |                          |                                   |                                   |                                  | 1200                     |                   |                                           |                           |                           |                         |                    |                       |                          |                               |
| Deadman Creek @ Gurr Rd | Irrigation | 6/13/06     | 5.01                      |                          |                                   |                                   |                                  | 310                      |                   |                                           |                           |                           |                         |                    |                       | 88                       |                               |
| Deadman Creek @ Gurr Rd | Irrigation | 7/11/06     | 6.50                      |                          |                                   |                                   |                                  | 490                      |                   |                                           |                           |                           |                         |                    |                       |                          |                               |
| Deadman Creek @ Gurr Rd | Irrigation | 8/8/06      | 6.96                      |                          |                                   |                                   |                                  | 390                      |                   |                                           |                           |                           |                         | 0.19               |                       |                          |                               |
| Deadman Creek @ Gurr Rd | Irrigation | 9/12/06     | 6.08                      |                          |                                   |                                   |                                  | 2400                     |                   |                                           | 0.027                     |                           |                         |                    |                       |                          |                               |
| Deadman Creek @ Gurr Rd | Storm      | 2/11/07     |                           |                          |                                   |                                   |                                  | 2400                     | 14                | 16 (15.4)                                 |                           |                           |                         |                    |                       |                          |                               |
| Deadman Creek @ Gurr Rd | Storm      | 2/28/07     |                           |                          |                                   |                                   |                                  | 1000                     | 14                |                                           |                           |                           |                         |                    |                       |                          |                               |
| Deadman Creek @ Gurr Rd | Irrigation | 4/24/07     |                           |                          |                                   |                                   |                                  |                          |                   | 9.2 (7.7)                                 |                           |                           |                         |                    |                       |                          |                               |
| Deadman Creek @ Gurr Rd | Irrigation | 5/29/07     | 5.11                      |                          |                                   |                                   |                                  | 1400                     |                   | 8.8 (7.5)                                 |                           |                           |                         |                    |                       | 87                       |                               |
| Deadman Creek @ Gurr Rd | Irrigation | 6/26/07     |                           |                          |                                   |                                   |                                  | 460                      |                   |                                           |                           |                           |                         |                    |                       |                          |                               |
| Deadman Creek @ Gurr Rd | Irrigation | 7/24/07     | 5.38                      |                          |                                   |                                   |                                  |                          |                   |                                           |                           |                           |                         |                    |                       |                          | 42                            |
| Deadman Creek @ Gurr Rd | Irrigation | 9/18/07     | 5.88                      |                          |                                   |                                   |                                  | 820                      |                   |                                           |                           |                           |                         |                    |                       |                          |                               |
| Deadman Creek @ Gurr Rd | Storm      | 1/25/08     |                           |                          |                                   |                                   |                                  | 870                      | 15                | 19 (11.7)                                 |                           | 0.0073                    |                         |                    |                       |                          |                               |
| Deadman Creek @ Gurr Rd | Storm      | 2/25/08     |                           | 8.51                     |                                   |                                   |                                  | 550                      | 13                |                                           |                           |                           |                         |                    |                       |                          | 47                            |

| SITE NAME               | SEASON     | SAMPLE DATE | OXYGEN, DISSOLVED, <7MG/L | pH, <6.5 AND > 8.5 UNITS | SPECIFIC CONDUCTIVITY, >700 µS/cm | TOTAL DISSOLVED SOLIDS, >450 MG/L | AMMONIA <sup>1</sup> , >1.5 MG/L | E. COLI, >235 MPN/100 mL | ARSENIC, >10 µg/L | COPPER, TOTAL <sup>2</sup> , > 1,300 µg/L | CHLORPYRIFOS, >0.015 µg/L | DDT (p,p'), > 0.00059µg/L | DIELDRIN, >0.00014 µg/L | MALATHION, >0 µg/L | C. DUBIA, (% CONTROL) | P. PROMELAS, (% CONTROL) | S. CAPRICORNUTUM, (% CONTROL) |
|-------------------------|------------|-------------|---------------------------|--------------------------|-----------------------------------|-----------------------------------|----------------------------------|--------------------------|-------------------|-------------------------------------------|---------------------------|---------------------------|-------------------------|--------------------|-----------------------|--------------------------|-------------------------------|
| Deadman Creek @ Gurr Rd | Irrigation | 4/29/08     |                           |                          |                                   |                                   |                                  | >2400                    | 18                |                                           |                           |                           | 0.028                   |                    |                       |                          |                               |
| Deadman Creek @ Gurr Rd | Irrigation | 5/27/08     |                           |                          | 801                               | 520                               |                                  |                          |                   |                                           |                           |                           |                         |                    |                       |                          |                               |
| Deadman Creek @ Gurr Rd | Irrigation | 6/24/08     | 4.85                      |                          |                                   |                                   |                                  |                          |                   |                                           |                           |                           |                         |                    |                       |                          |                               |
| Deadman Creek @ Gurr Rd | Irrigation | 7/29/08     | 6.87                      |                          |                                   |                                   |                                  |                          |                   |                                           |                           |                           |                         |                    |                       |                          |                               |
| Deadman Creek @ Gurr Rd | Irrigation | 8/26/08     | 5.21                      |                          |                                   |                                   |                                  | 330                      |                   |                                           |                           |                           |                         |                    |                       |                          |                               |
| Deadman Creek @ Gurr Rd | Sediment   | 8/28/08     | 5.90                      |                          |                                   |                                   |                                  |                          |                   |                                           |                           |                           |                         |                    |                       |                          |                               |
| Deadman Creek @ Gurr Rd | Irrigation | 9/30/08     | 5.46                      |                          |                                   |                                   |                                  | 330                      |                   |                                           |                           |                           |                         |                    |                       |                          |                               |
| Deadman Creek @ Gurr Rd | Fall       | 10/21/08    |                           |                          |                                   |                                   |                                  | 1400                     | 12                |                                           |                           |                           |                         |                    |                       |                          |                               |
| Deadman Creek @ Gurr Rd | Fall       | 11/11/08    |                           |                          |                                   |                                   |                                  | 370                      | 14                |                                           |                           |                           |                         |                    |                       |                          |                               |
| Deadman Creek @ Gurr Rd | Fall       | 12/16/08    |                           |                          |                                   |                                   |                                  | 1400                     |                   |                                           |                           |                           |                         |                    |                       |                          |                               |
| Deadman Creek @ Gurr Rd | Winter     | 1/20/09     | 5.61                      |                          | 762                               | 470                               | 5.5 (3.93)                       | >2400                    | 18                |                                           |                           |                           |                         |                    |                       | 88                       |                               |
| Deadman Creek @ Gurr Rd | Storm      | 2/7/09      | 1.01                      |                          | 1802                              | 1100                              | 50 (3.82)                        | >2400                    | 30                |                                           |                           |                           |                         |                    | 0                     | 0                        | 7                             |
| Deadman Creek @ Gurr Rd | Winter     | 3/17/09     |                           |                          |                                   |                                   |                                  | 1600                     | 14                |                                           |                           |                           |                         |                    | 10                    |                          |                               |
| Deadman Creek @ Gurr Rd | Irrigation | 5/19/09     |                           |                          |                                   |                                   |                                  | 490                      |                   |                                           |                           |                           |                         |                    |                       |                          |                               |
| Deadman Creek @ Gurr Rd | Irrigation | 6/16/09     |                           |                          |                                   |                                   |                                  | 730                      |                   |                                           |                           |                           |                         |                    |                       |                          |                               |
| Deadman Creek @ Gurr Rd | Irrigation | 7/21/09     | 6.04                      |                          |                                   |                                   |                                  | 460                      |                   |                                           |                           |                           |                         |                    |                       |                          |                               |
| Deadman Creek @ Gurr Rd | Irrigation | 8/18/09     | 6.94                      |                          |                                   |                                   |                                  |                          |                   |                                           |                           |                           |                         |                    |                       |                          |                               |
| Deadman Creek @ Gurr Rd | Fall       | 10/20/09    | 6.08                      |                          |                                   |                                   |                                  | 490                      |                   |                                           |                           |                           |                         |                    |                       |                          |                               |
| Deadman Creek @ Gurr Rd | Fall       | 11/17/09    |                           |                          |                                   |                                   |                                  | 2000                     |                   |                                           |                           |                           |                         |                    |                       |                          |                               |

| SITE NAME               | SEASON                 | SAMPLE DATE | OXYGEN, DISSOLVED, <7MG/L | pH, <6.5 AND > 8.5 UNITS | SPECIFIC CONDUCTIVITY, >700 µS/cm | TOTAL DISSOLVED SOLIDS, >450 MG/L | AMMONIA <sup>1</sup> , >1.5 MG/L | E. COLI, >235 MPN/100 mL | ARSENIC, >10 µg/L | COPPER, TOTAL <sup>2</sup> , > 1,300 µg/L | CHLORPYRIFOS, >0.015 µg/L | DDT (p,p'), > 0.00059µg/L | DIELDRIN, >0.00014 µg/L | MALATHION, >0 µg/L | C. DUBIA, (% CONTROL) | P. PROMELAS, (% CONTROL) | S. CAPRICORNUTUM, (% CONTROL) |
|-------------------------|------------------------|-------------|---------------------------|--------------------------|-----------------------------------|-----------------------------------|----------------------------------|--------------------------|-------------------|-------------------------------------------|---------------------------|---------------------------|-------------------------|--------------------|-----------------------|--------------------------|-------------------------------|
| Deadman Creek @ Gurr Rd | Non-contiguous, Storm  | 12/15/09    | 5.02                      |                          | 995                               | 610                               | 15                               | >2400                    |                   |                                           |                           |                           |                         |                    |                       | 75                       |                               |
| Deadman Creek @ Gurr Rd | Storm                  | 1/19/10     |                           |                          |                                   |                                   |                                  | >2400                    |                   |                                           |                           |                           |                         |                    |                       |                          |                               |
| Deadman Creek @ Gurr Rd | Storm                  | 2/23/10     |                           |                          |                                   |                                   |                                  | 370                      |                   |                                           |                           |                           |                         |                    |                       |                          |                               |
| Deadman Creek @ Gurr Rd | Non-contiguous, Winter | 3/23/10     | 0.20                      |                          | 4023                              | 2100                              | 155.4                            | >2400                    |                   |                                           | 0.14                      |                           |                         |                    | 0                     | 0                        |                               |
| Deadman Creek @ Gurr Rd | Storm                  | 4/20/10     |                           |                          |                                   |                                   |                                  | 280                      |                   |                                           | 0.018                     |                           |                         |                    |                       |                          |                               |
| Deadman Creek @ Gurr Rd | Irrigation             | 5/18/10     |                           |                          |                                   |                                   |                                  | 240                      |                   |                                           |                           |                           |                         |                    |                       |                          |                               |
| Deadman Creek @ Gurr Rd | Irrigation             | 6/15/10     | 4.56                      |                          |                                   |                                   |                                  | 370                      |                   |                                           |                           |                           |                         |                    |                       |                          |                               |
| Deadman Creek @ Gurr Rd | Irrigation             | 7/20/10     | 6.60                      |                          |                                   |                                   |                                  | 580                      |                   |                                           |                           |                           |                         |                    |                       |                          |                               |
| Deadman Creek @ Gurr Rd | Irrigation             | 8/17/10     | 6.77                      |                          |                                   |                                   |                                  |                          |                   |                                           | 0.024                     |                           |                         |                    |                       |                          |                               |
| Deadman Creek @ Gurr Rd | Sediment               | 9/14/10     | 6.82                      |                          |                                   |                                   |                                  | 360                      |                   |                                           |                           |                           |                         |                    |                       |                          |                               |
| Deadman Creek @ Gurr Rd | Fall                   | 10/19/10    |                           |                          |                                   |                                   |                                  | 340                      |                   |                                           |                           |                           |                         |                    |                       |                          |                               |
| Deadman Creek @ Gurr Rd | Fall                   | 11/16/10    | 6.82                      |                          | 1547                              | 840                               | 31 (2.05)                        | >2400                    | 14                |                                           |                           |                           |                         |                    | 0                     | 0                        |                               |
| Deadman Creek @ Gurr Rd | Non-contiguous, Fall   | 12/14/10    | 5.2                       |                          |                                   |                                   |                                  | >2400                    |                   |                                           |                           |                           |                         |                    |                       |                          |                               |
| Constituent Priority    |                        |             | E                         | NP                       | E                                 | E                                 | E                                | E                        | E                 | C                                         | A/B                       | NP                        | NP                      | NP                 | D                     | D                        | D                             |

<sup>1</sup>Ammonia WQTL variable based on pH and temperature.

<sup>2</sup>Total metal WQTL variable based on hardness.

NP – Not Prioritized; less than two exceedances within three consecutive monitoring years and currently no TMDL.

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## 2007-2011 Management Plan Monitoring Results

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All monitoring results for high priority management plan constituents in the Deadman Creek @ Gurr Rd subwatershed are listed in Table XIII-6, which includes chlorpyrifos, copper, *C. dubia* toxicity, *P. promelas* toxicity, and *S. capricornutum* toxicity. In the Deadman Creek @ Gurr Rd subwatershed, MPM occurred in 2008 for additional MPM and in 2010 for MPM. Deadman Creek was sampled as an Assessment Monitoring location during 2009 and 2010.

Chlorpyrifos first exceeded the WQTL in Deadman Creek @ Gurr Rd during 2006 September monitoring. The chlorpyrifos and diazinon TMDL for the Lower San Joaquin River was approved in October 2007 and hence chlorpyrifos was added to the Deadman Creek @ Gurr Rd management plan in 2008. However, no MPM for chlorpyrifos in 2008 was scheduled. Chlorpyrifos did not exceed the WQTL during 2008 Normal Monitoring, and no exceedances occurred during 2009 Assessment Monitoring. However, Assessment Monitoring in 2010 resulted in three exceedances of chlorpyrifos (March, April, and August, Table XIII-6). Chlorpyrifos MPM is scheduled to occur in 2012 (March, April, August, and September).

Copper exceeded the WQTL three times during 2007 (February, April and May), therefore the constituent was added to the Deadman Creek @ Gurr Rd management plan as of 2008. Additional MPM for copper in 2008 occurred during April and May but resulted in no exceedances (Table XIII-6). Copper did exceed the WQTL once in 2008 during January Normal Monitoring. However, copper did not exceed the WQTL during 2009 and 2010 Assessment Monitoring. Management Plan Monitoring for copper is scheduled for 2012 (January, February, April and May).

Toxicity to *C. dubia* did not occur in the subwatershed until 2009 (February and March) and in 2010 (March and November). The March 2010 toxicity was associated with a chlorpyrifos exceedance (Table XIII-6). The Coalition is scheduled to conduct MPM for *C. dubia* toxicity in 2012 (February, March, and November).

Toxicity to *P. promelas* first occurred in June 2006, and the second toxicity occurred in May 2007. Toxicity to *P. promelas* was added to the Deadman Creek @ Gurr Rd management plan and additional MPM occurred during 2008 (May and June). In 2008, toxicity to *P. promelas* did not occur during MPM or Normal Monitoring. However, *P. promelas* toxicity occurred in 2009 (January, February, and December) and during 2010 (March and November, Table XIII-6). All five of the *P. promelas* toxicities from 2009 and 2010 coincided with ammonia exceedances—ammonia exceedances did not occur prior to 2009. Management Plan Monitoring for toxicity to *P. promelas* is scheduled to occur during 2012 (January, February, March, May, June, November and December).

Toxicity to *S. capricornutum* occurred in July 2007 and February 2008; consequently, the constituent was added to the 2009 to the Deadman Creek @ Gurr Rd management plan. Assessment Monitoring resulted in *S. capricornutum* toxicity during February 2009 and, both the 2008 and 2009 February

toxicities coincided with arsenic exceedances. There was no toxicity during 2010 Assessment Monitoring, however March 2010 *S. capricornutum* toxicity analysis could not be conducted since pigment and suspended solids precluded measurement of algae cells; however, samples collected from the same event were also toxic to both *C. dubia* and *P. promelas* (Table XIII-6). The Coalition will conduct MPM for *S. capricornutum* toxicity in 2012 (February and July).



**Table XIII-6. Deadman Creek @ Gurr Rd site subwatershed monitoring results for high priority constituents.**

Exceedance values are in bold. Resampling (RS) due to toxicity not included in table.

|                           | MONTH:                                       | JAN       | FEB      | MAR          | APR          | MAY     | JUN     | JUL     | AUG          | SEP     | OCT      | NOV      | DEC        |
|---------------------------|----------------------------------------------|-----------|----------|--------------|--------------|---------|---------|---------|--------------|---------|----------|----------|------------|
| 2008 NM (@ Gurr Rd)       | Date                                         | 1/25/08   | 2/25/08  | 3/4/08       | 4/29/08      | 5/27/08 | 6/24/08 | 7/29/08 | 8/26/08      | 9/30/08 | 10/21/08 | 11/11/08 | 12/16/08   |
|                           | Copper, dissolved (µg/L)                     | NA        | NA       | NA           | NA           | NA      | NA      | NA      | NA           | NA      | 1        | 1.6      | 1.5        |
|                           | Copper, total (µg/L)                         | <b>19</b> | 3.4      | NA           | 5.8          | 5       | 5       | 7       | 3.9          | 4.5     | 4.4      | 8.4      | 4.8        |
|                           | Chlorpyrifos (µg/L)                          | <0.003    | 0.0037   | NA           | <0.003       | <0.003  | <0.003  | 0.0067  | <0.003       | <0.003  | <0.003   | <0.003   | <0.003     |
|                           | <i>P. promelas</i> toxicity (% Control)      | 100       | 100      | NA           | 98           | 100     | 100     | 98      | 100          | 100     | 95       | 100      | 100        |
| 2008 MPM A (@ Gurr Rd)    | Date                                         | NA        | NA       | NA           | 4/22/08      | 5/20/08 | 6/17/08 | NA      | NA           | NA      | NA       | NA       | NA         |
|                           | Copper, total (µg/L)                         | NA        | NA       | NA           | 4.2          | 6.2     | NA      | NA      | NA           | NA      | NA       | NA       | NA         |
|                           | <i>P. promelas</i> toxicity (% Control)      | NA        | NA       | NA           | NA           | 100     | 103     | NA      | NA           | NA      | NA       | NA       | NA         |
| 2009 NM (@ Gurr Rd)       | Date                                         | 1/20/09   | 2/7/09   | 3/17/09      | 4/21/09      | 5/19/09 | 6/16/09 | 7/21/09 | 8/18/09      | 9/22/09 | 10/20/09 | 11/17/09 | 12/15/2009 |
|                           | Copper, dissolved (µg/L)                     | 4.3       | 4.9      | 0.5          | 1.3          | 1.6     | 1.2     | 2.1     | 1            | 0.62    | 1.6      | 4        | 2.5        |
|                           | Copper, total (µg/L)                         | 17        | 51       | 1.7          | 2.1          | 5.3     | 4       | 6.2     | 4.2          | 4.1     | 4.3      | 6.5      | 12         |
|                           | Chlorpyrifos (µg/L)                          | <0.003    | <0.003   | <0.003       | <0.003       | <0.003  | <0.003  | <0.003  | <0.003       | <0.003  | <0.003   | <0.003   | <0.003     |
|                           | <i>P. promelas</i> toxicity (% Control)      | <b>88</b> | <b>0</b> | 100          | 100          | 100     | 100     | 100     | 100          | 100     | 100      | 98       | <b>75</b>  |
|                           | <i>S. capricornutum</i> toxicity (% Control) | 242       | <b>7</b> | 211          | 578          | 374     | 870     | 1736    | 760          | 447     | 991      | 600      | 343        |
| 2010 NM & MPM (@ Gurr Rd) | Date                                         | 1/19/10   | 2/23/10  | 3/23/10      | 4/20/10      | 5/18/10 | 6/15/10 | 7/20/10 | 8/17/10      | 9/14/10 | 10/19/10 | 11/16/10 | 12/14/10   |
|                           | Copper, dissolved (µg/L)                     | 3.5*      | 2.3*     | 8.1          | 2.4          | 1.7     | 1.79    | 1.8     | 0.94         | 1.2     | 1        | 12       | 3.5        |
|                           | Copper, total (µg/L)                         | 16*       | 5.7*     | 106.4        | 4.3          | 2.53    | 3.83    | 5.9     | 4.1          | 5.2     | 4.1      | 30       | 9          |
|                           | Chlorpyrifos (µg/L)                          | <0.003    | <0.003   | <b>0.14</b>  | <b>0.018</b> | <0.003  | <0.003  | <0.003  | <b>0.024</b> | <0.003  | <0.003   | <0.003   | <0.003     |
|                           | <i>C. dubia</i> toxicity (% Control)         | 100       | 100      | <b>0</b>     | 100          | 100     | 100     | 100     | 100          | 100     | 100      | <b>0</b> | 95         |
|                           | <i>P. promelas</i> toxicity (% Control)      | 100       | 100      | <b>0</b>     | 100          | 100     | 100     | 100     | 100          | 100     | 100      | <b>0</b> | 100        |
|                           | <i>S. capricornutum</i> toxicity (% Control) | 547*      | 1478*    | <b>-88**</b> | 2016         | 417     | 299     | 578     | 415          | 483     | 646      | 102      | 658        |

A – Additional MPM conducted in 2008 only.

MPM – Management Plan Monitoring (see Table 4 for MPM schedule)

NA – Not applicable. No monitoring occurred on this date for this constituent.

NM – Normal Monitoring

\*NM and MPM occurred during this date for this constituent

\*\*Test not conducted since pigment and suspended solids precluded measurement of algae cells.

## Load Calculations

Loads have been calculated for all chlorpyrifos and copper detections in the site subwatershed based on the following formula (Table VIII-7):

$$\text{Load} = \text{Discharge (cfs)} \times 28.317\text{L/ft}^3 \times \text{Concentration (mg/L} \times 1000 \text{ or } \mu\text{g/L)}.$$

The load values for constituents in this report represent instantaneous loads only. These values should not be used to extrapolate loading over any period of time (e.g. weekly, monthly, seasonal or annual). The primary purpose for reporting instantaneous loads is to provide a normalization of the concentrations by flow for various constituents at the time the samples were collected.

**Table XIII-7. Deadman Creek @ Gurr Rd site subwatershed instantaneous load calculations for chlorpyrifos and copper.**

Sorted by analyte and date.

| SITE NAME                           | ANALYTE NAME | SAMPLE DATE | DISCHARGE CFS | CONCENTRATION $\mu\text{G/L}$ | LOADING RATE $\mu\text{G/SEC}$ |
|-------------------------------------|--------------|-------------|---------------|-------------------------------|--------------------------------|
| Deadman Creek (Dutchman) @ Gurr Rd  | Chlorpyrifos | 08/08/06    | 8.45          | 0.014                         | 3.35                           |
| Deadman Creek (Dutchman) @ Gurr Rd  | Chlorpyrifos | 09/12/06    | 34.18         | 0.027                         | 26.13                          |
| Deadman Creek (Dutchman) @ Gurr Rd  | Chlorpyrifos | 07/24/07    | 7.81          | 0.005                         | 1.11                           |
| Deadman Creek (Dutchman) @ Gurr Rd  | Chlorpyrifos | 02/25/08    | 2.52          | 0.0037                        | 0.26                           |
| Deadman Creek (Dutchman) @ Gurr Rd  | Chlorpyrifos | 07/29/08    | 1.1           | 0.0067                        | 0.21                           |
| Deadman Creek (Dutchman) @ Gurr Rd  | Chlorpyrifos | 03/23/10    | 0             | 0.14                          | 0.00                           |
| Deadman Creek (Dutchman) @ Gurr Rd* | Chlorpyrifos | 03/23/10    | 0             | 0.097                         | 0.00                           |
| Deadman Creek (Dutchman) @ Gurr Rd  | Chlorpyrifos | 04/20/10    | 0.43          | 0.018                         | 0.22                           |
| Deadman Creek (Dutchman) @ Gurr Rd* | Chlorpyrifos | 04/20/10    | 0.43          | 0.017                         | 0.21                           |
| Deadman Creek (Dutchman) @ Gurr Rd  | Chlorpyrifos | 08/17/10    | 18.52         | 0.024                         | 12.59                          |
| Deadman Creek (Dutchman) @ Gurr Rd  | Copper       | 05/17/06    | 9.95          | 7.5                           | 2113.16                        |
| Deadman Creek (Dutchman) @ Gurr Rd  | Copper       | 06/13/06    | 13.7          | 4.6                           | 1784.54                        |
| Deadman Creek (Dutchman) @ Gurr Rd  | Copper       | 07/11/06    | 1.44          | 9.1                           | 371.07                         |
| Deadman Creek (Dutchman) @ Gurr Rd  | Copper       | 08/08/06    | 8.45          | 6.9                           | 1651.02                        |
| Deadman Creek (Dutchman) @ Gurr Rd  | Copper       | 09/12/06    | 34.18         | 7.7                           | 7452.64                        |
| Deadman Creek (Dutchman) @ Gurr Rd  | Copper       | 02/11/07    | 4.77          | 16                            | 2161.15                        |
| Deadman Creek (Dutchman) @ Gurr Rd  | Copper       | 02/28/07    | 0.87          | 9.7                           | 238.97                         |
| Deadman Creek (Dutchman) @ Gurr Rd  | Copper       | 04/24/07    | 15.15         | 9.2                           | 3946.82                        |
| Deadman Creek (Dutchman) @ Gurr Rd  | Copper       | 06/26/07    | 10.21         | 7.5                           | 2168.37                        |
| Deadman Creek (Dutchman) @ Gurr Rd  | Copper       | 07/24/07    | 7.81          | 9.2                           | 2034.63                        |
| Deadman Creek (Dutchman) @ Gurr Rd  | Copper       | 08/21/07    | 0             | 4.2                           | 0.00                           |
| Deadman Creek (Dutchman) @ Gurr Rd  | Copper       | 01/25/08    | 28.58         | 19                            | 15376.70                       |
| Deadman Creek (Dutchman) @ Gurr Rd  | Copper       | 02/25/08    | 2.52          | 3.4                           | 242.62                         |
| Deadman Creek (Dutchman) @ Gurr Rd  | Copper       | 04/22/08    | 3.86          | 4.2                           | 459.08                         |
| Deadman Creek (Dutchman) @ Gurr Rd  | Copper       | 04/29/08    | 1.97          | 5.8                           | 323.55                         |
| Deadman Creek (Dutchman) @ Gurr Rd  | Copper       | 05/20/08    | 0             | 6.2                           | 0.00                           |
| Deadman Creek (Dutchman) @ Gurr Rd  | Copper       | 05/27/08    | 2.55          | 5                             | 361.04                         |
| Deadman Creek (Dutchman) @ Gurr Rd  | Copper       | 06/24/08    | 0             | 5                             | 0.00                           |
| Deadman Creek (Dutchman) @ Gurr Rd  | Copper       | 07/29/08    | 1.1           | 7                             | 218.04                         |
| Deadman Creek (Dutchman) @ Gurr Rd  | Copper       | 08/26/08    | 0             | 3.9                           | 0.00                           |
| Deadman Creek (Dutchman) @ Gurr Rd  | Copper       | 09/30/08    | 2.98          | 4.5                           | 379.73                         |

| SITE NAME                           | ANALYTE NAME | SAMPLE DATE | DISCHARGE CFS | CONCENTRATION µG/L | LOADING RATE µG/SEC |
|-------------------------------------|--------------|-------------|---------------|--------------------|---------------------|
| Deadman Creek (Dutchman) @ Gurr Rd* | Copper       | 09/30/08    | 2.98          | 4.6                | 388.17              |
| Deadman Creek (Dutchman) @ Gurr Rd  | Copper       | 10/21/08    | 0.89          | 4.4                | 110.89              |
| Deadman Creek (Dutchman) @ Gurr Rd  | Copper       | 11/11/08    | 0.57          | 8.4                | 135.58              |
| Deadman Creek (Dutchman) @ Gurr Rd  | Copper       | 12/16/08    | 0.09          | 4.8                | 12.23               |
| Deadman Creek (Dutchman) @ Gurr Rd* | Copper       | 12/16/08    | 0.09          | 4.7                | 11.98               |
| Deadman Creek (Dutchman) @ Gurr Rd  | Copper       | 01/20/09    | 0             | 17                 | 0.00                |
| Deadman Creek (Dutchman) @ Gurr Rd* | Copper       | 01/20/09    | 0             | 14                 | 0.00                |
| Deadman Creek (Dutchman) @ Gurr Rd  | Copper       | 02/07/09    | 0.01          | 51                 | 14.44               |
| Deadman Creek (Dutchman) @ Gurr Rd  | Copper       | 03/17/09    | 0             | 1.7                | 0.00                |
| Deadman Creek (Dutchman) @ Gurr Rd  | Copper       | 04/21/09    | 0.99          | 2.1                | 58.87               |
| Deadman Creek (Dutchman) @ Gurr Rd  | Copper       | 05/19/09    | 6.74          | 5.3                | 1011.54             |
| Deadman Creek (Dutchman) @ Gurr Rd  | Copper       | 06/16/09    | 5.4           | 4                  | 611.65              |
| Deadman Creek (Dutchman) @ Gurr Rd  | Copper       | 07/21/09    | 0             | 6.2                | 0.00                |
| Deadman Creek (Dutchman) @ Gurr Rd  | Copper       | 08/18/09    | 0             | 4.2                | 0.00                |
| Deadman Creek (Dutchman) @ Gurr Rd  | Copper       | 09/22/09    | 5.3           | 4.1                | 615.33              |
| Deadman Creek (Dutchman) @ Gurr Rd  | Copper       | 10/20/09    | 0             | 4.3                | 0.00                |
| Deadman Creek (Dutchman) @ Gurr Rd  | Copper       | 11/17/09    | 0             | 6.5                | 0.00                |
| Deadman Creek (Dutchman) @ Gurr Rd* | Copper       | 12/15/09    | 0             | 10                 | 0.00                |
| Deadman Creek (Dutchman) @ Gurr Rd  | Copper       | 12/15/09    | 0             | 12                 | 0.00                |
| Deadman Creek (Dutchman) @ Gurr Rd* | Copper       | 01/19/10    | 0.08          | 14                 | 31.72               |
| Deadman Creek (Dutchman) @ Gurr Rd  | Copper       | 01/19/10    | 0.08          | 16                 | 36.25               |
| Deadman Creek (Dutchman) @ Gurr Rd* | Copper       | 02/23/10    | 0             | 4.3                | 0.00                |
| Deadman Creek (Dutchman) @ Gurr Rd  | Copper       | 02/23/10    | 0             | 5.7                | 0.00                |
| Deadman Creek (Dutchman) @ Gurr Rd  | Copper       | 03/23/10    | 0             | 106.4              | 0.00                |
| Deadman Creek (Dutchman) @ Gurr Rd* | Copper       | 03/23/10    | 0             | 86                 | 0.00                |
| Deadman Creek (Dutchman) @ Gurr Rd  | Copper       | 04/20/10    | 0.43          | 4.3                | 52.36               |
| Deadman Creek (Dutchman) @ Gurr Rd* | Copper       | 04/20/10    | 0.43          | 3.9                | 47.49               |
| Deadman Creek (Dutchman) @ Gurr Rd* | Copper       | 05/18/10    | 7.32          | 2.6                | 538.93              |
| Deadman Creek (Dutchman) @ Gurr Rd  | Copper       | 05/18/10    | 7.32          | 2.53               | 524.42              |
| Deadman Creek (Dutchman) @ Gurr Rd  | Copper       | 06/15/10    | 0             | 3.83               | 0.00                |
| Deadman Creek (Dutchman) @ Gurr Rd* | Copper       | 06/15/10    | 0             | 3.8                | 0.00                |
| Deadman Creek (Dutchman) @ Gurr Rd  | Copper       | 07/20/10    | 9.71          | 5.9                | 1622.25             |
| Deadman Creek (Dutchman) @ Gurr Rd  | Copper       | 08/17/10    | 18.52         | 4.1                | 2150.17             |
| Deadman Creek (Dutchman) @ Gurr Rd  | Copper       | 09/14/10    | 9.18          | 5.2                | 1351.74             |
| Deadman Creek (Dutchman) @ Gurr Rd  | Copper       | 10/19/10    | 2.99          | 4.1                | 347.14              |
| Deadman Creek (Dutchman) @ Gurr Rd  | Copper       | 11/16/10    | 0             | 30                 | 0.00                |
| Deadman Creek (Dutchman) @ Gurr Rd* | Copper       | 11/16/10    | 0             | 28                 | 0.00                |
| Deadman Creek (Dutchman) @ Gurr Rd  | Copper       | 12/14/10    | 0             | 9                  | 0.00                |
| Deadman Creek (Dutchman) @ Gurr Rd  | Copper (D)   | 10/21/08    | 0.89          | 1                  | 25.20               |
| Deadman Creek (Dutchman) @ Gurr Rd  | Copper (D)   | 11/11/08    | 0.57          | 1.6                | 25.83               |
| Deadman Creek (Dutchman) @ Gurr Rd  | Copper (D)   | 12/16/08    | 0.09          | 1.5                | 3.82                |
| Deadman Creek (Dutchman) @ Gurr Rd* | Copper (D)   | 12/16/08    | 0.09          | 1.6                | 4.08                |
| Deadman Creek (Dutchman) @ Gurr Rd  | Copper (D)   | 01/20/09    | 0             | 4.3                | 0.00                |
| Deadman Creek (Dutchman) @ Gurr Rd* | Copper (D)   | 01/20/09    | 0             | 4.7                | 0.00                |
| Deadman Creek (Dutchman) @ Gurr Rd  | Copper (D)   | 02/07/09    | 0.01          | 4.9                | 1.39                |
| Deadman Creek (Dutchman) @ Gurr Rd  | Copper (D)   | 03/17/09    | 0             | 0.5                | 0.00                |
| Deadman Creek (Dutchman) @ Gurr Rd  | Copper (D)   | 04/21/09    | 0.99          | 1.3                | 36.44               |
| Deadman Creek (Dutchman) @ Gurr Rd  | Copper (D)   | 05/19/09    | 6.74          | 1.6                | 305.37              |
| Deadman Creek (Dutchman) @ Gurr Rd  | Copper (D)   | 06/16/09    | 5.4           | 1.2                | 183.49              |

| SITE NAME                           | ANALYTE NAME | SAMPLE DATE | DISCHARGE CFS | CONCENTRATION µG/L | LOADING RATE µG/SEC |
|-------------------------------------|--------------|-------------|---------------|--------------------|---------------------|
| Deadman Creek (Dutchman) @ Gurr Rd  | Copper (D)   | 07/21/09    | 0             | 2.1                | 0.00                |
| Deadman Creek (Dutchman) @ Gurr Rd  | Copper (D)   | 08/18/09    | 0             | 1                  | 0.00                |
| Deadman Creek (Dutchman) @ Gurr Rd  | Copper (D)   | 09/22/09    | 5.3           | 0.62               | 93.05               |
| Deadman Creek (Dutchman) @ Gurr Rd  | Copper (D)   | 10/20/09    | 0             | 1.6                | 0.00                |
| Deadman Creek (Dutchman) @ Gurr Rd  | Copper (D)   | 11/17/09    | 0             | 4                  | 0.00                |
| Deadman Creek (Dutchman) @ Gurr Rd* | Copper (D)   | 12/15/09    | 0             | 2.7                | 0.00                |
| Deadman Creek (Dutchman) @ Gurr Rd  | Copper (D)   | 12/15/09    | 0             | 2.5                | 0.00                |
| Deadman Creek (Dutchman) @ Gurr Rd  | Copper (D)   | 01/19/10    | 0.08          | 3.5                | 7.93                |
| Deadman Creek (Dutchman) @ Gurr Rd* | Copper (D)   | 01/19/10    | 0.08          | 3.1                | 7.02                |
| Deadman Creek (Dutchman) @ Gurr Rd* | Copper (D)   | 02/23/10    | 0             | 2.3                | 0.00                |
| Deadman Creek (Dutchman) @ Gurr Rd  | Copper (D)   | 02/23/10    | 0             | 2.3                | 0.00                |
| Deadman Creek (Dutchman) @ Gurr Rd  | Copper (D)   | 03/23/10    | 0             | 8.1                | 0.00                |
| Deadman Creek (Dutchman) @ Gurr Rd* | Copper (D)   | 03/23/10    | 0             | 28                 | 0.00                |
| Deadman Creek (Dutchman) @ Gurr Rd  | Copper (D)   | 04/20/10    | 0.43          | 2.4                | 29.22               |
| Deadman Creek (Dutchman) @ Gurr Rd* | Copper (D)   | 04/20/10    | 0.43          | 2.2                | 26.79               |
| Deadman Creek (Dutchman) @ Gurr Rd  | Copper (D)   | 05/18/10    | 7.32          | 1.7                | 352.38              |
| Deadman Creek (Dutchman) @ Gurr Rd* | Copper (D)   | 05/18/10    | 7.32          | 1.5                | 310.92              |
| Deadman Creek (Dutchman) @ Gurr Rd* | Copper (D)   | 06/15/10    | 0             | 1.8                | 0.00                |
| Deadman Creek (Dutchman) @ Gurr Rd  | Copper (D)   | 06/15/10    | 0             | 1.79               | 0.00                |
| Deadman Creek (Dutchman) @ Gurr Rd  | Copper (D)   | 07/20/10    | 9.71          | 1.8                | 494.92              |
| Deadman Creek (Dutchman) @ Gurr Rd  | Copper (D)   | 08/17/10    | 18.52         | 0.94               | 492.96              |
| Deadman Creek (Dutchman) @ Gurr Rd  | Copper (D)   | 09/14/10    | 9.18          | 1.2                | 311.94              |
| Deadman Creek (Dutchman) @ Gurr Rd  | Copper (D)   | 10/19/10    | 2.99          | 1                  | 84.67               |
| Deadman Creek (Dutchman) @ Gurr Rd* | Copper (D)   | 11/16/10    | 0             | 9.9                | 0.00                |
| Deadman Creek (Dutchman) @ Gurr Rd  | Copper (D)   | 11/16/10    | 0             | 12                 | 0.00                |
| Deadman Creek (Dutchman) @ Gurr Rd  | Copper (D)   | 12/14/10    | 0             | 3.5                | 0.00                |

\*Field duplicate

## Source Identification and Outreach

The Coalition focuses its efforts on applied pesticides and considers past monitoring results and associated PUR data to address source identification and determine an outreach strategy. In 2008, the Coalition conducted additional MPM during the months when exceedances historically occurred to better characterize water quality in the subwatershed. Assessment Monitoring was initiated at Deadman Creek @ Gurr Rd in the fall of 2008 and continued through 2010. The results from those monitoring years, coupled with a review of PUR data to determine the most frequent crop type and timing associated with pesticide applications, provided the Coalition with enough data to develop an outreach strategy, which is detailed in the following sections.

The Deadman Creek @ Gurr Rd subwatershed is a high priority subwatershed as of 2012 and will remain so through 2014. The Coalition will actively engage in grower outreach and education to address Deadman Creek@ Gurr Rd management plan's highest priority constituents. The Coalition organized grower meetings and mailings to educate growers about management practices and their importance in achieving acceptable water quality. Additionally, in May 2011, the Coalition sent out a mailing to members within the subwatershed to summarize chlorpyrifos water quality concerns in Deadman Creek and urge growers to implement relevant management practices. Individual grower meetings with

targeted members are planned to inform growers about management practices as well as to assess current and expected future implementation of additional management practices.

### *Priority A/B Constituents*

Chlorpyrifos is the only A/B constituent for the Deadman Creek @ Gurr Rd subwatershed.

#### **Chlorpyrifos**

The WQTL for chlorpyrifos (0.015 µg/L) was exceeded four times in the Deadman Creek @ Gurr Rd subwatershed, once in 2006 (September) and three times in 2010 (March, April, and August). The exceedance that occurred during March 2010 was associated with toxicity to both *C. dubia* and *P. promelas*.

The land use within this subwatershed has the potential for chlorpyrifos applications throughout the year. Chlorpyrifos may be applied in dormant sprays to orchards during the winter months, and may also be applied to orchards and row crops at various times during the irrigation season.

To determine an outreach strategy, the Coalition reviewed PUR data for the number of monthly chlorpyrifos applications, pounds of active ingredient applied, and the acres treated within the subwatershed (Table XIII-8, Figure XIII-2). Chlorpyrifos use peaked in 2005 (6,556 lbs AI) and declined since; 2,867 lbs AI were applied in 2011 (complete PUR data only available through October 2011). Chlorpyrifos is applied throughout the year, but peak use typically occurs in June and July in the subwatershed; the month of August had the greatest pounds applied in 2011. There were numerous applications of chlorpyrifos in the subwatershed over the years, and the largest amount of chlorpyrifos applied was to almonds and alfalfa (Table XIII-9). The most common product containing chlorpyrifos used within this subwatershed was Lorsban.

**Table XIII-8. Deadman Creek @ Gurr Rd site subwatershed chlorpyrifos applications, lbs AI applied, and acres treated by month (2004-2011).**

PUR data available October 2011 for Merced County. If month is not included in table, no applications were made.

| MONTH/YEAR      | NUMBER OF CHLORPYRIFOS APPLICATIONS | POUNDS OF AI APPLIED | ACRES TREATED |
|-----------------|-------------------------------------|----------------------|---------------|
| January, 2004   | 4                                   | 88.0                 | 43.6          |
| March, 2004     | 7                                   | 505.2                | 571.0         |
| April, 2004     | 2                                   | 228.6                | 121.0         |
| July, 2004      | 14                                  | 2182.4               | 1309.0        |
| August, 2004    | 3                                   | 127.2                | 279.0         |
| September, 2004 | 1                                   | 179.8                | 90.2          |
| January, 2005   | 4                                   | 76.9                 | 38.1          |
| March, 2005     | 19                                  | 602.5                | 1470.0        |
| May, 2005       | 3                                   | 378.9                | 217.0         |
| June, 2005      | 1                                   | 39.9                 | 20.0          |
| July, 2005      | 33                                  | 3999.2               | 2033.5        |
| August, 2005    | 14                                  | 478.8                | 740.0         |
| September, 2005 | 3                                   | 199.6                | 280.0         |

| MONTH/YEAR               | NUMBER OF CHLORPYRIFOS APPLICATIONS | POUNDS OF AI APPLIED | ACRES TREATED  |
|--------------------------|-------------------------------------|----------------------|----------------|
| October, 2005            | 1                                   | 780.0                | 391.2          |
| January, 2006            | 5                                   | 91.7                 | 45.0           |
| March, 2006              | 3                                   | 122.9                | 349.0          |
| April, 2006              | 1                                   | 4.0                  | 29.0           |
| May, 2006                | 13                                  | 1386.1               | 741.0          |
| June, 2006               | 1                                   | 137.6                | 69.0           |
| July, 2006               | 12                                  | 2202.8               | 1097.0         |
| August, 2006             | 8                                   | 473.0                | 393.0          |
| September, 2006          | 18                                  | 593.9                | 1153.2         |
| October, 2006            | 1                                   | 723.4                | 362.8          |
| January, 2007            | 2                                   | 29.9                 | 15.0           |
| March, 2007              | 21                                  | 537.2                | 1449.7         |
| July, 2007               | 10                                  | 1812.1               | 1200.5         |
| August, 2007             | 23                                  | 902.7                | 2025.9         |
| October, 2007            | 1                                   | 780.0                | 391.2          |
| March, 2008              | 8                                   | 94.1                 | 303.0          |
| May, 2008                | 11                                  | 619.0                | 633.0          |
| July, 2008               | 32                                  | 746.3                | 2691.6         |
| August, 2008             | 35                                  | 827.4                | 2521.8         |
| September, 2008          | 4                                   | 65.1                 | 310.0          |
| March, 2009              | 6                                   | 997.8                | 928.0          |
| April, 2009              | 11                                  | 213.0                | 963.0          |
| June, 2009               | 8                                   | 2417.3               | 1270.0         |
| July, 2009               | 2                                   | 34.1                 | 68.0           |
| August, 2009             | 1                                   | 25.1                 | 53.0           |
| September, 2009          | 10                                  | 319.9                | 768.9          |
| March, 2010              | 31                                  | 432.3                | 2150.9         |
| June, 2010               | 15                                  | 1168.0               | 1599.0         |
| July, 2010               | 20                                  | 824.7                | 1395.8         |
| August, 2010             | 33                                  | 1075.1               | 2149.5         |
| September, 2010          | 15                                  | 532.0                | 1185.2         |
| October, 2010            | 1                                   | 1027.3               | 547.0          |
| March, 2011              | 41                                  | 677.5                | 2959.3         |
| April, 2011              | 4                                   | 90.8                 | 341.0          |
| May, 2011                | 2                                   | 437.2                | 215.0          |
| July, 2011               | 30                                  | 666.8                | 1817.2         |
| August, 2011             | 45                                  | 960.7                | 2845.1         |
| September, 2011          | 1                                   | 34.0                 | 68.0           |
| <b>Summaries by Year</b> |                                     |                      |                |
| 2004 Total               | 31                                  | 3311.2               | 2413.8         |
| 2005 Total               | 78                                  | 6555.7               | 5189.8         |
| 2006 Total               | 62                                  | 5735.4               | 4239.0         |
| 2007 Total               | 57                                  | 4061.9               | 5082.3         |
| 2008 Total               | 90                                  | 2351.9               | 6459.4         |
| 2009 Total               | 38                                  | 4007.1               | 4050.9         |
| 2010 Total               | 115                                 | 5059.3               | 9027.4         |
| 2011 Total               | 123                                 | 2867.1               | 8245.6         |
| <b>Total</b>             | <b>594</b>                          | <b>33949.6</b>       | <b>44708.2</b> |

**Figure XIII-2. Deadman Creek @ Gurr Rd site subwatershed lbs chlorpyrifos applied by month (2004-2011).**

Asterisk (\*) denotes months with exceedances. PUR data available October 2011 for Merced County.

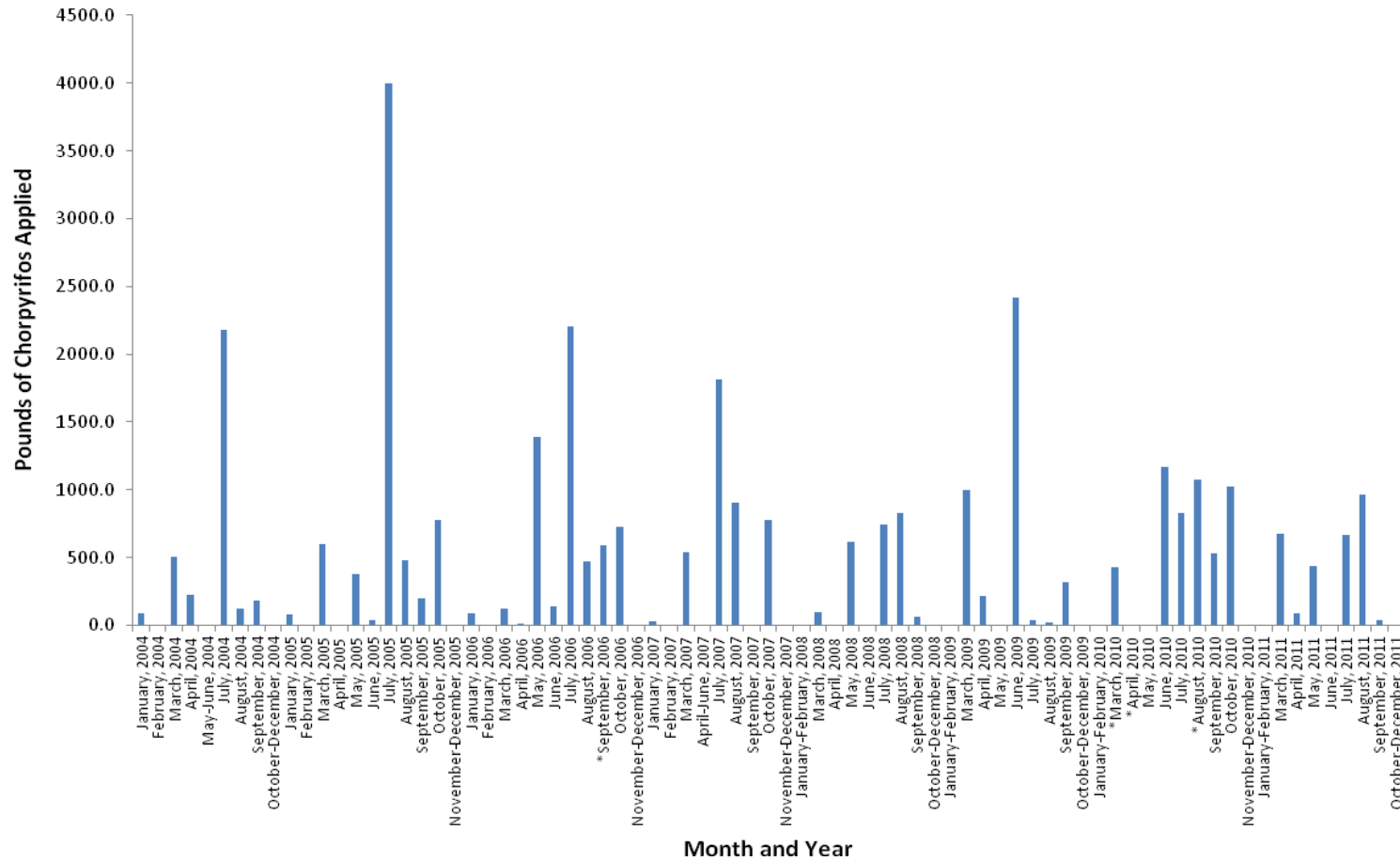


**Table XIII-9. Deadman Creek @ Gurr Rd site subwatershed chlorpyrifos PUR data (2004-2011).**

PUR data available October 2011 for Merced County.

| CHEMICAL NAME                               | COMMODITY                               | PRODUCT NAME                     | LBS AI APPLIED |
|---------------------------------------------|-----------------------------------------|----------------------------------|----------------|
| CHLORPYRIFOS                                | ALFALFA (FORAGE - FODDER) (ALFALFA HAY) | CHLORPYRIFOS 4E AG               | 502.6          |
|                                             |                                         | GOVERN 4E INSECTICIDE            | 1916.0         |
|                                             |                                         | LOCK-ON INSECTICIDE              | 4061.5         |
|                                             |                                         | LORSBAN 4E-HF                    | 681.3          |
|                                             |                                         | LORSBAN-4E                       | 552.6          |
|                                             |                                         | NUFOS 4E                         | 725.7          |
|                                             |                                         | WARHAWK                          | 54.8           |
|                                             |                                         | WHIRLWIND                        | 2630.7         |
|                                             | ALMOND                                  | CHLORPYRIFOS 4E AG               | 258.3          |
|                                             |                                         | ERASER                           | 97.9           |
|                                             |                                         | GOVERN 4E INSECTICIDE            | 4421.7         |
|                                             |                                         | LORSBAN 4E INSECTICIDE           | 1533.1         |
|                                             |                                         | LORSBAN 4E-HF                    | 2974.8         |
|                                             |                                         | LORSBAN ADVANCED                 | 10.9           |
|                                             |                                         | LORSBAN-4E                       | 1889.4         |
|                                             |                                         | NUFOS 4E                         | 3742.7         |
|                                             |                                         | WHIRLWIND                        | 579.9          |
|                                             | CORN (FORAGE - FODDER)                  | CHLORPYRIFOS 4E AG               | 45.8           |
|                                             |                                         | LORSBAN 15G GRANULAR INSECTICIDE | 565.5          |
|                                             |                                         | LORSBAN 4E-HF                    | 39.9           |
|                                             |                                         | LORSBAN-4E                       | 317.4          |
|                                             |                                         | NUFOS 4E                         | 181.0          |
|                                             |                                         | SAURUS                           | 202.5          |
|                                             | COTTON, GENERAL                         | WHIRLWIND                        | 107.7          |
|                                             |                                         | CHLORPYRIFOS 4E AG               | 40.3           |
|                                             |                                         | LORSBAN 4E-HF                    | 278.0          |
|                                             |                                         | LORSBAN-4E                       | 60.5           |
|                                             | FIG                                     | WHIRLWIND                        | 30.2           |
|                                             | GRAPES, WINE                            | WHIRLWIND                        | 160.0          |
|                                             |                                         | LORSBAN 4E-HF                    | 2463.2         |
|                                             |                                         | LORSBAN ADVANCED                 | 1027.3         |
|                                             | PEACH                                   | LORSBAN-4E                       | 900.4          |
|                                             |                                         | CHLORPYRIFOS 4E AG               | 164.9          |
|                                             |                                         | LORSBAN 4E-HF                    | 121.6          |
|                                             | SUGARBEET, GENERAL                      | LORSBAN 4E-HF                    | 179.6          |
|                                             |                                         | LORSBAN-4E                       | 56.0           |
|                                             | WALNUT (ENGLISH WALNUT, PERSIAN WALNUT) | LORSBAN-4E                       | 187.1          |
|                                             |                                         | QUALI-PRO CHLORPYRIFOS 4E        | 155.8          |
|                                             | WHEAT                                   | LORSBAN ADVANCED                 | 31.0           |
| ALFALFA - Total Pounds Chlorpyrifos Applied |                                         |                                  | 11125.2        |
| ALMOND - Total Pounds Chlorpyrifos Applied  |                                         |                                  | 15508.7        |
| CORN - Total Pounds Chlorpyrifos Applied    |                                         |                                  | 1459.8         |
| COTTON - Total Pounds Chlorpyrifos Applied  |                                         |                                  | 409.0          |
| FIG - Total Pounds Chlorpyrifos Applied     |                                         |                                  | 160.0          |
| GRAPES - Total Pounds Chlorpyrifos Applied  |                                         |                                  | 4390.9         |
| PEACH - Total Pounds Chlorpyrifos Applied   |                                         |                                  | 286.5          |

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| CHEMICAL NAME | COMMODITY | PRODUCT NAME                                  | LBS AI APPLIED |
|---------------|-----------|-----------------------------------------------|----------------|
|               |           | SUGARBEET - Total Pounds Chlorpyrifos Applied | 235.7          |
|               |           | WALNUT - Total Pounds Chlorpyrifos Applied    | 342.9          |
|               |           | WHEAT - Total Pounds Chlorpyrifos Applied     | 31.0           |
|               |           | Total Pounds Chlorpyrifos Applied (2004-2011) | 33949.7        |

Monitoring results and PUR data indicate that management of chlorpyrifos in this subwatershed should focus on applications during the early spring and summer months. Hence, the Coalition's strategy is to provide information on a subwatershed basis to growers to review their operation and determine if storm water runoff and irrigation return flows are managed properly, specifically to growers with the potential to drain to the creek. Vineyard and orchard operators will be provided with information for improving irrigation and better manage irrigation tailwater and storm water runoff. Growers farming row crops will also be advised of the importance of managing irrigation tailwater and storm water runoff. Coalition representatives will discuss and encourage management practices to reduce spray drift. The Coalition recognizes that irrigation and storm water runoff management are often best improved by installation of structural management practices, such as a tailwater return system or drainage basin, which can be expensive. The Coalition will provide growers with information about (and include as a part of their discussions) available funding opportunities for management practice implementation.

Since 2007, Coalition outreach included grower meetings and the mailing/distribution of information. A complete list of coalition outreach during 2011 is provided in the Actions Taken to Address Water Quality Exceedances section of the 2012 AMR (Table 46, page 142). The Coalition is focusing outreach to growers who have parcels in the direct drainage area of the subwatershed and who used chlorpyrifos within recent years. From these criteria, the Coalition compiled a list of targeted growers.

The Coalition initiated scheduling individual contact meetings with targeted growers. Although meetings will focus mainly on chlorpyrifos and copper exceedances, all water quality results will be reviewed and discussed including exceedances of ammonia, arsenic, DO, *E. coli*, SC, and TDS, and toxicity to *C. dubia*, *P. promelas*, and *S. capricornutum*. The Coalition contacted two targeted growers accounting for 240 acres of direct drainage within the subwatershed.

Grower surveys completed at the meetings, documenting members' current practices and indicating which recommended practices growers anticipated implementing in the upcoming years, will be compiled and assessed by the Coalition. Follow up with targeted growers will occur to determine what additional management practices were implemented after the initial meeting with Coalition representatives.

Management Plan Monitoring is scheduled to resume at Deadman Creek @ Gurr Rd in 2012 during months of historical exceedances. The Coalition plans to conduct MPM through 2014 to evaluate improvements in water quality as recommended management practice implementation occurs.

### *Priority C Constituents*

Copper is the only priority C constituent under the Deadman Creek @ Gurr Rd management plan.

#### **Copper**

Four exceedances of the copper WQTL occurred in the Deadman Creek @ Gurr Rd site subwatershed in 2007 (February, April, and May) and 2008 (January).

Copper is an algaecide and fungicide that is often applied to orchards and row crops following harvest and throughout the dormant season. High use can also occur early in the irrigation season.

The Coalition reviewed PUR data for the number of monthly copper applications, pounds of active ingredient applied, and acres treated (Table XIII-10 and Figure XIII-3). Numerous copper applications occurred in the subwatershed, with peak use during 2005 (14,773 lbs AI). Copper applications have since declined slightly (9,769 lbs AI in 2011; complete PUR data only available through October 2011). In past years, copper applications were typically been heavy in the early irrigation season; although, more recently, copper applications have peaked during January in the subwatershed. Almonds and grapes receive the most applications of copper, followed by tomatoes and pistachios (Table XIII-11).

**Table XIII-10. Deadman Creek @ Gurr Rd site subwatershed copper applications, lbs AI applied, and acres treated by month (2004-2011).**

PUR data available October 2011 for Merced County. If month is not included in table, no applications were made.

| MONTH/YEAR      | NUMBER OF COPPER APPLICATIONS | POUNDS OF AI APPLIED | ACRES TREATED |
|-----------------|-------------------------------|----------------------|---------------|
| January, 2004   | 18                            | 2813.1               | 891.6         |
| February, 2004  | 1                             | 52.4                 | 34            |
| March, 2004     | 9                             | 2525.7               | 1904.42       |
| April, 2004     | 10                            | 310.5                | 134.95        |
| September, 2004 | 3                             | 399.1                | 280           |
| October, 2004   | 3                             | 478.9                | 230           |
| November, 2004  | 6                             | 1446.6               | 327           |
| December, 2004  | 9                             | 2244.6               | 291.5         |
| January, 2005   | 7                             | 754.8                | 136.1         |
| February, 2005  | 12                            | 956.5                | 861.4         |
| March, 2005     | 20                            | 1781.3               | 2398.01       |
| April, 2005     | 34                            | 3049.9               | 2164.36       |
| May, 2005       | 26                            | 2299.7               | 1223.99       |
| June, 2005      | 1                             | 2672.1               | 398.11        |
| July, 2005      | 1                             | 148.5                | 59            |
| September, 2005 | 5                             | 330.3                | 269           |
| October, 2005   | 3                             | 246.2                | 167           |
| November, 2005  | 8                             | 1844.9               | 239.6         |
| December, 2005  | 6                             | 689.2                | 89.5          |
| January, 2006   | 8                             | 975.5                | 234           |
| February, 2006  | 1                             | 44.5                 | 58            |
| March, 2006     | 5                             | 1724.8               | 1028.22       |
| April, 2006     | 22                            | 2346.1               | 2017.31       |

| MONTH/YEAR      | NUMBER OF COPPER APPLICATIONS | POUNDS OF AI APPLIED | ACRES TREATED |
|-----------------|-------------------------------|----------------------|---------------|
| May, 2006       | 15                            | 1336.4               | 1018          |
| November, 2006  | 14                            | 2433.2               | 316           |
| January, 2007   | 5                             | 444.9                | 51            |
| February, 2007  | 2                             | 102.6                | 76            |
| March, 2007     | 5                             | 530.1                | 880.61        |
| April, 2007     | 26                            | 1455.9               | 1165.8        |
| May, 2007       | 1                             | 9.2                  | 10            |
| November, 2007  | 1                             | 94.7                 | 22            |
| December, 2007  | 7                             | 329.8                | 107           |
| January, 2008   | 3                             | 938.0                | 278           |
| March, 2008     | 8                             | 701.3                | 713           |
| April, 2008     | 3                             | 1054.0               | 752.79        |
| May, 2008       | 9                             | 1918.7               | 494.69        |
| June, 2008      | 2                             | 83.2                 | 120.34        |
| November, 2008  | 2                             | 233.2                | 84.3          |
| December, 2008  | 2                             | 233.2                | 84.3          |
| January, 2009   | 5                             | 1637.5               | 888           |
| February, 2009  | 1                             | 35.6                 | 58            |
| April, 2009     | 17                            | 1382.7               | 1720.29       |
| May, 2009       | 5                             | 58.5                 | 107.5         |
| August, 2009    | 4                             | 739.2                | 320           |
| October, 2009   | 3                             | 64.3                 | 186           |
| November, 2009  | 1                             | 77.0                 | 10            |
| December, 2009  | 7                             | 270.6                | 94            |
| January, 2010   | 17                            | 6326.3               | 1574          |
| February, 2010  | 2                             | 140.3                | 80            |
| March, 2010     | 5                             | 188.4                | 261           |
| April, 2010     | 25                            | 3355.5               | 1860.5        |
| May, 2010       | 19                            | 2259.8               | 1014          |
| June, 2010      | 1                             | 27.1                 | 47            |
| September, 2010 | 3                             | 22.1                 | 48            |
| October, 2010   | 1                             | 14.8                 | 32            |
| January, 2011   | 31                            | 7114.2               | 2429.3        |
| February, 2011  | 4                             | 165.0                | 122           |
| March, 2011     | 2                             | 59.9                 | 85            |
| April, 2011     | 25                            | 1150.7               | 1937.5        |
| May, 2011       | 14                            | 382.4                | 490.5         |
| June, 2011      | 24                            | 479.0                | 858           |
| July, 2011      | 12                            | 413.6                | 598           |
| October, 2011   | 1                             | 4.6                  | 10            |

**Summaries by Year**

|            |     |         |         |
|------------|-----|---------|---------|
| 2004 Total | 59  | 10270.8 | 4093.47 |
| 2005 Total | 123 | 14773.3 | 8006.07 |
| 2006 Total | 65  | 8860.5  | 4671.53 |
| 2007 Total | 47  | 2967.2  | 2312.41 |
| 2008 Total | 29  | 5161.6  | 2527.42 |

| MONTH/YEAR | NUMBER OF COPPER APPLICATIONS | POUNDS OF AI APPLIED | ACRES TREATED |
|------------|-------------------------------|----------------------|---------------|
| 2009 Total | 43                            | 4265.5               | 3383.79       |
| 2010 Total | 73                            | 12334.2              | 4916.5        |
| 2011 Total | 113                           | 9769.2               | 6530.3        |
| Total      | 552                           | 68402.4              | 36441.49      |

**Figure XIII-3. Deadman Creek @ Gurr Rd site subwatershed lbs copper applied by month (2004-2011).**

(\*) denotes months with exceedances. PUR data available October 2011 for Merced County.

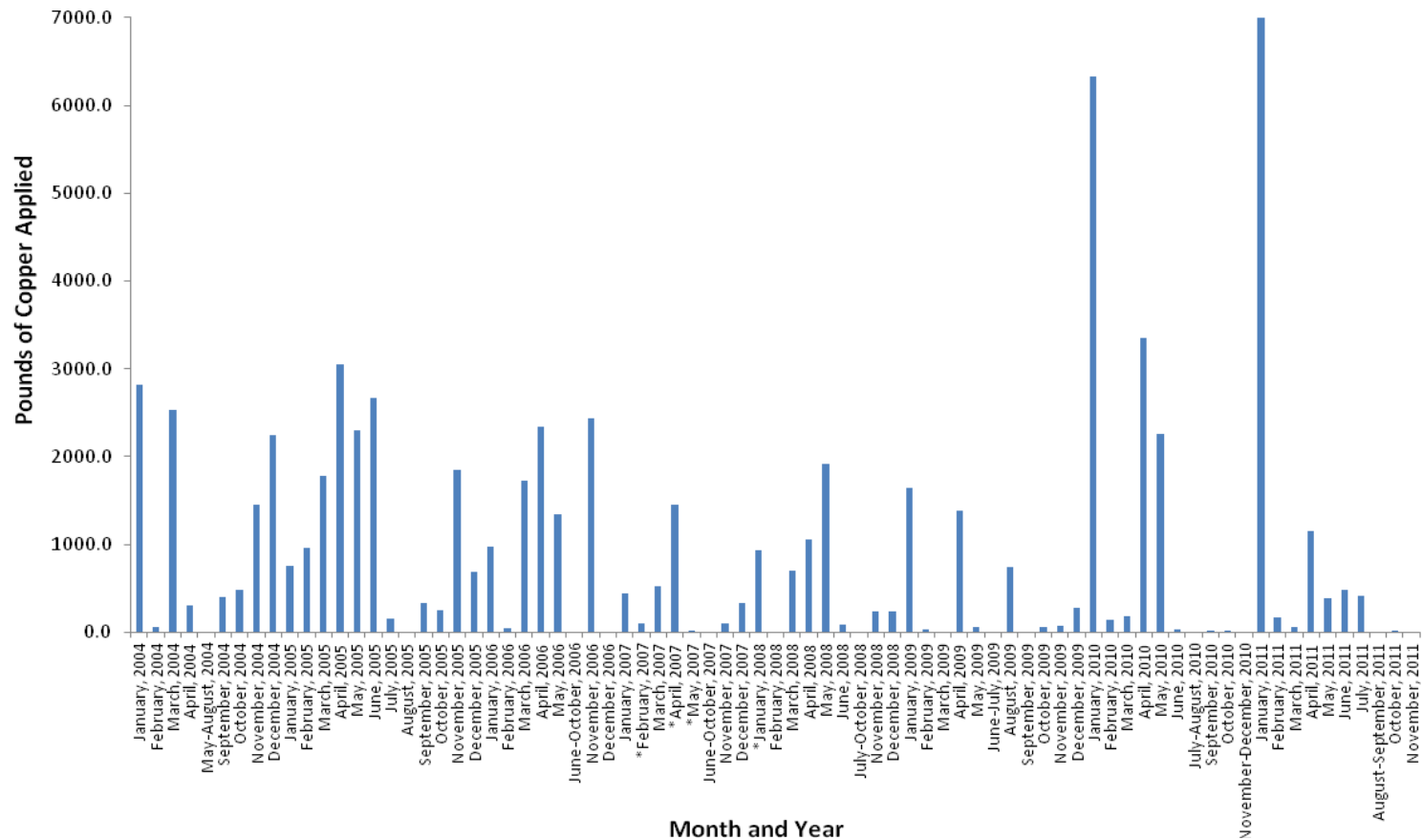


**Table XIII-11. Deadman Creek @ Gurr Rd site subwatershed copper PUR data (2004-2011).**

PUR data available October 2011 for Merced County.

| CHEMICAL NAME | COMMODITY                                        | PRODUCT NAME                             | LBS AI APPLIED |
|---------------|--------------------------------------------------|------------------------------------------|----------------|
| COPPER        | ALFALFA (FORAGE - FODDER) (ALFALFA HAY)          | DUPONT KOCIDE 3000 FUNGICIDE/BACTERICIDE | 13.8           |
|               | ALMOND                                           | BASIC COPPER 50W HB                      | 172.6          |
|               |                                                  | BASIC COPPER 53                          | 77.4           |
|               |                                                  | BASICOP                                  | 307.4          |
|               |                                                  | CHAMP DRY PRILL                          | 1201.0         |
|               |                                                  | CHAMP FORMULA 2 FLOWABLE                 | 1508.3         |
|               |                                                  | CHAMPION WETTABLE POWDER                 | 52.4           |
|               |                                                  | CUPROFIX ULTRA 40 DISPERS                | 8795.7         |
|               |                                                  | DUPONT KOCIDE 2000 FUNGICIDE/BACTERICIDE | 896.3          |
|               |                                                  | DUPONT KOCIDE 3000 FUNGICIDE/BACTERICIDE | 3520.2         |
|               |                                                  | DUPONT KOCIDE DF FUNGICIDE/BACTERICIDE   | 35.6           |
|               |                                                  | KOCIDE 101                               | 977.9          |
|               |                                                  | KOCIDE 2000                              | 1742.0         |
|               |                                                  | KOCIDE DF                                | 1125.9         |
|               |                                                  | KOP-HYDROXIDE 50W                        | 308.0          |
|               |                                                  | NORDOX                                   | 138.2          |
|               |                                                  | NORDOX 75 WG                             | 2120.5         |
|               |                                                  | NU-COP 50 WP                             | 52.4           |
|               | APRICOT                                          | BASIC COPPER 53                          | 58.8           |
|               |                                                  | KOCIDE 2000                              | 10.8           |
|               |                                                  | KOCIDE DF                                | 122.8          |
|               | CHERRY                                           | NORDOX 75 WG                             | 4.2            |
|               |                                                  | NU-COP 50DF                              | 154.0          |
|               | GRAPES                                           | DUPONT KOCIDE 2000 FUNGICIDE/BACTERICIDE | 266.3          |
|               |                                                  | DUPONT KOCIDE 3000 FUNGICIDE/BACTERICIDE | 91.3           |
|               |                                                  | KOCIDE 2000                              | 958.7          |
|               | GRAPES, WINE                                     | BADGE X2                                 | 291.8          |
|               |                                                  | CHAMP DP                                 | 641.7          |
|               |                                                  | CHAMP FLOWABLE                           | 866.7          |
|               |                                                  | CHAMP FORMULA 2 FLOWABLE                 | 2385.7         |
|               |                                                  | DUPONT KOCIDE 3000 FUNGICIDE/BACTERICIDE | 980.4          |
|               |                                                  | KENTAN DF                                | 196.2          |
|               |                                                  | KOCIDE 101                               | 251.8          |
|               |                                                  | KOCIDE 2000                              | 2018.6         |
|               |                                                  | NORDOX 75 WG                             | 6966.2         |
|               | NECTARINE                                        | NU-COP HB                                | 428.9          |
|               |                                                  | BASIC COPPER 53                          | 98.0           |
|               | N-OUTDR CONTAINER/FLD GRWN PLANTS                | DUPONT GX-569 FUNGICIDE/BACTERICIDE      | 135.5          |
|               |                                                  | DUPONT KOCIDE 3000 FUNGICIDE/BACTERICIDE | 588.5          |
|               |                                                  | KOCIDE 101                               | 6588.1         |
|               |                                                  | KOCIDE 2000                              | 189.4          |
|               | PEACH                                            | BASIC COPPER 53                          | 196.0          |
|               |                                                  | DUPONT GX-569 FUNGICIDE/BACTERICIDE      | 99.6           |
|               |                                                  | DUPONT KOCIDE 3000 FUNGICIDE/BACTERICIDE | 192.5          |
|               |                                                  | KOCIDE 101                               | 1062.6         |
|               |                                                  | KOCIDE DF                                | 635.2          |
|               | PEPPERS (FRUITING VEGETABLE), (BELL,CHILI, ETC.) | CHAMPION WETTABLE POWDER                 | 23.1           |
|               |                                                  | DUPONT GX-569 FUNGICIDE/BACTERICIDE      | 8.1            |

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| CHEMICAL NAME                             | COMMODITY                                         | PRODUCT NAME                             | LBS AI APPLIED |
|-------------------------------------------|---------------------------------------------------|------------------------------------------|----------------|
| COPPER                                    | PEPPERS (FRUITING VEGETABLE), (BELL, CHILI, ETC.) | DUPONT KOCIDE 3000 FUNGICIDE/BACTERICIDE | 115.0          |
|                                           |                                                   | KOCIDE 101                               | 121.3          |
|                                           |                                                   | KOCIDE DF                                | 134.5          |
|                                           | PISTACHIO (PISTACHE NUT)                          | DUPONT KOCIDE 2000 FUNGICIDE/BACTERICIDE | 603.6          |
|                                           |                                                   | KOCIDE 101                               | 65.5           |
|                                           |                                                   | NORDOX 75 WG                             | 7417.6         |
|                                           | RICE (ALL OR UNSPEC)                              | COPPER-Z 4/4                             | 530.2          |
|                                           | TOMATOES, FOR PROCESSING/CANNING                  | CHAMPION WETTABLE POWDER                 | 1105.9         |
|                                           |                                                   | DUPONT KOCIDE 2000 FUNGICIDE/BACTERICIDE | 41.3           |
|                                           |                                                   | DUPONT KOCIDE 3000 FUNGICIDE/BACTERICIDE | 1628.4         |
|                                           |                                                   | DUPONT KOCIDE DF FUNGICIDE/BACTERICIDE   | 327.0          |
|                                           |                                                   | KOCIDE 101                               | 1678.3         |
|                                           |                                                   | KOCIDE 2000                              | 795.2          |
|                                           |                                                   | KOCIDE DF                                | 2577.1         |
|                                           |                                                   | NU-COP 50DF                              | 181.7          |
|                                           | WALNUT (ENGLISH WALNUT, PERSIAN WALNUT)           | DUPONT KOCIDE 2000 FUNGICIDE/BACTERICIDE | 195.7          |
|                                           |                                                   | DUPONT KOCIDE 3000 FUNGICIDE/BACTERICIDE | 229.7          |
|                                           |                                                   | KOCIDE 2000                              | 639.7          |
|                                           |                                                   | KOP-HYDROXIDE 50W                        | 173.3          |
|                                           |                                                   | NORDOX 75 WG                             | 184.6          |
|                                           |                                                   | NU-COP HB                                | 100.1          |
| ALFALFA - Total Pounds Diazinon Applied   |                                                   |                                          | 13.8           |
| ALMOND - Total Pounds Diazinon Applied    |                                                   |                                          | 23031.7        |
| APRICOT - Total Pounds Diazinon Applied   |                                                   |                                          | 192.4          |
| CHERRY - Total Pounds Diazinon Applied    |                                                   |                                          | 158.2          |
| GRAPES - Total Pounds Diazinon Applied    |                                                   |                                          | 16344.1        |
| NECTARINE - Total Pounds Diazinon Applied |                                                   |                                          | 98.0           |
| N-OUTDR - Total Pounds Diazinon Applied   |                                                   |                                          | 7501.5         |
| PEACH - Total Pounds Diazinon Applied     |                                                   |                                          | 2185.9         |
| PEPPERS - Total Pounds Diazinon Applied   |                                                   |                                          | 401.9          |
| PISTACHIO - Total Pounds Diazinon Applied |                                                   |                                          | 8086.7         |
| RICE - Total Pounds Diazinon Applied      |                                                   |                                          | 530.2          |
| TOMATOES - Total Pounds Diazinon Applied  |                                                   |                                          | 8334.8         |
| WALNUT - Total Pounds Diazinon Applied    |                                                   |                                          | 1523.0         |
| Total Pounds Copper Applied (2004-2011)   |                                                   |                                          | 68402.4        |

The Coalition noted in the 2008 Management Plan that copper appears to be mobilized during winter storm water discharges and through irrigation return flows to Deadman Creek@ Gurr Rd. As discussed above, copper is heavily used in the subwatershed with numerous applications being made across numerous sections. Therefore, the Coalition plans to provide information on a subwatershed basis to growers to review their operation and determine if storm water runoff and irrigation return flows are managed properly, specifically to growers with the potential to drain to the creek. In addition, the Coalition is targeting growers with the potential to drain to the creek and who applied copper in the past. This is consistent with the strategy to address priority A/B constituent exceedances.

In addition, because Assessment Monitoring in 2009 and 2010 demonstrated two consecutive years of monitoring with no copper exceedances since the most recent exceedance in January 2008, the Coalition petitioned to remove copper from the Deadman Creek @ Gurr Rd management plan in a letter submitted to the Regional Board on January 6, 2012.

### *Priority D Constituents*

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The priority D constituents listed in the Deadman Creek @ Gurr Rd subwatershed management plan are water column toxicity to *C. dubia*, *P. promelas* and *S. capricornutum*.

#### *C. dubia* toxicity

Through analysis of associated monitoring data and TIEs, the Coalition determined ammonia is the most frequent and primary cause of *C. dubia* toxicity in the subwatershed. Toxicity to *C. dubia* occurred four times in the subwatershed in 2009 (February and March) and 2010 (March and November), and, although a chlorpyrifos exceedance was associated with the March 2010 toxicity, ammonia contributed to toxicity in the February 2009 and the 2010 (March and November) events.

#### *P. promelas* toxicity

Ammonia concentrations are also responsible for the majority of *P. promelas* toxicities in the Deadman Creek @ Gurr Rd subwatershed 2006 (June), 2007 (May), 2009 (January, February, and December) and 2010 (March and November) and either was the only cause or contributed to all of the most recent toxicities in 2009 and 2010.

Fertilizers applied to agricultural fields can contain ammonium. However, the ammonium is rapidly converted to nitrate in the natural environment, and ammonium-based fertilizer is unlikely to be the source of ammonia detected in surface waterways, especially at relatively high concentrations (Table XIII-5), would be agricultural applications of fertilizer. The Coalition suspects other sources are responsible for the ammonia exceedances, most likely dairies and irrigated pastureland in the subwatershed. The Coalition continues to emphasize the importance of nutrient, irrigation tailwater, and storm water management, which is consistent with the strategy for the subwatershed.

#### *S. capricornutum* toxicity

*S. capricornutum* toxicity occurred three times in the subwatershed 2007 (July), 2008 and 2009 (February). The causes of the first two toxicities were undetermined, but the third toxicity to *S. capricornutum* was due to ammonia. Similar to the strategy for the other two toxicity species, the Coalition believes preventing irrigation return flows carrying agricultural constituents from entering the surface waterway will be effective in eliminating *S. capricornutum* toxicity. The Coalition will continue with outreach as explained under the chlorpyrifos section to address the toxicity.

### *Priority E Constituents*

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The priority E constituents listed under the Deadman Creek @ Gurr Rd management plan are ammonia, arsenic, DO, *E. coli*, SC and TDS.



Potential sources of ammonia were discussed in the section above as they relate to toxicities. Although the Coalition suspects sources other than agriculture are the primary contributors to the exceedances, the Coalition will discuss ammonia during outreach according to its strategy described above.

Although these constituents will remain low priority, the Coalition will continue to collect monitoring data as a part of Assessment Monitoring and /or MPM. Dissolved oxygen and SC are field parameters that will be collected during every monitoring event, Assessment and MPM. Ammonia, arsenic, *E. coli*, and TDS will be monitored during Assessment Monitoring at this site as scheduled in 2017. The priority E constituents are also discussed during individual contacts and at annual grower meetings. In addition, the Coalition plans to participate in a focus group along with other Coalitions and Regional Board staff to develop a joint Work Plan to address *E. coli* exceedances by determining the potential agricultural sources of *E. coli* and identifying management practices to prevent discharges to surface waters.

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### Evaluation

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Deadman Creek @ Gurr Rd is one of the four fourth priority site subwatersheds within the ESJWQC and is in its first year of focused outreach (2012-2014).

The Coalition will focus its resources on identifying sources of agricultural discharge within this subwatershed that could result in water quality impairments, extending outreach to Coalition members, and setting evaluation goals based on the effectiveness of management practices (by considering changes in water quality over time).

The Coalition's strategy for the Deadman Creek @ Gurr Rd subwatershed is to focus on providing information on a subwatershed level to growers to review their operation and determine if irrigation return flows and storm water runoff are managed properly. The Coalition targeted growers with crops located adjacent to the waterway and whose agricultural practices may result in the discharge or drift of pesticides, specifically chlorpyrifos and copper, into the waterway. Outreach efforts include grower notification, management practice outreach and education, tracking of management practice implementation, and providing information on special studies of management practice efficacy.

Targeted growers will complete individual surveys to document current management practice and assess future planned practices. The Coalition will review these results and plan the final stages of outreach including follow up contacts with growers to identify newly implemented practices and future monitoring to evaluate water quality improvement.

In 2012, MPM is scheduled for high priority constituents during months of historical exceedances. However, monitoring for copper resulted in zero exceedances for two or more consecutive years of monitoring during months of past exceedances. A letter was submitted to the Regional Board on January 6, 2012 petitioning to remove the constituent from the active Deadman Creek @ Gurr Rd management plan; until the letter is approved, copper will continue to be monitored as scheduled.

## XIV. DEADMAN CREEK @ HWY 59

### Management Plan Constituents

#### Priority A/B

- Chlorpyrifos

#### Priority D

- *Selenastrum capricornutum* water column toxicity

#### Priority E

- Arsenic
- DO
- *E. coli*

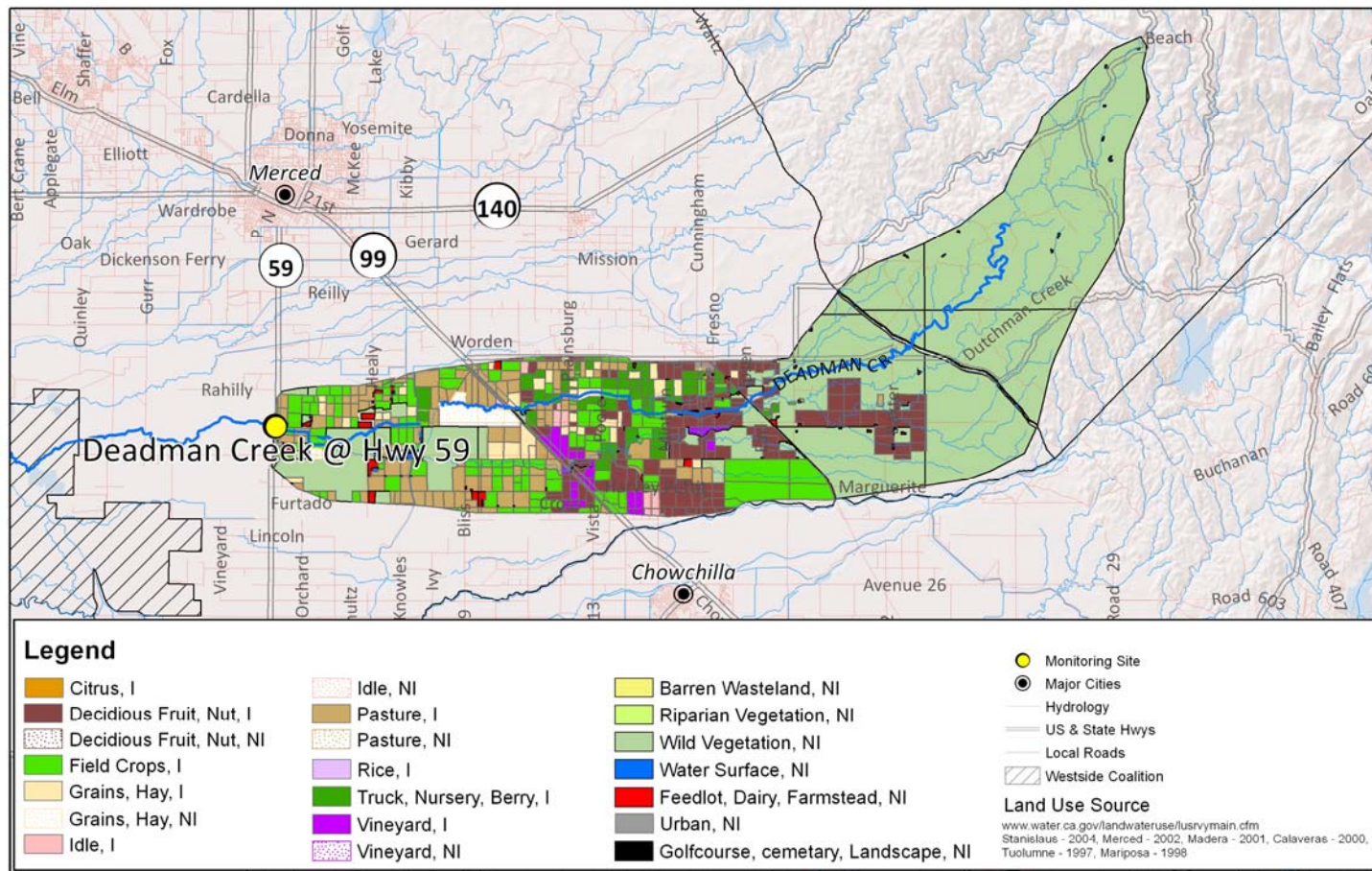
### Description of Deadman Creek @ Hwy 59 Site Subwatershed

Deadman Creek @ Hwy 59 (37,400 irrigated acres) –This site is upstream from the Deadman Creek @ Gurr Rd site subwatershed (Table XIV-1). The primary agriculture in the site subwatershed consists of orchards, field crops, and alfalfa (Figure XIV-1).

**Table XIV-1. Deadman Creek @ Hwy 59 site subwatershed sampling location coordinates.**

| SITE NAME              | STATION CODE | TARGET LATITUDE | TARGET LONGITUDE |
|------------------------|--------------|-----------------|------------------|
| Deadman Creek @ Hwy 59 | 535DMCAHF    | 37.1981         | -120.4869        |

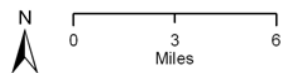
Figure XIV-1. Deadman Creek @ Hwy 59 site subwatershed land use map.



Source of Layers:  
Hydrology - NHD hydrodata, 1:24,000-scale, <http://nhd.usgs.gov/>  
Roads, highways, railroads, county boundary, city outlines - California Spatial Information Library  
TRS - Teale Public Land Survey System, Pub. date: 20050101, California Spatial Information Library  
Parcel Layer - Stanislaus 2010, Merced 2011, Madera 2011  
Basemap, Shaded Relief - ESRI  
GSC North America 1983

Date Prepared: 07/20/11

ESJWQC



## Deadman Creek @ Hwy 59

## Subwatershed Monitoring History

Monitoring at Deadman Creek @ Hwy 59 began in the irrigation season of 2006 and continued through the irrigation season of 2008 (Table XIV-2). Deadman Creek @ Hwy 59 is an Assessment Monitoring location in the Duck Slough @ Gurr Rd Zone (Zone 5), and Assessment Monitoring resumed at the site in 2011 and will continue through 2012. Deadman Creek @ Hwy 59 is scheduled for Assessment Monitoring again in 2019 through 2020. Constituents monitored during sampling years are listed in Table XIV-3.

Management Plan Monitoring in the subwatershed occurred in 2008 through 2010. The Coalition conducted MPM for chlorpyrifos in August and September in 2008 and 2009 (Table XIV-4).

Management Plan Monitoring also occurred for *S. capricornutum* in April 2009 and January 2010. The site, however, was dry during all three 2009 events and during the single 2010 monitoring event. Since Deadman Creek @ Hwy 59 is a fourth priority subwatershed, MPM is scheduled to resume during 2012.

Deadman Creek is currently on California's 2008-2010 303d List of Impaired Waterbodies for chlorpyrifos and *E. coli*.

**Table XIV-2. Deadman Creek @ Hwy 59 site subwatershed sampling events per season and year (including MPM).**

| YEAR | SEASON     | EVENTS SAMPLED | EVENTS NOT SAMPLED <sup>1</sup> | TOTAL |
|------|------------|----------------|---------------------------------|-------|
| 2006 | Storm      | NA             | NA                              | NA    |
|      | Irrigation | 5              | 0                               | 5     |
| 2007 | Storm      | 2              | 0                               | 2     |
|      | Irrigation | 6              | 0                               | 6     |
| 2008 | Storm      | 2              | 0                               | 2     |
|      | Irrigation | 8              | 0                               | 8     |
|      | Fall       | NA             | NA                              | NA    |
| 2009 | Winter     | NA             | NA                              | NA    |
|      | Storm      | NA             | NA                              | NA    |
|      | Irrigation | 0              | 3                               | 3     |
|      | Fall       | NA             | NA                              | NA    |
| 2010 | Winter     | NA             | NA                              | NA    |
|      | Storm      | 0              | 1                               | 1     |
|      | Irrigation | NA             | NA                              | NA    |
|      | Fall       | NA             | NA                              | NA    |
| 2011 | Winter     | 2              | 0                               | 2     |
|      | Storm      | 1              | 0                               | 1     |
|      | Irrigation | 6              | 0                               | 6     |
|      | Fall       | 3              | 0                               | 3     |

<sup>1</sup>If an event was not sampled during scheduled monitoring, the site was dry.

NA – Not applicable. This site was not scheduled for sampling during this season/year.

**Table XIV-3. Deadman Creek @ Hwy 59 site subwatershed analyses per sampling season and year.**

Only environmental samples with a sample replicate and lab replicate of one are listed.

| METHOD                        | ANALYTE                         | 2006    |            | 2007  |            | 2008  |            |        | 2009          | 2010          | 2011   |       |            |      |  |
|-------------------------------|---------------------------------|---------|------------|-------|------------|-------|------------|--------|---------------|---------------|--------|-------|------------|------|--|
|                               |                                 | STORM * | IRRIGATION | STORM | IRRIGATION | STORM | IRRIGATION | FALL * | WINTER-FALL * | WINTER-FALL * | WINTER | STORM | IRRIGATION | FALL |  |
| Field and Physical Parameters |                                 |         |            |       |            |       |            |        |               |               |        |       |            |      |  |
| NA                            | Dissolved Oxygen                |         | 5          | 3     | 7          | 4     | 11         |        |               |               | 3      | 1     | 6          | 3    |  |
| NA                            | Specific Conductivity           |         | 5          | 3     | 7          | 4     | 11         |        |               |               | 3      | 1     | 6          | 3    |  |
| NA                            | pH                              |         | 5          | 3     | 7          | 4     | 11         |        |               |               | 3      | 1     | 6          | 3    |  |
| EPA 110.2                     | Color                           |         | 5          | 2     | 6          | 2     | 6          |        |               |               |        |       |            |      |  |
| EPA 160.1                     | Dissolved Solids                |         | 5          | 2     | 6          | 2     | 6          |        |               |               | 2      | 1     | 6          | 3    |  |
| EPA 160.2                     | Suspended Solids                |         |            |       |            |       |            |        |               |               | 1      | 2     | 6          | 3    |  |
| EPA 180.1                     | Turbidity                       |         | 5          | 2     | 6          | 2     | 6          |        |               |               | 2      | 1     | 6          | 3    |  |
| EPA 415.1                     | Total Organic Carbon            |         | 5          | 2     | 6          | 2     | 6          |        |               |               |        |       |            |      |  |
| SM 9223                       | <i>E. coli</i>                  |         | 5          | 2     | 6          | 2     | 6          |        |               |               | 2      | 1     | 6          | 3    |  |
| Walkley-Black                 | Total Organic Carbon (sediment) |         |            |       |            |       |            |        |               |               | 1      |       | 1          |      |  |
| ASTM D422 or ASTM D4464       | Grain size (sediment)           |         |            |       |            |       |            |        |               |               | 1      |       | 1          |      |  |
| EPA 405.1                     | BOD                             |         | 1          | 2     | 2          |       |            |        |               |               |        |       |            |      |  |
| Carbamates                    |                                 |         |            |       |            |       |            |        |               |               |        |       |            |      |  |
| EPA 8321A                     | Aldicarb                        |         | 5          | 2     | 6          | 2     | 6          |        |               |               | 2      | 1     | 6          | 3    |  |
| EPA 8321A                     | Carbaryl                        |         | 5          | 2     | 6          | 2     | 6          |        |               |               | 2      | 1     | 6          | 3    |  |
| EPA 8321A                     | Carbofuran                      |         | 5          | 2     | 6          | 2     | 6          |        |               |               | 2      | 1     | 6          | 3    |  |
| EPA 8321A                     | Diuron                          |         | 5          | 2     | 6          | 2     | 6          |        |               |               | 2      | 1     | 6          | 3    |  |
| EPA 8321A                     | Linuron                         |         | 5          | 2     | 6          | 2     | 6          |        |               |               | 2      | 1     | 6          | 3    |  |
| EPA 8321A                     | Methiocarb                      |         | 5          | 2     | 6          | 2     | 6          |        |               |               | 2      | 1     | 6          | 3    |  |
| EPA 8321A                     | Methomyl                        |         | 5          | 2     | 6          | 2     | 6          |        |               |               | 2      | 1     | 6          | 3    |  |
| EPA 8321A                     | Oxamyl                          |         | 5          | 2     | 6          | 2     | 6          |        |               |               | 2      | 1     | 6          | 3    |  |
| Organochlorines               |                                 |         |            |       |            |       |            |        |               |               |        |       |            |      |  |
| EPA 8081A                     | DDD(p,p')                       |         | 5          | 2     | 6          | 2     | 6          |        |               |               | 2      | 1     | 4          |      |  |
| EPA 8081A                     | DDE(p,p')                       |         | 5          | 2     | 6          | 2     | 6          |        |               |               | 2      | 1     | 4          |      |  |
| EPA 8081A                     | DDT(p,p')                       |         | 5          | 2     | 6          | 2     | 6          |        |               |               | 2      | 1     | 4          |      |  |
| EPA 8081A                     | Dicofol                         |         | 5          | 2     | 6          | 2     | 6          |        |               |               | 2      | 1     | 4          |      |  |

| METHOD             | ANALYTE            | 2006    |            | 2007  |            | 2008  |            |        | 2009          | 2010          | 2011   |       |            |      |
|--------------------|--------------------|---------|------------|-------|------------|-------|------------|--------|---------------|---------------|--------|-------|------------|------|
|                    |                    | STORM * | IRRIGATION | STORM | IRRIGATION | STORM | IRRIGATION | FALL * | WINTER-FALL * | WINTER-FALL * | WINTER | STORM | IRRIGATION | FALL |
| EPA 8081A          | Dieldrin           |         | 5          | 2     | 6          | 2     | 6          |        |               |               | 2      | 1     | 4          |      |
| EPA 8081A          | Endrin             |         | 5          | 2     | 6          | 2     | 6          |        |               |               | 2      | 1     | 4          |      |
| EPA 8081A          | Methoxychlor       |         | 5          | 2     | 6          | 2     | 6          |        |               |               | 2      | 1     | 4          |      |
| Group A Pesticides |                    |         |            |       |            |       |            |        |               |               |        |       |            |      |
| EPA 8081A          | Aldrin             |         |            |       |            |       |            |        |               |               | 2      | 1     | 4          |      |
| EPA 8081A          | Chlordane          |         |            |       |            |       |            |        |               |               | 2      | 1     | 4          |      |
| EPA 8081A          | Endosulfan I       |         |            |       |            |       |            |        |               |               | 2      | 1     | 4          |      |
| EPA 8081A          | Endosulfan II      |         |            |       |            |       |            |        |               |               | 2      | 1     | 4          |      |
| EPA 8081A          | HCH, alpha         |         |            |       |            |       |            |        |               |               | 2      | 1     | 4          |      |
| EPA 8081A          | HCH, beta          |         |            |       |            |       |            |        |               |               | 2      | 1     | 4          |      |
| EPA 8081A          | HCH, delta         |         |            |       |            |       |            |        |               |               | 2      | 1     | 4          |      |
| EPA 8081A          | HCH, gamma         |         |            |       |            |       |            |        |               |               | 2      | 1     | 4          |      |
| EPA 8081A          | Heptachlor         |         |            |       |            |       |            |        |               |               | 2      | 1     | 4          |      |
| EPA 8081A          | Heptachlor epoxide |         |            |       |            |       |            |        |               |               | 2      | 1     | 4          |      |
| EPA 8081A          | Toxaphene          |         |            |       |            |       |            |        |               |               | 2      | 1     | 4          |      |
| Organophosphates   |                    |         |            |       |            |       |            |        |               |               |        |       |            |      |
| EPA 8141A          | Azinphos methyl    |         | 5          | 2     | 6          | 2     | 6          |        |               |               | 2      | 1     | 6          | 3    |
| EPA 8141A          | Chlorpyrifos       |         | 5          | 2     | 6          | 8     | 6          |        |               |               | 2      | 1     | 6          | 3    |
| EPA 8141A          | Demeton-s          |         |            |       |            |       |            |        |               |               | 2      | 1     | 6          | 3    |
| EPA 8141A          | Diazinon           |         | 5          | 2     | 6          | 2     | 6          |        |               |               | 2      | 1     | 6          | 3    |
| EPA 8141A          | Dichlorvos         |         |            |       |            |       |            |        |               |               | 2      | 1     | 6          | 3    |
| EPA 8141A          | Dimethoate         |         | 5          | 2     | 6          | 2     | 6          |        |               |               | 2      | 1     | 6          | 3    |
| EPA 8141A          | Disulfoton         |         | 5          | 2     | 6          | 2     | 6          |        |               |               | 2      | 1     | 6          | 3    |
| EPA 8141A          | Malathion          |         | 5          | 2     | 6          | 2     | 6          |        |               |               | 2      | 1     | 6          | 3    |
| EPA 8321A          | Methamidophos      |         | 5          | 2     | 6          | 2     | 6          |        |               |               | 2      | 1     | 6          | 3    |
| EPA 8141A          | Methidathion       |         | 5          | 2     | 6          | 2     | 6          |        |               |               | 2      | 1     | 6          | 3    |
| EPA 8141A          | Molinate           |         | 5          | 2     | 6          | 2     | 6          |        |               |               | 2      | 1     | 6          | 3    |
| EPA 8141A          | Parathion, Methyl  |         | 5          | 2     | 6          | 2     | 6          |        |               |               | 2      | 1     | 6          | 3    |
| EPA 8141A          | Phorate            |         | 5          | 2     | 6          | 2     | 6          |        |               |               | 2      | 1     | 6          | 3    |
| EPA 8141A          | Phosmet            |         | 5          | 2     | 6          | 2     | 6          |        |               |               | 2      | 1     | 6          | 3    |

| METHOD                    | ANALYTE                           | 2006    |            | 2007  |            | 2008  |            |        | 2009          | 2010          | 2011   |       |            |      |
|---------------------------|-----------------------------------|---------|------------|-------|------------|-------|------------|--------|---------------|---------------|--------|-------|------------|------|
|                           |                                   | STORM * | IRRIGATION | STORM | IRRIGATION | STORM | IRRIGATION | FALL * | WINTER-FALL * | WINTER-FALL * | WINTER | STORM | IRRIGATION | FALL |
| EPA 8141A                 | Thiobencarb                       |         | 5          | 2     | 6          | 2     | 6          |        |               |               |        |       |            |      |
| EPA 8141A                 | Trifluralin                       |         |            |       |            |       |            |        |               |               | 2      | 1     | 6          | 3    |
| <b>Pyrethroids</b>        |                                   |         |            |       |            |       |            |        |               |               |        |       |            |      |
| EPA 8081A                 | Bifenthrin                        |         | 5          | 2     | 6          | 2     | 6          |        |               |               |        |       |            |      |
| EPA 8081A                 | Cyfluthrin, total                 |         | 5          | 2     | 6          | 2     | 6          |        |               |               |        |       |            |      |
| EPA 8081A                 | Cyhalothrin, lambda, total        |         | 5          | 2     | 6          | 2     | 6          |        |               |               |        |       |            |      |
| EPA 8081A                 | Cypermethrin, total               |         | 5          | 2     | 6          | 2     | 6          |        |               |               |        |       |            |      |
| EPA 8081A                 | Esfenvalerate/ Fenvalerate, total |         | 5          | 2     | 6          | 2     | 6          |        |               |               |        |       |            |      |
| EPA 8081A                 | Permethrin, total                 |         | 5          | 2     | 6          | 2     | 6          |        |               |               |        |       |            |      |
| <b>Triazines</b>          |                                   |         |            |       |            |       |            |        |               |               |        |       |            |      |
| EPA 547M                  | Glyphosate                        |         | 5          | 2     | 6          | 2     | 6          |        |               |               | 2      |       | 4          |      |
| EPA 549.2M                | Paraquat dichloride               |         | 5          | 2     | 6          | 2     | 6          |        |               |               | 2      |       | 4          |      |
| EPA 619                   | Atrazine                          |         | 5          | 2     | 6          | 2     | 6          |        |               |               | 2      | 1     | 6          | 3    |
| EPA 619                   | Cyanazine                         |         | 5          | 2     | 6          | 2     | 6          |        |               |               | 2      | 1     | 6          | 3    |
| EPA 619                   | Simazine                          |         | 5          | 2     | 6          | 2     | 6          |        |               |               | 2      | 1     | 6          | 3    |
| <b>Metals (Total)</b>     |                                   |         |            |       |            |       |            |        |               |               |        |       |            |      |
| EPA 200.8                 | Arsenic                           |         |            |       |            |       | 6          |        |               |               | 2      | 1     | 5          |      |
| EPA 200.8                 | Boron                             |         |            |       |            |       | 6          |        |               |               | 2      | 1     | 6          | 3    |
| EPA 200.8                 | Cadmium                           |         |            |       |            |       | 6          |        |               |               | 2      | 1     | 5          |      |
| EPA 200.8                 | Copper                            |         |            |       |            |       | 6          |        |               |               | 2      | 1     | 6          | 3    |
| EPA 200.8                 | Lead                              |         |            |       |            |       | 6          |        |               |               | 2      | 1     | 5          |      |
| EPA 200.8                 | Molybdenum                        |         |            |       |            |       |            |        |               |               | 2      | 1     | 5          |      |
| EPA 200.8                 | Nickel                            |         |            |       |            |       | 6          |        |               |               | 2      | 1     | 6          | 3    |
| EPA 200.8                 | Selenium                          |         |            |       |            |       | 6          |        |               |               | 2      | 1     | 5          | 3    |
| EPA 200.8                 | Zinc                              |         |            |       |            |       | 6          |        |               |               | 2      | 1     | 6          | 3    |
| <b>Metals (Dissolved)</b> |                                   |         |            |       |            |       |            |        |               |               |        |       |            |      |
| EPA 200.8                 | Cadmium                           |         |            |       |            |       |            |        |               |               | 2      | 1     | 5          |      |
| EPA 200.8                 | Copper                            |         |            |       |            |       |            |        |               |               | 2      | 1     | 6          | 3    |
| EPA 200.8                 | Lead                              |         |            |       |            |       |            |        |               |               | 2      | 1     | 5          |      |
| EPA 200.8                 | Nickel                            |         |            |       |            |       |            |        |               |               | 2      | 1     | 6          | 3    |

| METHOD           | ANALYTE                          | 2006    |            | 2007  |            | 2008  |            |        | 2009          | 2010          | 2011   |       |            |      |
|------------------|----------------------------------|---------|------------|-------|------------|-------|------------|--------|---------------|---------------|--------|-------|------------|------|
|                  |                                  | STORM * | IRRIGATION | STORM | IRRIGATION | STORM | IRRIGATION | FALL * | WINTER-FALL * | WINTER-FALL * | WINTER | STORM | IRRIGATION | FALL |
| EPA 200.8        | Zinc                             |         |            |       |            |       |            |        |               |               | 2      | 1     | 6          | 3    |
| Nutrients        |                                  |         |            |       |            |       |            |        |               |               |        |       |            |      |
| SM 2340 C        | Hardness as CaCO3                |         |            |       |            |       | 6          |        |               |               | 2      | 1     | 6          | 3    |
| EPA 300.0        | Nitrate as N                     |         |            |       |            |       | 6          |        |               |               |        |       |            |      |
| EPA 350.2        | Ammonia as N                     |         |            |       |            |       | 6          |        |               |               | 2      | 1     | 6          | 3    |
| EPA 351.3        | Nitrogen, Total Kjeldahl         |         |            |       |            |       | 6          |        |               |               | 2      | 1     | 6          | 3    |
| EPA 354.1        | Nitrite as N                     |         |            |       |            |       | 6          |        |               |               |        |       |            |      |
| EPA 353.2        | Nitrate + Nitrite as N           |         |            |       |            |       |            |        |               |               | 2      | 1     | 6          | 3    |
| EPA 365.2        | OrthoPhosphate as P              |         |            |       |            |       | 6          |        |               |               | 2      | 1     | 6          | 3    |
| EPA 365.2        | Phosphate as P                   |         |            |       |            |       | 6          |        |               |               | 2      | 1     | 6          | 3    |
| Toxicity         |                                  |         |            |       |            |       |            |        |               |               |        |       |            |      |
| EPA 821/R-02-012 | <i>Ceriodaphnia dubia</i>        |         | 5          | 2     | 6          | 2     | 6          |        |               |               | 2      | 1     | 6          | 3    |
| EPA 821/R-02-012 | <i>Pimephales promelas</i>       |         | 5          | 2     | 6          | 2     | 6          |        |               |               | 2      | 1     | 6          | 3    |
| EPA 821/R-02-013 | <i>Selenastrum capricornutum</i> |         | 5          | 2     | 6          | 3     | 7          |        |               |               | 2      | 1     | 6          | 3    |
| EPA 600/R-99-064 | <i>Hyalella azteca</i>           |         | 1          | 1     | 1          | 1     | 2          |        |               |               | 1      |       | 1          |      |

\*Site not sampled during the 2006 storm season, 2008 fall season, and 2009 and 2010 winter, storm and fall seasons (dry in both irrigation seasons).



**Table XIV-4. Deadman Creek @ Hwy 59 site subwatershed Management Plan Monitoring schedule (2008-2010).**

| SITE NAME              | SAMPLE DATE | MONITORING TYPE | CHLORPYRIFOS | S. CAPRICORNUTUM |
|------------------------|-------------|-----------------|--------------|------------------|
| Deadman Creek @ Hwy 59 | 5-Aug-08    | A               | X            |                  |
| Deadman Creek @ Hwy 59 | 9-Sep-08    | A               | X            |                  |
| Deadman Creek @ Hwy 59 | 21-Apr-09   | MPM             |              | X                |
| Deadman Creek @ Hwy 59 | 18-Aug-09   | MPM             | X            |                  |
| Deadman Creek @ Hwy 59 | 22-Sep-09   | MPM             | X            |                  |
| Deadman Creek @ Hwy 59 | 19-Jan-10   | MPM             |              | X                |

A – Additional sampling

X – Constituent sampled for Management Plan Monitoring (MPM)

## Exceedance History

Deadman Creek @ Hwy 59 samples collected from 2006 through 2011 exceeded the WQTLs for field parameters, *E. coli*, pesticides, and metals and water column and sediment toxicity have also occurred (Table XIV-5). Constituents that exceeded their respective WQTLs in this subwatershed include DO (17), *E. coli* (17), arsenic (5), chlorpyrifos (6), diuron (1), DDD (1), DDT (one) and simazine (1). Toxicity to *S. capricornutum* (2), one of which demonstrated persistent toxicity in the resample, and *H. azteca* sediment has occurred once (Table XIV-5).

In 2011, exceedances included pH (4), *E. coli* (5), and chlorpyrifos (2).

Exceedances are based on WQTLs listed in the introduction to the ESJWQC Management Plan. The highest priority constituents in the Deadman Creek @ Hwy 59 subwatershed are chlorpyrifos (A/B) and toxicity to *S. capricornutum* (D).

**Table XIV-5. Deadman Creek @ Hwy 59 site subwatershed exceedances (2006-2011).**

The WQTL used to evaluate the data are listed in the header after the analyte.

| SITE NAME              | SEASON     | SAMPLE DATE | OXYGEN, DISSOLVED, <7 mg/L | pH, <6.5 AND > 8.5 UNITS | <i>E. COLI</i> , >235 MPN/100 ML | ARSENIC, >10 µg/L | CHLORPYRIFOS, >0.015 µg/L | DDD (P,P'), >0.00083 µg/L | DDT (P,P'), >0.00059 µg/L | DIURON, >2 µg/L | SIMAZINE, >4 µg/L | <i>S. CAPRICORNUTUM</i> , (% CONTROL) | <i>H. AZTECA</i> , (% CONTROL) |
|------------------------|------------|-------------|----------------------------|--------------------------|----------------------------------|-------------------|---------------------------|---------------------------|---------------------------|-----------------|-------------------|---------------------------------------|--------------------------------|
| Deadman Creek @ Hwy 59 | Irrigation | 6/13/2006   | 5.65                       |                          |                                  |                   |                           | 0.0053                    | 0.05                      |                 |                   |                                       |                                |
| Deadman Creek @ Hwy 59 | Irrigation | 8/8/2006    | 6.55                       |                          |                                  |                   |                           |                           |                           |                 |                   |                                       |                                |
| Deadman Creek @ Hwy 59 | Irrigation | 9/12/2006   | 6.53                       |                          |                                  |                   | 0.059                     |                           |                           |                 |                   |                                       |                                |
| Deadman Creek @ Hwy 59 | Storm      | 2/11/2007   |                            |                          | 400                              |                   |                           |                           |                           |                 |                   |                                       |                                |
| Deadman Creek @ Hwy 59 | Storm      | 2/28/2007   |                            |                          | 490                              |                   |                           |                           |                           |                 |                   |                                       |                                |
| Deadman Creek @ Hwy 59 | Irrigation | 4/24/2007   |                            |                          | 310                              |                   |                           |                           |                           |                 |                   |                                       |                                |
| Deadman Creek @ Hwy 59 | Irrigation | 5/29/2007   | 6.13                       |                          | 490                              |                   |                           |                           |                           |                 |                   |                                       |                                |
| Deadman Creek @ Hwy 59 | Irrigation | 6/26/2007   | 6.78                       |                          | 610                              |                   |                           |                           |                           |                 |                   |                                       |                                |
| Deadman Creek @ Hwy 59 | Irrigation | 7/24/2007   | 4.31                       |                          |                                  |                   |                           |                           |                           |                 |                   |                                       |                                |
| Deadman Creek @ Hwy 59 | Irrigation | 8/21/2007   | 4.47                       |                          |                                  |                   | 0.038                     |                           |                           |                 |                   |                                       |                                |
| Deadman Creek @ Hwy 59 | Irrigation | 8/23/2007   | 2.65                       |                          |                                  |                   |                           |                           |                           |                 |                   |                                       |                                |
| Deadman Creek @ Hwy 59 | Irrigation | 9/18/2007   | 5.43                       |                          | 330                              |                   |                           |                           |                           |                 |                   |                                       |                                |
| Deadman Creek @ Hwy 59 | Storm      | 1/25/2008   |                            |                          | >2400                            |                   |                           |                           |                           | 6.2             | 25                | 44                                    |                                |
| Deadman Creek @ Hwy 59 | Storm      | 2/25/2008   |                            |                          | 1200                             |                   |                           |                           |                           |                 |                   |                                       |                                |
| Deadman Creek @ Hwy 59 | Irrigation | 4/29/2008   |                            |                          | 610                              | 16                |                           |                           |                           |                 |                   | 71                                    |                                |
| Deadman Creek @ Hwy 59 | Irrigation | 5/7/2008    |                            |                          |                                  |                   |                           |                           |                           |                 |                   | 42                                    |                                |

| SITE NAME              | SEASON     | SAMPLE DATE | OXYGEN, DISSOLVED, <7 MG/L | PH, <6.5 AND > 8.5 UNITS | E. COLI, >235 MPN/100 ML | ARSENIC, >10 µG/L | CHLORPYRIFOS, >0.015 µG/L | DDD (P,P'), >0.00083 µG/L | DDT (P,P'), >0.00059 µG/L | DIURON, >2 µG/L | SIMAZINE, >4 µG/L | S. CAPRICORNUTUM, (% CONTROL) | H. AZTECA, (% CONTROL) |
|------------------------|------------|-------------|----------------------------|--------------------------|--------------------------|-------------------|---------------------------|---------------------------|---------------------------|-----------------|-------------------|-------------------------------|------------------------|
| Deadman Creek @ Hwy 59 | Irrigation | 5/27/2008   |                            |                          | 610                      | 12                |                           |                           |                           |                 |                   |                               |                        |
| Deadman Creek @ Hwy 59 | Irrigation | 6/24/2008   | 3.78                       |                          | 310                      | 17                |                           |                           |                           |                 |                   |                               |                        |
| Deadman Creek @ Hwy 59 | Irrigation | 7/29/2008   | 3.08                       |                          | 490                      |                   |                           |                           |                           |                 |                   |                               |                        |
| Deadman Creek @ Hwy 59 | Irrigation | 8/5/2008    | 4.51                       |                          |                          |                   | 0.14                      |                           |                           |                 |                   |                               |                        |
| Deadman Creek @ Hwy 59 | Irrigation | 8/26/2008   | 1.78                       |                          |                          | 11                |                           |                           |                           |                 |                   |                               |                        |
| Deadman Creek @ Hwy 59 | Sediment   | 8/28/2008   | 1.05                       |                          |                          |                   |                           |                           |                           |                 |                   |                               | 90                     |
| Deadman Creek @ Hwy 59 | Irrigation | 9/9/2008    | 3.37                       |                          |                          |                   | 0.069                     |                           |                           |                 |                   |                               |                        |
| Deadman Creek @ Hwy 59 | Irrigation | 9/30/2008   | 4.45                       |                          |                          | 13                |                           |                           |                           |                 |                   |                               |                        |
| Deadman Creek @ Hwy 59 | Sediment   | 10/2/2008   | 4.22                       |                          |                          |                   |                           |                           |                           |                 |                   |                               |                        |
| Deadman Creek @ Hwy 59 | Winter     | 1/18/2011   |                            |                          | 310                      |                   |                           |                           |                           |                 |                   |                               |                        |
| Deadman Creek @ Hwy 59 | Storm      | 2/17/2011   |                            | 8.58                     |                          |                   |                           |                           |                           |                 |                   |                               |                        |
| Deadman Creek @ Hwy 59 | Winter     | 3/15/2011   |                            |                          | 580                      |                   |                           |                           |                           |                 |                   |                               |                        |
| Deadman Creek @ Hwy 59 | Irrigation | 4/19/2011   |                            | 9.09                     | 2400                     |                   | 0.016                     |                           |                           |                 |                   |                               |                        |
| Deadman Creek @ Hwy 59 | Irrigation | 5/17/2011   |                            | 9.63                     |                          |                   |                           |                           |                           |                 |                   |                               |                        |
| Deadman Creek @ Hwy 59 | Irrigation | 6/21/2011   |                            |                          | 410                      |                   |                           |                           |                           |                 |                   |                               |                        |
| Deadman Creek @ Hwy 59 | Irrigation | 7/19/2011   |                            | 8.57                     | 460                      |                   |                           |                           |                           |                 |                   |                               |                        |
| Deadman Creek @ Hwy 59 | Irrigation | 9/13/2011   |                            |                          |                          |                   | 0.049                     |                           |                           |                 |                   |                               |                        |
| Constituent Priority   |            |             | E                          | E                        | E                        | E                 | A/B                       | NP                        | NP                        | NP              | NP                | D                             | NP                     |

NP – Not Prioritized; less than two exceedances within three consecutive monitoring years and currently no TMDL.

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### 2007-2011 Management Plan Monitoring Results

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All monitoring results for high priority management plan constituents in the Deadman Creek @ Hwy 59 subwatershed are listed in Table XIV-6. These constituents include chlorpyrifos and *S. capricornutum* toxicity.

The second exceedance of the chlorpyrifos WQTL occurred at the site during 2007 monitoring (the first chlorpyrifos exceedance occurred during 2006, but the chlorpyrifos and diazinon TMDL for the San Joaquin River was not approved) and additional MPM was scheduled for chlorpyrifos in 2008 (Table XIV-6). Chlorpyrifos was detected in the 2008 (January, August and September) Normal Monitoring samples and exceeded the WQTL in the additional MPM samples collected in 2008 (August and September). Chlorpyrifos MPM was scheduled again for 2009 (August and September) but the site was dry during both months. During 2011 Assessment Monitoring, chlorpyrifos exceeded the WQTL twice (April and September).

Toxicity to *S. capricornutum* first occurred in 2008 (January and April). Management Plan Monitoring was scheduled for *S. capricornutum* toxicity in April 2009 and January 2010, but the Deadman Creek @ Hwy 59 site was dry during both events. There was no toxicity to *S. capricornutum* during 2011 Assessment Monitoring.

Assessment Monitoring is scheduled to continue through 2012 for the Deadman Creek @ Hwy 59 site. In addition, the site becomes a high priority subwatershed in 2012 and will remain as such through 2014. Management Plan Monitoring will occur for chlorpyrifos and toxicity to *S. capricornutum* during the high priority years.

**Table XIV-6. Deadman Creek @ Hwy 59 site subwatershed monitoring results for high priority constituents.**

Exceedance values are in bold. Resampling (RS) due to toxicity not included in table.

| MONTH:                           |                                              | JAN     | FEB     | MAR     | APR          | MAY     | JUN     | JUL     | AUG         | SEP          | OCT      | NOV     | DEC     |
|----------------------------------|----------------------------------------------|---------|---------|---------|--------------|---------|---------|---------|-------------|--------------|----------|---------|---------|
| <b>2008 NM<br/>(@ Hwy 59)</b>    | Date                                         | 1/25/08 | 2/25/08 | NA      | 4/29/08      | 5/27/08 | 6/24/08 | 7/29/08 | 8/26/08     | 9/30/08      | NA       | NA      | NA      |
|                                  | Chlorpyrifos (µg/L)                          | 0.012   | <0.003  | NA      | <0.003       | <0.003  | <0.003  | <0.003  | 0.015       | 0.015        | NA       | NA      | NA      |
| <b>2008 MPM A<br/>(@ Hwy 59)</b> | Date                                         | NA      | NA      | NA      | NA           | NA      | NA      | NA      | 8/5/08      | 9/9/08       | NA       | NA      | NA      |
|                                  | Chlorpyrifos (µg/L)                          | NA      | NA      | NA      | NA           | NA      | NA      | NA      | <b>0.14</b> | <b>0.069</b> | NA       | NA      | NA      |
| <b>2009 MPM<br/>(@ Hwy 59)</b>   | Date                                         | NA      | NA      | NA      | 4/21/09      | NA      | NA      | NA      | 8/18/09     | 9/22/09      | NA       | NA      | NA      |
|                                  | Chlorpyrifos (µg/L)                          | NA      | NA      | NA      | NA           | NA      | NA      | NA      | Dry         | Dry          | NA       | NA      | NA      |
|                                  | <i>S. capricornutum</i> toxicity (% Control) | NA      | NA      | NA      | Dry          | NA      | NA      | NA      | NA          | NA           | NA       | NA      | NA      |
| <b>2010 MPM<br/>(@ Hwy 59)</b>   | Date                                         | 1/19/10 | NA      | NA      | NA           | NA      | NA      | NA      | NA          | NA           | NA       | NA      | NA      |
|                                  | <i>S. capricornutum</i> toxicity (% Control) | Dry     | NA      | NA      | NA           | NA      | NA      | NA      | NA          | NA           | NA       | NA      | NA      |
| <b>2011 NM<br/>(@ Hwy 59)</b>    | Date                                         | 1/18/11 | 2/17/11 | 3/15/11 | 4/19/11      | 5/17/11 | 6/21/11 | 7/19/11 | 8/16/11     | 9/13/11      | 10/11/11 | 11/8/11 | 12/6/11 |
|                                  | Chlorpyrifos (µg/L)                          | <0.003  | <0.003  | <0.003  | <b>0.016</b> | <0.003  | <0.003  | <0.003  | <0.003      | <b>0.049</b> | <0.003   | <0.003  | <0.003  |
|                                  | <i>S. capricornutum</i> toxicity (% Control) | 865     | 136     | 725     | 415          | 363     | 916     | 562     | 1259        | 585          | 801      | 2044    | 358     |

A – Additional MPM conducted in 2008 only.

MPM – Management Plan Monitoring (see Table 4 for MPM schedule)

NA – Not applicable. No monitoring occurred on this date for this constituent.

NM – Normal Monitoring

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## Load Calculations

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Loads have been calculated for all chlorpyrifos detections in the site subwatershed based on the following formula (Table XIV-7):

$$\text{Load} = \text{Discharge (cfs)} \times 28.317\text{L/ft}^3 \times \text{Concentration (mg/L} \times 1000 \text{ or } \mu\text{g/L)}.$$

The load values for constituents in this report represent instantaneous loads only. These values should not be used to extrapolate loading over any period of time (e.g. weekly, monthly, seasonal or annual). The primary purpose for reporting instantaneous loads is to provide a normalization of the concentrations by flow for various constituents at the time the samples were collected.

**Table XIV-7. Deadman Creek @ Hwy 59 site subwatershed instantaneous load calculations for chlorpyrifos.**  
Sorted by analyte and date.

| SITE NAME              | ANALYTE NAME | SAMPLE DATE | DISCHARGE CFS | CONCENTRATION $\mu\text{G/L}$ | LOADING RATE $\mu\text{G/SEC}$ |
|------------------------|--------------|-------------|---------------|-------------------------------|--------------------------------|
| Deadman Creek @ Hwy 59 | Chlorpyrifos | 09/12/06    | 3.06          | 0.059                         | 5.11                           |
| Deadman Creek @ Hwy 59 | Chlorpyrifos | 08/21/07    | 5.96          | 0.038                         | 6.41                           |
| Deadman Creek @ Hwy 59 | Chlorpyrifos | 08/05/08    | 0.08          | 0.14                          | 0.32                           |
| Deadman Creek @ Hwy 59 | Chlorpyrifos | 08/26/08    | 0.55          | 0.015                         | 0.23                           |
| Deadman Creek @ Hwy 59 | Chlorpyrifos | 09/09/08    | 3.02          | 0.069                         | 5.90                           |
| Deadman Creek @ Hwy 59 | Chlorpyrifos | 09/30/08    | 1.01          | 0.015                         | 0.43                           |
| Deadman Creek @ Hwy 59 | Chlorpyrifos | 04/19/11    | 0.86          | 0.016                         | 0.39                           |
| Deadman Creek @ Hwy 59 | Chlorpyrifos | 09/13/11    | 2.25          | 0.049                         | 3.12                           |

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## Source Identification and Outreach

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The Coalition evaluates past monitoring results and associated PUR data to develop a source identification and outreach strategy. The highest priority constituents in the Deadman Creek @ Hwy 59 subwatershed management plan are chlorpyrifos (A/B) and *S. capricornutum* toxicity (D). To better characterize water quality in the subwatershed, the Coalition conducted additional MPM for chlorpyrifos in 2008 and MPM in 2009 and 2010 for both constituents during the months of past exceedances. The Coalition reviews PUR data to determine the most frequent crop type and timing associated with chlorpyrifos applications. From these actions, the Coalition developed an outreach strategy, which is detailed in the following sections.

The Deadman Creek @ Hwy 59 subwatershed is a high priority subwatershed as of 2012 and will remain so through 2014. The Coalition will actively engage in grower outreach and education to address the Deadman Creek @ Hwy 59 management plan's highest priority constituents. The Coalition organized grower meetings and mailings to educate growers about management practices and their importance in achieving acceptable water quality. Individual grower meetings with targeted members are planned to inform growers about management practices as well as to assess current and expected future implementation of additional management practices.

### Priority A/B Constituents

Chlorpyrifos is the only A/B constituent for the Deadman Creek @ Hwy 59 subwatershed.

#### Chlorpyrifos

Chlorpyrifos exceeded the WQTL of 0.015 µg/L four times in Deadman Creek @ Hwy 59 in 2006 (September), 2007 (August) and 2008 (August and September, Table XIV-5). Chlorpyrifos was also detected at (but did not exceed the WQTL) during Normal Monitoring in 2008 (August and September). The site was dry during scheduled MPM for chlorpyrifos in 2009 (August and September), but was sampled during 2011 Assessment Monitoring and chlorpyrifos exceedances occurred in samples collected during April and September.

Across the ESJWQC region, chlorpyrifos use often peaks during July, August and September when hull split applications to almonds and codling moth applications to walnuts occur. In addition, chlorpyrifos is applied in the latter summer months to various row crops, in particular alfalfa. The consistent timing of exceedances suggest that chlorpyrifos in the waterways is the result of these applications. However, the relatively high concentrations detected in the waterways suggest that irrigation runoff to the creek is the primary mechanism of transport, as opposed to spray drift from chlorpyrifos applications to orchards.

To determine an outreach strategy, the Coalition reviewed PUR data for the number of monthly chlorpyrifos applications, pounds of active ingredient applied, and the acres treated within the subwatershed (Table XIV-8, Figure XIV-2). Applications of chlorpyrifos typically occur throughout the irrigation season in the subwatershed, with peak use in June, July, or August. The greatest amount of chlorpyrifos use occurred in 2006 (5,735 lbs AI) and has declined since. Applications amounts have declined and acreage has increased, indicating growers are now applying less chlorpyrifos per acre. Exceedances do not necessarily coincide with heavy use, indicating only a few applications may be the cause of water quality impairments. Applications in the subwatershed are largely to almonds (9,170 lbs AI), alfalfa (8,342 lbs AI), and grapes (3,431 lbs AI; Table XIV-9). Of note, growers use aerial as the method of chlorpyrifos application nearly three times as often as they apply from the ground.

**Table XIV-8. Deadman Creek @ Hwy 59 site subwatershed chlorpyrifos applications, lbs AI applied, and acres treated by month (2006-2011).**

PUR data available through October 2011 for Merced County. If month is not included in table, no applications were made.

| MONTH/YEAR      | NUMBER OF CHLORPYRIFOS APPLICATIONS | POUNDS OF AI APPLIED | ACRES TREATED |
|-----------------|-------------------------------------|----------------------|---------------|
| January, 2006   | 5                                   | 91.7                 | 45.0          |
| March, 2006     | 3                                   | 122.9                | 349.0         |
| April, 2006     | 1                                   | 4.0                  | 29.0          |
| May, 2006       | 13                                  | 1386.1               | 741.0         |
| June, 2006      | 1                                   | 137.6                | 69.0          |
| July, 2006      | 12                                  | 2202.8               | 1097.0        |
| August, 2006    | 8                                   | 473.0                | 393.0         |
| September, 2006 | 18                                  | 593.9                | 1153.2        |

| MONTH/YEAR               | NUMBER OF CHLORPYRIFOS APPLICATIONS | POUNDS OF AI APPLIED | ACRES TREATED  |
|--------------------------|-------------------------------------|----------------------|----------------|
| October, 2006            | 1                                   | 723.4                | 362.8          |
| January, 2007            | 2                                   | 29.9                 | 15.0           |
| March, 2007              | 18                                  | 422.0                | 1219.7         |
| July, 2007               | 10                                  | 1812.1               | 1200.5         |
| August, 2007             | 22                                  | 883.2                | 1948.9         |
| October, 2007            | 1                                   | 780.0                | 391.2          |
| March, 2008              | 7                                   | 78.2                 | 240.0          |
| May, 2008                | 11                                  | 619.0                | 633.0          |
| July, 2008               | 27                                  | 624.1                | 2365.3         |
| August, 2008             | 34                                  | 808.0                | 2444.8         |
| September, 2008          | 3                                   | 50.5                 | 252.0          |
| March, 2009              | 6                                   | 997.7                | 928.0          |
| April, 2009              | 11                                  | 213.0                | 963.0          |
| June, 2009               | 8                                   | 2417.3               | 1270.0         |
| July, 2009               | 2                                   | 34.1                 | 68.0           |
| August, 2009             | 1                                   | 25.1                 | 53.0           |
| September, 2009          | 10                                  | 319.9                | 768.9          |
| March, 2010              | 31                                  | 432.3                | 2150.9         |
| June, 2010               | 15                                  | 1168.0               | 1599.0         |
| July, 2010               | 18                                  | 774.7                | 1295.9         |
| August, 2010             | 30                                  | 946.1                | 1891.5         |
| September, 2010          | 14                                  | 514.1                | 1149.3         |
| October, 2010            | 1                                   | 1027.3               | 547.0          |
| March, 2011              | 35                                  | 521.5                | 2585.5         |
| April, 2011              | 3                                   | 60.8                 | 281.0          |
| May, 2011                | 2                                   | 437.2                | 215.0          |
| July, 2011               | 16                                  | 402.9                | 762.2          |
| August, 2011             | 29                                  | 588.9                | 1617.1         |
| September, 2011          | 1                                   | 34.0                 | 68.0           |
| <b>Summaries by Year</b> |                                     |                      |                |
| 2006 Total               | 62                                  | 5735.4               | 4239.0         |
| 2007 Total               | 53                                  | 3927.3               | 4775.3         |
| 2008 Total               | 82                                  | 2179.7               | 5935.1         |
| 2009 Total               | 38                                  | 4007.2               | 4050.9         |
| 2010 Total               | 109                                 | 4862.4               | 8633.6         |
| 2011 Total               | 86                                  | 2045.4               | 5528.8         |
| <b>Total</b>             | <b>431</b>                          | <b>22757.4</b>       | <b>33162.7</b> |



**Figure XIV-2. Deadman Creek @ Hwy 59 site subwatershed lbs chlorpyrifos applied by month (2006-2011).**

Asterisk (\*) denotes months with exceedances. PUR data available through October 2011 for Merced County.

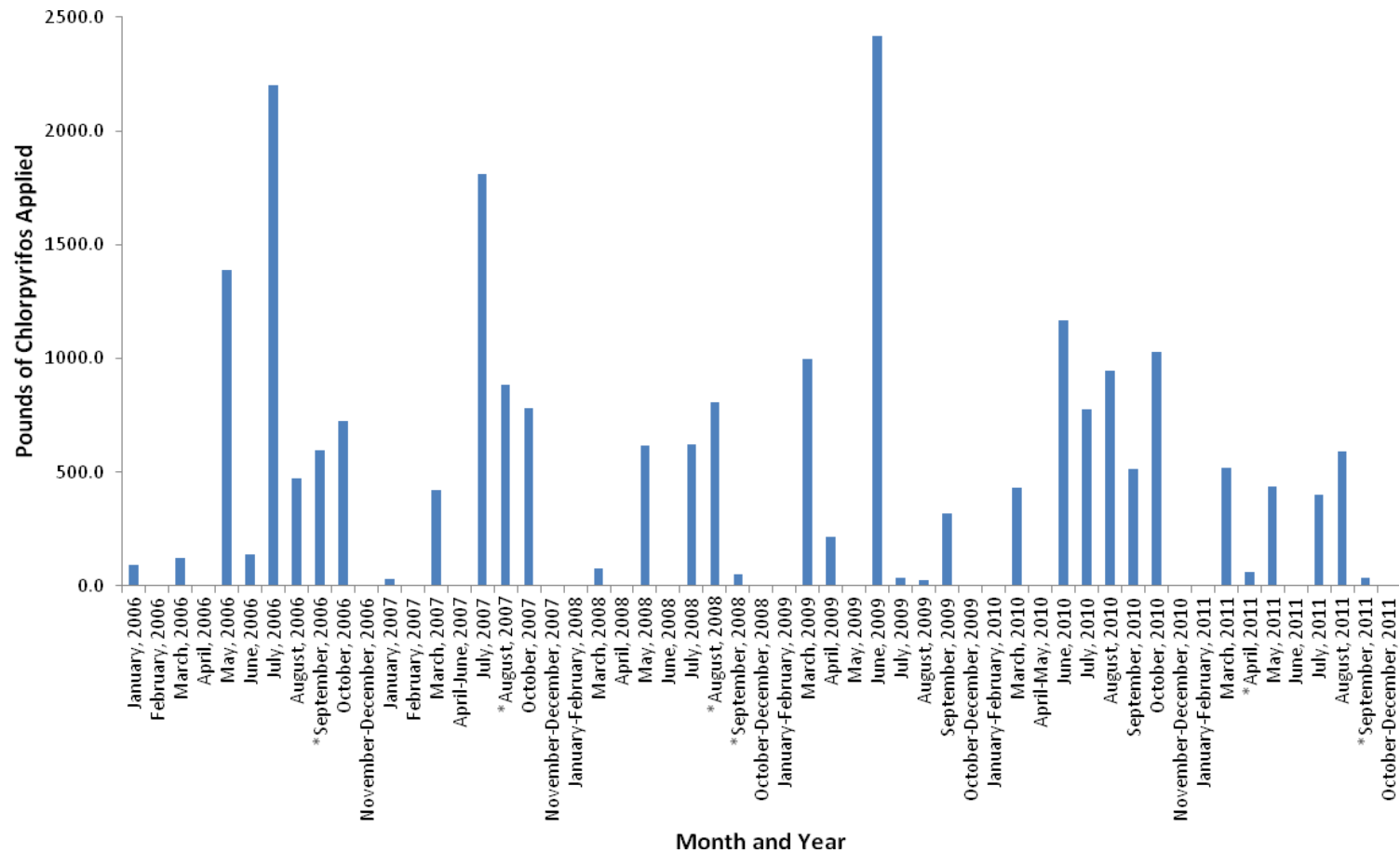


**Table XIV-9. Deadman Creek @ Hwy 59 site subwatershed chlorpyrifos PUR data (2006-2011).**

PUR data available through October 2011 for Merced County.

| CHEMICAL NAME                                 | COMMODITY                               | PRODUCT NAME                     | LBS AI APPLIED |
|-----------------------------------------------|-----------------------------------------|----------------------------------|----------------|
| CHLORPYRIFOS                                  | ALFALFA (FORAGE - FODDER) (ALFALFA HAY) | CHLORPYRIFOS 4E AG               | 319.7          |
|                                               |                                         | GOVERN 4E INSECTICIDE            | 1785.6         |
|                                               |                                         | LOCK-ON INSECTICIDE              | 3450.5         |
|                                               |                                         | LORSBAN 4E-HF                    | 201.1          |
|                                               |                                         | LORSBAN-4E                       | 424.5          |
|                                               |                                         | NUFOS 4E                         | 293.6          |
|                                               |                                         | WARHAWK                          | 54.8           |
|                                               |                                         | WHIRLWIND                        | 1812.5         |
|                                               | ALMOND                                  | ERASER                           | 97.9           |
|                                               |                                         | GOVERN 4E INSECTICIDE            | 2973.3         |
|                                               |                                         | LORSBAN 4E-HF                    | 1865.4         |
|                                               |                                         | LORSBAN ADVANCED                 | 10.9           |
|                                               |                                         | LORSBAN-4E                       | 479.7          |
|                                               |                                         | NUFOS 4E                         | 3742.7         |
|                                               | CORN (FORAGE - FODDER)                  | LORSBAN 15G GRANULAR INSECTICIDE | 565.5          |
|                                               |                                         | NUFOS 4E                         | 181.0          |
|                                               |                                         | SAURUS                           | 202.5          |
|                                               |                                         | WHIRLWIND                        | 107.7          |
|                                               | COTTON, GENERAL                         | LORSBAN 4E-HF                    | 89.6           |
|                                               |                                         | WHIRLWIND                        | 12.2           |
|                                               | FIG                                     | WHIRLWIND                        | 160.0          |
|                                               | GRAPES, WINE                            | LORSBAN 4E-HF                    | 1503.4         |
|                                               |                                         | LORSBAN ADVANCED                 | 1027.3         |
|                                               |                                         | LORSBAN-4E                       | 900.4          |
|                                               | PEACH                                   | LORSBAN 4E-HF                    | 121.6          |
|                                               | WALNUT (ENGLISH WALNUT, PERSIAN WALNUT) | LORSBAN-4E                       | 187.1          |
|                                               |                                         | QUALI-PRO CHLORPYRIFOS 4E        | 155.8          |
|                                               | WHEAT                                   | LORSBAN ADVANCED                 | 31.0           |
| ALFALFA - Total Pounds Chlorpyrifos Applied   |                                         |                                  | 8342.2         |
| ALMOND - Total Pounds Chlorpyrifos Applied    |                                         |                                  | 9170.0         |
| CORN - Total Pounds Chlorpyrifos Applied      |                                         |                                  | 1056.7         |
| COTTON - Total Pounds Chlorpyrifos Applied    |                                         |                                  | 101.8          |
| FIG - Total Pounds Chlorpyrifos Applied       |                                         |                                  | 160.0          |
| GRAPES - Total Pounds Chlorpyrifos Applied    |                                         |                                  | 3431.1         |
| PEACH - Total Pounds Chlorpyrifos Applied     |                                         |                                  | 121.6          |
| WALNUT - Total Pounds Chlorpyrifos Applied    |                                         |                                  | 342.9          |
| WHEAT - Total Pounds Chlorpyrifos Applied     |                                         |                                  | 31.0           |
| Total Pounds Chlorpyrifos Applied (2006-2011) |                                         |                                  | 22757.3        |

Monitoring results and PUR data indicate that management of chlorpyrifos in this subwatershed should focus on chlorpyrifos applications during the late summer months. Grower's irrigation tailwater management should be closely scrutinized to ensure runoff cannot transport pesticides to the creek, especially for growers with the potential to drain to the creek. Operators of orchards will be advised of methods to improve irrigation and to better manage irrigation tailwater and storm water runoff. Coalition representatives will also discuss and encourage management practices to reduce spray drift.

Farmers of row crops will be directed to evaluate their irrigation and storm water management as well as ensure appropriate practices are used to apply pesticides. The Coalition recognizes that irrigation and storm water management are often best improved by installation of structural management practices, such as a tailwater return system or drainage basin, which can be expensive. The Coalition plans to provide growers with information about (and include as a part of their discussions) available funding opportunities for management practice implementation.

Since 2007, general Coalition outreach included grower meetings and the mailing/distribution of information. A complete list of coalition outreach during 2011 is provided in the Actions Taken to Address Water Quality Exceedances section of the 2012 AMR (Table 46, page 142).

The Coalition began scheduling individual meetings with targeted growers in the fourth priority subwatersheds. Targeted growers farm parcels with the potential to drain to Deadman Creek and they applied chlorpyrifos in the past. Although meetings are focusing mainly on chlorpyrifos exceedances, all water quality results are reviewed and discussed including *S. capricornutum* toxicity, and exceedances of DO, *E. coli*, and arsenic. The Coalition contacted eight members accounting for 3,414 acres of targeted direct drainage.

Grower surveys completed at the meetings documenting members' current practices and indicating which recommended practices growers anticipate implementing in the upcoming years will be compiled and assessed by the Coalition. The Coalition is hopeful growers will be able to implement recommended practices as soon as the irrigation season of 2012, but recognizes that some practices may not be able to be implemented until later. Follow up meetings with targeted growers will occur to determine what additional management practices were implemented.

In 2012, Assessment Monitoring is scheduled at Deadman Creek @ Hwy 59 when all priority constituents will be monitored on a monthly basis. Starting in 2013, MPM for chlorpyrifos will occur during months of past exceedances. The Coalition plans to conduct MPM through 2014 to evaluate improvements in water quality as recommended management practice implementation occurs.

### *Priority D Constituents*

The only priority D constituent listed in the Deadman Creek @ Hwy 59 management plan is water column toxicity to *S. capricornutum*.

#### ***S. capricornutum* toxicity**

Toxicity to *S. capricornutum* occurred in this site subwatershed twice, during 2008 (January and April), the April toxicity was persistent in the May resample. During the January 2008 storm event, relatively high concentrations of diuron (6.2 µg/L) and simazine (25 µg/L) were detected well above their respective WQTLs (Table XIV-5). The TIE indicated nonpolar organics were the cause of toxicity. A TIE was unable to be conducted on the April sample and none of the herbicides analyzed resulted in concentrations of concern. Improved management of irrigation return flows and storm water runoff

should reduce the offsite movement of pesticides which should in turn eliminate *S. capricornutum* toxicity. The Coalition will continue with outreach as explained above to address the toxicity.

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### *Priority E Constituents*

The priority E constituents listed under the Deadman Creek @ Hwy 59 management plan are arsenic, DO and *E. coli*.

Although these constituents will remain low priority, the Coalition will continue to collect monitoring data as a part of Assessment Monitoring and/or MPM. Dissolved oxygen is a field parameter that will be collected during every monitoring event, Assessment and MPM. Arsenic and *E. coli* will continue to be monitored through 2012 as a part of Assessment Monitoring. The priority E constituents are also discussed during individual contacts and at annual grower meetings. In addition, the Coalition plans to participate in a focus group along with other Coalitions and Regional Board staff to develop a joint Work Plan to address *E. coli* exceedances by determining the potential agricultural sources of *E. coli* and identifying management practices to prevent discharges to surface waters.

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### *Evaluation*

Deadman Creek @ Hwy 59 is one of the four fourth priority site subwatersheds within the ESJWQC and is in its first year of focused outreach (2012-2014).

The Coalition will focus its resources on identifying sources of agricultural discharge within this subwatershed that could result in water quality impairments, extending outreach to Coalition members, and setting evaluation goals based on the effectiveness of management practices (by considering changes in water quality over time).

The Coalition's strategy for the Deadman Creek @ Hwy 59 subwatershed is to focus on providing information on a subwatershed level to growers to review their operation and determine if irrigation return flows and storm water runoff are managed properly. The Coalition targeted growers with crops located adjacent to the waterway and whose agricultural practices may result in the discharge or drift of pesticides into the waterway. Outreach includes grower notification, management practice outreach and education, tracking of management practice implementation, and providing information on special studies of management practice efficacy.

Targeted growers will complete their individual surveys documenting current management practices and planned future practices. The Coalition will then assess these results and plan the final stages of outreach including following up with growers to identify newly implemented practices and future monitoring to evaluate water quality improvement.

In 2012, Assessment Monitoring is scheduled for Deadman Creek @ Hwy 59 and all high priority constituents will be sampled monthly.

## XV. HILMAR DRAIN @ CENTRAL AVE

### Management Plan Constituents

#### Priority A/B

- Chlorpyrifos

#### Priority C

- Copper
- Diuron
- Nitrate / Nitrate + Nitrite

#### Priority D

- *Hyalella azteca* sediment toxicity
- *Selenastrum capricornutum* water column toxicity

#### Priority E

- Ammonia
- DO
- *E. coli*
- pH
- SC
- TDS

### Description of Hilmar Drain @ Central Ave Site Subwatershed

Hilmar Drain @ Central Ave (1,686 irrigated acres) –This site subwatershed is located toward the western edge of the Coalition region near the San Joaquin River (Table XV-1). Hilmar Drain @ Mitchell Rd and Reclamation Drain @ Williams Ave are upstream site locations within the subwatershed. Hilmar Drain originates at Williams Ave and Washington Road and eventually drains into the San Joaquin River. This is a small site subwatershed containing primarily field crops and a large number of dairies with irrigated pasture (Figure XV-1).

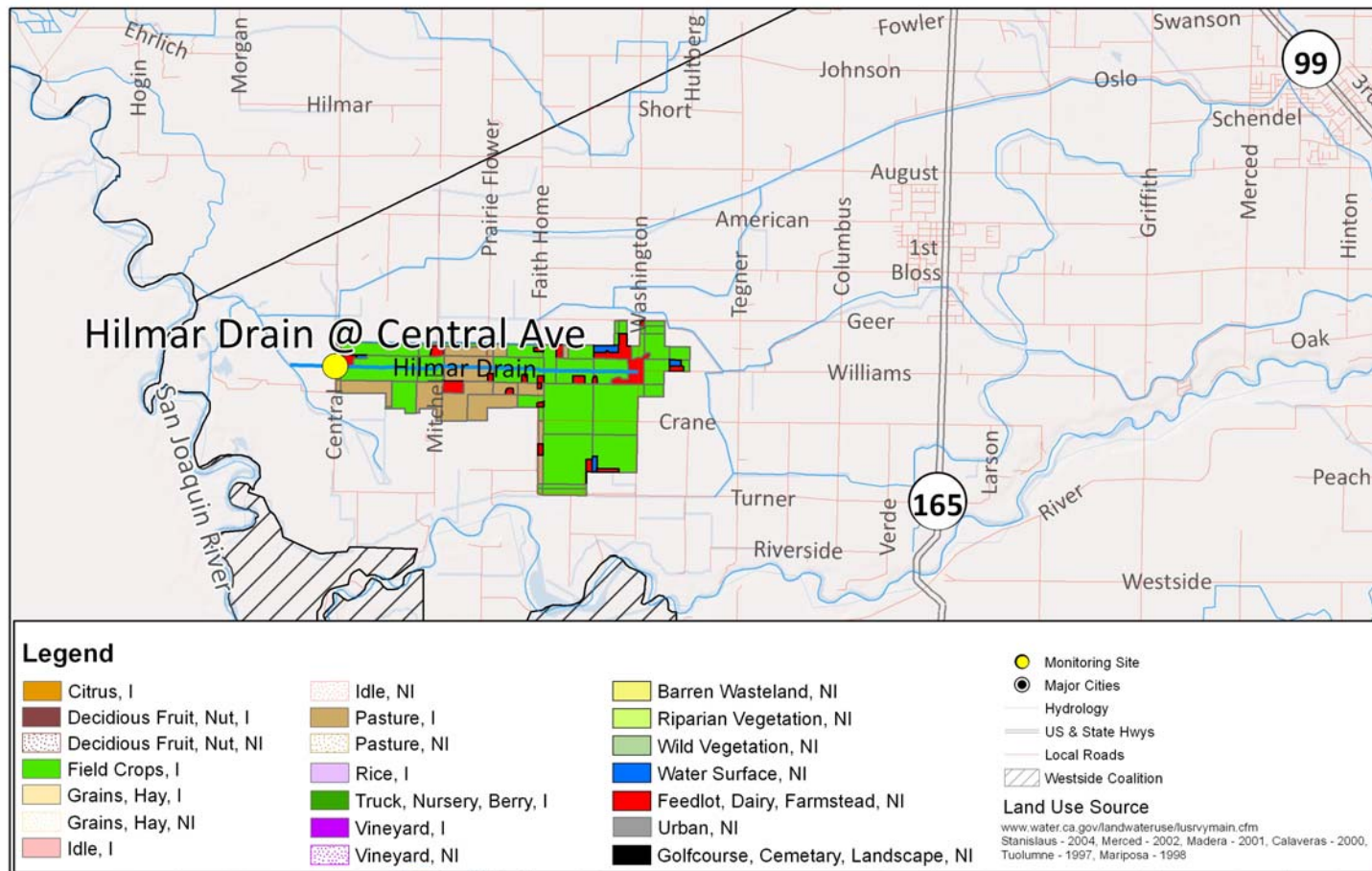
**Table XV-1. Hilmar Drain site subwatershed sampling locations coordinates.**

| SITE NAME                                     | STATION CODE | TARGET LATITUDE | TARGET LONGITUDE |
|-----------------------------------------------|--------------|-----------------|------------------|
| Hilmar Drain @ Central Ave*                   | 535XHDACA    | 37.3906         | -120.9582        |
| Hilmar Drain @ Mitchell Rd <sup>U</sup>       | 535XHDAMR    | 37.3907         | -120.9408        |
| Reclamation Drain @ Williams Ave <sup>U</sup> | 535XRDAWA    | 37.3907         | -120.9409        |

<sup>U</sup>Upstream sites

\*Original ESJWQC sampling site

Figure XV-1. Hilmar Drain @ Central Ave site subwatershed land use map.



Source of Layers:  
 Hydrology - NHD hydrodata, 1:24,000-scale, <http://nhd.usgs.gov/>  
 Roads, highways, railroads, county boundary, city outlines - California Spatial Information Library  
 TRS - Teale Public Land Survey System, Pub. date. 20090101, California Spatial Information Library.  
 Parcel Layer - Stanislaus 2010, Merced 2011, Madera 2011  
 Basemap, Shaded Relief - ESR  
 GSC North America 1983

Date Prepared: 08/10/11

ESJWQC



### Hilmar Drain @ Central Ave

ESJWQC MPUR, April 1, 2012

Appendix I

## Subwatershed Monitoring History

Monitoring at Hilmar Drain @ Central Ave began in the storm season of 2005 and continued through 2008 (Table XV-2). The site was also monitored in 2009, but for MPM only; all monitoring constituents per each year are listed in Table XV-3.

Management Plan Monitoring was initiated during the 2008 irrigation season. Additional MPM occurred for diuron (April and June) at Hilmar Drain @ Central Ave and the two upstream locations (Hilmar Drain @ Mitchell Rd and Reclamation Drain @ Williams Ave), were monitored for ammonia, nitrate, copper and *S. capricornutum* toxicity in July of 2008 (Table XV-4). Water column toxicity to *S. capricornutum* was monitored as part of MPM at Hilmar Drain @ Central Ave in 2009 (April and September).

Hilmar Drain @ Central Ave is an Assessment Monitoring location within the Prairie Flower Drain Zone (Zone 2) and Assessment Monitoring is scheduled for 2020 and 2021. Sampling at Hilmar Drain @ Central Ave did not occur during 2010 or 2011.

Hilmar Drain is not considered impaired on California's 2008-2010 303d List of Impaired Waterbodies; however, its downstream waterbody (San Joaquin River from Merced to Tuolumne) is listed for boron, chlorpyrifos, DDE, DDT, electrical conductance, group A pesticides, BHC, mercury, water temperature and unknown water column toxicity.

**Table XV-2. Hilmar Drain @ Central Ave site subwatershed sampling events per season and year (including MPM).**

| YEAR | SEASON     | EVENTS SAMPLED | EVENTS NOT SAMPLED <sup>1</sup> | TOTAL |
|------|------------|----------------|---------------------------------|-------|
| 2005 | Storm      | 2              | 0                               | 2     |
|      | Irrigation | 5              | 0                               | 5     |
| 2006 | Storm      | 2              | 0                               | 2     |
|      | Irrigation | 5              | 0                               | 5     |
| 2007 | Storm      | 2              | 0                               | 2     |
|      | Irrigation | 6              | 0                               | 6     |
| 2008 | Storm      | 2              | 0                               | 2     |
|      | Irrigation | 8              | 0                               | 8     |
|      | Fall       | NA             | NA                              | NA    |
| 2009 | Winter     | NA             | NA                              | NA    |
|      | Storm      | NA             | NA                              | NA    |
|      | Irrigation | 2              | 0                               | 2     |
|      | Fall       | NA             | NA                              | NA    |
| 2010 | Winter     | NA             | NA                              | NA    |
|      | Storm      | NA             | NA                              | NA    |
|      | Irrigation | NA             | NA                              | NA    |
|      | Fall       | NA             | NA                              | NA    |
| 2011 | Winter     | NA             | NA                              | NA    |
|      | Storm      | NA             | NA                              | NA    |
|      | Irrigation | NA             | NA                              | NA    |
|      | Fall       | NA             | NA                              | NA    |

<sup>1</sup>If an event was not sampled during scheduled monitoring, the site was dry.

NA – Not applicable. This site was not scheduled for sampling during this season/year.

**Table XV-3. Hilmar Drain @ Central Ave site subwatershed analyses per sampling season and year.**

Only environmental samples with a sample replicate and lab replicate of one are listed.

| METHOD                        | ANALYTE               | 2005  |            | 2006  |            | 2007  |            | 2008  |            |        | 2009          | 2010          | 2011          |
|-------------------------------|-----------------------|-------|------------|-------|------------|-------|------------|-------|------------|--------|---------------|---------------|---------------|
|                               |                       | STORM | IRRIGATION | STORM | IRRIGATION | STORM | IRRIGATION | STORM | IRRIGATION | FALL * | WINTER-FALL * | WINTER-FALL * | WINTER-FALL * |
| Field and Physical Parameters |                       |       |            |       |            |       |            |       |            |        |               |               |               |
| NA                            | Dissolved Oxygen      | 2     | 6          | 4     | 6          | 3     | 8          | 4     | 14         |        |               |               |               |
| NA                            | Specific Conductivity | 2     | 6          | 4     | 6          | 3     | 8          | 4     | 14         |        |               |               |               |
| NA                            | pH                    | 2     | 6          | 4     | 6          | 3     | 8          | 4     | 14         |        |               |               |               |
| EPA 110.2                     | Color                 | 2     | 5          | 2     | 5          | 2     | 6          | 2     | 6          |        |               |               |               |
| EPA 160.1                     | Dissolved Solids      | 2     | 5          | 2     | 5          | 2     | 6          | 2     | 6          |        |               |               |               |
| EPA 160.2                     | Suspended Solids      |       |            |       |            |       |            |       |            |        |               |               |               |
| EPA 180.1                     | Turbidity             | 2     | 5          | 2     | 5          | 2     | 6          | 2     | 6          |        |               |               |               |
| EPA 415.1                     | Total Organic Carbon  | 2     | 5          | 2     | 5          | 2     | 6          | 2     | 6          |        |               |               |               |
| SM 9223                       | <i>E. coli</i>        | 2     | 5          | 2     | 5          | 2     | 6          | 2     | 6          |        |               |               |               |
| EPA 405.1                     | BOD                   |       |            |       | 1          | 2     | 2          |       |            |        |               |               |               |
| Carbamates                    |                       |       |            |       |            |       |            |       |            |        |               |               |               |
| EPA 8321A                     | Aldicarb              |       |            |       | 5          | 2     | 6          | 2     | 6          |        |               |               |               |
| EPA 8321A                     | Carbaryl              |       |            |       | 5          | 2     | 6          | 2     | 6          |        |               |               |               |
| EPA 8321A                     | Carbofuran            |       |            |       | 5          | 2     | 6          | 2     | 6          |        |               |               |               |
| EPA 8321A                     | Diuron                |       |            |       | 5          | 2     | 6          | 2     | 8          |        |               |               |               |
| EPA 8321A                     | Linuron               |       |            |       | 5          | 2     | 6          | 2     | 6          |        |               |               |               |
| EPA 8321A                     | Methiocarb            |       |            |       | 5          | 2     | 6          | 2     | 6          |        |               |               |               |
| EPA 8321A                     | Methomyl              |       |            |       | 5          | 2     | 6          | 2     | 6          |        |               |               |               |
| EPA 8321A                     | Oxamyl                |       |            |       | 5          | 2     | 6          | 2     | 6          |        |               |               |               |
| Organochlorines               |                       |       |            |       |            |       |            |       |            |        |               |               |               |
| EPA 8081A                     | DDD(p,p')             |       |            |       | 5          | 2     | 6          | 2     | 6          |        |               |               |               |
| EPA 8081A                     | DDE(p,p')             |       |            |       | 5          | 2     | 6          | 2     | 6          |        |               |               |               |
| EPA 8081A                     | DDT(p,p')             |       |            |       | 5          | 2     | 6          | 2     | 6          |        |               |               |               |
| EPA 8081A                     | Dicofol               |       |            |       | 5          | 2     | 6          | 2     | 6          |        |               |               |               |
| EPA 8081A                     | Dieldrin              |       |            |       | 5          | 2     | 6          | 2     | 6          |        |               |               |               |
| EPA 8081A                     | Endrin                |       |            |       | 5          | 2     | 6          | 2     | 6          |        |               |               |               |
| EPA 8081A                     | Methoxychlor          |       |            |       | 5          | 2     | 6          | 2     | 6          |        |               |               |               |
| Organophosphates              |                       |       |            |       |            |       |            |       |            |        |               |               |               |
| EPA 8141A                     | Azinphos methyl       |       |            |       | 5          | 2     | 6          | 2     | 6          |        |               |               |               |
| EPA 8141A                     | Chlorpyrifos          | 2     | 5          | 2     | 5          | 2     | 6          | 2     | 6          |        |               |               |               |
| EPA 8141A                     | Demeton-s             |       |            |       |            |       |            |       |            |        |               |               |               |
| EPA 8141A                     | Diazinon              | 2     | 5          | 2     | 5          | 2     | 6          | 2     | 6          |        |               |               |               |
| EPA 8141A                     | Dichlorvos            |       |            |       |            |       |            |       |            |        |               |               |               |
| EPA 8141A                     | Dimethoate            |       |            |       | 5          | 2     | 6          | 2     | 6          |        |               |               |               |
| EPA 8141A                     | Disulfoton            |       |            |       | 5          | 2     | 6          | 2     | 6          |        |               |               |               |
| EPA 8141A                     | Malathion             |       |            |       | 5          | 2     | 6          | 2     | 6          |        |               |               |               |
| EPA 8321A                     | Methamidophos         |       |            |       | 5          | 2     | 6          | 2     | 6          |        |               |               |               |
| EPA 8141A                     | Methidathion          |       |            |       | 5          | 2     | 6          | 2     | 6          |        |               |               |               |
| EPA 8141A                     | Molinate              |       |            |       | 5          | 2     | 6          | 2     | 6          |        |               |               |               |
| EPA 8141A                     | Parathion, Methyl     |       |            |       | 5          | 2     | 6          | 2     | 6          |        |               |               |               |
| EPA 8141A                     | Phorate               |       |            |       | 5          | 2     | 6          | 2     | 6          |        |               |               |               |



| METHOD                | ANALYTE                           | 2005  |            | 2006  |            | 2007  |            | 2008  |            |       | 2009         | 2010         | 2011         |
|-----------------------|-----------------------------------|-------|------------|-------|------------|-------|------------|-------|------------|-------|--------------|--------------|--------------|
|                       |                                   | STORM | IRRIGATION | STORM | IRRIGATION | STORM | IRRIGATION | STORM | IRRIGATION | FALL* | WINTER-FALL* | WINTER-FALL* | WINTER-FALL* |
| EPA 8141A             | Phosmet                           |       |            |       | 5          | 2     | 6          | 2     | 6          |       |              |              |              |
| EPA 8141A             | Thiobencarb                       |       |            |       | 5          | 2     | 6          | 2     | 6          |       |              |              |              |
| <b>Pyrethroids</b>    |                                   |       |            |       |            |       |            |       |            |       |              |              |              |
| EPA 8081A             | Bifenthrin                        |       | 1          | 2     | 5          | 2     | 6          | 2     | 6          |       |              |              |              |
| EPA 8081A             | Cyfluthrin, total                 |       | 1          | 2     | 5          | 2     | 6          | 2     | 6          |       |              |              |              |
| EPA 8081A             | Cyhalothrin, lambda, total        | 2     | 5          | 2     | 5          | 2     | 6          | 2     | 6          |       |              |              |              |
| EPA 8081A             | Cypermethrin, total               | 2     | 5          | 2     | 5          | 2     | 6          | 2     | 6          |       |              |              |              |
| EPA 8081A             | Esfenvalerate/ Fenvalerate, total | 2     | 5          | 2     | 5          | 2     | 6          | 2     | 6          |       |              |              |              |
| EPA 8081A             | Permethrin, total                 | 2     | 5          | 2     | 5          | 2     | 6          | 2     | 6          |       |              |              |              |
| <b>Triazines</b>      |                                   |       |            |       |            |       |            |       |            |       |              |              |              |
| EPA 547M              | Glyphosate                        |       |            |       | 5          | 2     | 6          | 2     | 6          |       |              |              |              |
| EPA 549.2M            | Paraquat dichloride               |       |            |       | 5          | 2     | 6          | 2     | 6          |       |              |              |              |
| EPA 619               | Atrazine                          |       |            |       | 5          | 2     | 6          | 2     | 6          |       |              |              |              |
| EPA 619               | Cyanazine                         |       |            |       | 5          | 2     | 6          | 2     | 6          |       |              |              |              |
| EPA 619               | Simazine                          |       |            |       | 5          | 2     | 6          | 2     | 6          |       |              |              |              |
| <b>Metals (Total)</b> |                                   |       |            |       |            |       |            |       |            |       |              |              |              |
| EPA 200.8             | Arsenic                           |       |            |       | 5          | 2     | 6          | 2     | 6          |       |              |              |              |
| EPA 200.8             | Boron                             |       |            |       | 5          | 2     | 6          | 2     | 6          |       |              |              |              |
| EPA 200.8             | Cadmium                           |       |            |       | 5          | 2     | 6          | 2     | 7          |       |              |              |              |
| EPA 200.8             | Copper                            |       |            |       | 5          | 2     | 6          | 2     | 6          |       |              |              |              |
| EPA 200.8             | Lead                              |       |            |       | 5          | 2     | 6          | 2     | 6          |       |              |              |              |
| EPA 200.8             | Molybdenum                        |       |            |       |            |       |            |       |            |       |              |              |              |
| EPA 200.8             | Nickel                            |       |            |       | 5          | 2     | 6          | 2     | 6          |       |              |              |              |
| EPA 200.8             | Selenium                          |       |            |       | 5          | 2     | 2          | 2     | 6          |       |              |              |              |
| EPA 200.8             | Zinc                              |       |            |       | 5          | 2     | 6          | 2     | 6          |       |              |              |              |
| <b>Nutrients</b>      |                                   |       |            |       |            |       |            |       |            |       |              |              |              |
| SM 2340 C             | Hardness as CaCO3                 |       |            |       | 5          | 2     | 6          | 2     | 7          |       |              |              |              |
| EPA 300.0             | Nitrate as N                      |       |            |       | 5          | 2     | 6          | 2     | 7          |       |              |              |              |
| EPA 350.2             | Ammonia as N                      |       |            |       | 5          | 2     | 6          | 2     | 7          |       |              |              |              |
| EPA 351.3             | Nitrogen, Total Kjeldahl          |       |            |       | 5          | 2     | 6          | 2     | 6          |       |              |              |              |
| EPA 354.1             | Nitrite as N                      |       |            |       | 5          | 2     | 6          | 2     | 6          |       |              |              |              |
| EPA 353.2             | Nitrate + Nitrite as N            |       |            |       |            |       |            |       |            |       |              |              |              |
| EPA 365.2             | OrthoPhosphate as P               |       |            |       | 5          | 2     | 6          | 2     | 6          |       |              |              |              |
| EPA 365.2             | Phosphate as P                    |       |            |       | 5          | 2     | 6          | 2     | 6          |       |              |              |              |
| <b>Toxicity</b>       |                                   |       |            |       |            |       |            |       |            |       |              |              |              |
| EPA 821/R-02-012      | <i>Ceriodaphnia dubia</i>         | 2     | 6          | 3     | 5          | 2     | 6          | 2     | 6          |       |              |              |              |
| EPA 821/R-02-012      | <i>Pimephales promelas</i>        | 2     | 5          | 2     | 5          | 2     | 6          | 2     | 6          |       |              |              |              |
| EPA 821/R-02-013      | <i>Selenastrum capricornutum</i>  | 2     | 5          | 2     | 6          | 2     | 7          | 2     | 11         |       |              |              |              |
| EPA 600/R-99-064      | <i>Hyalella azteca</i>            |       | 5          | 1     | 1          | 1     | 1          |       | 2          |       |              |              |              |

\*Site not sampled during the 2008 fall season, and 2009, 2010, and 2011 sampling years.

**Table XV-4. Hilmar Drain site subwatershed Management Plan Monitoring schedule (2008-2009).**

Upstream locations included.

| SITE NAME                        | SAMPLE DATE | MONITORING TYPE | DIURON | AMMONIA | NITRATE | COPPER | <i>S. CAPRICORNUTUM</i> |
|----------------------------------|-------------|-----------------|--------|---------|---------|--------|-------------------------|
| Hilmar Drain @ Central Ave       | 29-Apr-08   | A               | X      |         |         |        |                         |
| Hilmar Drain @ Central Ave       | 3-Jun-08    | A               | X      |         |         |        |                         |
| Hilmar Drain @ Mitchell Rd       | 22-Jul-08   | U               |        | X       | X       | X      | X                       |
| Reclamation Drain @ Williams Ave | 22-Jul-08   | U               |        | X       | X       | X      | X                       |
| Hilmar Drain @ Central Ave       | 21-Apr-09   | MPM             |        |         |         |        | X                       |
| Hilmar Drain @ Central Ave       | 22-Sep-09   | MPM             |        |         |         |        | X                       |

A – Additional sampling

U – Upstream sampling

X – Constituent sampled for Management Plan Monitoring (MPM)

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### Exceedance History

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Samples collected from the Hilmar Drain subwatershed from 2005 through 2011 exceeded the WQTLs for field parameters, *E. coli*, pesticides, and metals (Table XV-5). Water column and sediment toxicity also occurred. Constituents that exceeded their respective WQTLs in this subwatershed (including upstream sites) are DO (8), pH (3), SC (40), TDS (26), *E. coli* (20), ammonia (2), nitrate (13), chlorpyrifos (1), diuron (3), DDD (1), DDE (1), and copper (2). *C. dubia* toxicity (1), *S. capricornutum* toxicity (9), which resulted in three instances of persistent toxicity in resamples, and *H. azteca* sediment toxicity (3), which resulted in one instance of persistent toxicity in a resample, have also occurred (Table XV-5).

Exceedances are based on WQTLs listed in the introduction to the ESJWQC Management Plan. The highest priority constituents in the Hilmar Drain @ Central Ave subwatershed are chlorpyrifos (A/B), copper (C), diuron (C), nitrate (C), *S. capricornutum* toxicity (D), and *H. azteca* (D).

**Table XV-5. Hilmar Drain site subwatershed exceedances (2005-2009).**

The WQTL used to evaluate the data are listed in the header after the analyte. Upstream site is italicized.

| SITE NAME                  | SEASON     | SAMPLE DATE | OXYGEN, DISSOLVED, <7 MG/L | PH, <6.5 AND > 8.5 UNITS | SPECIFIC CONDUCTIVITY, >700 µS/CM | TOTAL DISSOLVED SOLIDS, >450 MG/L | AMMONIA <sup>1</sup> , >1.5 MG/L | NITRATE AS N, >10 MG/L | E. COLI, >235 MPN/100 ML | COPPER, TOTAL <sup>2</sup> , > 1,300 µG/L | CHLORPYRIFOS, >0.015 µG/L | DDD (P,P'), >0.00083 µG/L | DDE (P,P'), >0.00059 µG/L | DIURON, >2 µG/L | C. DUBIA, (% CONTROL) | S. CAPRICORNUTUM, (% CONTROL) | H. AZTECA, (% CONTROL) |
|----------------------------|------------|-------------|----------------------------|--------------------------|-----------------------------------|-----------------------------------|----------------------------------|------------------------|--------------------------|-------------------------------------------|---------------------------|---------------------------|---------------------------|-----------------|-----------------------|-------------------------------|------------------------|
| Hilmar Drain @ Central Ave | Storm      | 2/15/2005   |                            |                          | 1102                              | 740                               |                                  |                        | 240                      |                                           |                           |                           |                           |                 |                       |                               |                        |
| Hilmar Drain @ Central Ave | Storm      | 3/22/2005   |                            |                          | 1157                              | 760                               |                                  |                        | 900                      |                                           |                           |                           |                           |                 |                       |                               |                        |
| Hilmar Drain @ Central Ave | Irrigation | 5/11/2005   |                            |                          | 1354                              | 740                               |                                  |                        | 1600                     |                                           |                           |                           |                           |                 | 74                    |                               |                        |
| Hilmar Drain @ Central Ave | Irrigation | 5/19/2005   |                            |                          | 1214                              |                                   |                                  |                        |                          |                                           |                           |                           |                           |                 |                       |                               |                        |
| Hilmar Drain @ Central Ave | Irrigation | 6/15/2005   |                            |                          | 855                               | 720                               |                                  |                        | 500                      |                                           |                           |                           |                           |                 |                       |                               |                        |
| Hilmar Drain @ Central Ave | Irrigation | 7/13/2005   | 6.45                       |                          | 826                               | 600                               |                                  |                        | 1600                     |                                           |                           |                           |                           |                 |                       |                               |                        |
| Hilmar Drain @ Central Ave | Irrigation | 8/16/2005   |                            |                          | 788                               | 500                               |                                  |                        | 1600                     |                                           |                           |                           |                           |                 |                       |                               |                        |
| Hilmar Drain @ Central Ave | Irrigation | 9/21/2005   |                            |                          |                                   | 690                               |                                  |                        | 430                      |                                           |                           |                           |                           |                 |                       |                               | 32                     |
| Hilmar Drain @ Central Ave | Storm      | 3/1/2006    |                            | 9.55                     | 1058                              | 670                               |                                  |                        |                          |                                           |                           |                           |                           |                 |                       |                               |                        |
| Hilmar Drain @ Central Ave | Storm      | 3/16/2006   |                            |                          | 1215                              | 710                               |                                  |                        |                          |                                           |                           |                           |                           |                 |                       |                               |                        |
| Hilmar Drain @ Central Ave | Storm      | 3/24/2006   |                            |                          | 1400                              |                                   |                                  |                        |                          |                                           |                           |                           |                           |                 |                       |                               |                        |
| Hilmar Drain @ Central Ave | Storm      | 5/2/2006    |                            | 8.58                     | 794                               |                                   |                                  |                        |                          |                                           |                           |                           |                           |                 |                       |                               |                        |
| Hilmar Drain @ Central Ave | Irrigation | 5/18/2006   | 6.28                       |                          |                                   |                                   |                                  |                        | 2400                     |                                           |                           |                           |                           |                 |                       |                               |                        |
| Hilmar Drain @ Central Ave | Irrigation | 6/15/2006   | 6.80                       |                          |                                   |                                   |                                  | 12                     |                          |                                           |                           |                           |                           |                 |                       |                               |                        |
| Hilmar Drain @ Central Ave | Irrigation | 7/13/2006   |                            |                          | 1096                              | 610                               | 3.8                              | 11                     | 2400                     | 31 (19)                                   | 0.016                     |                           |                           |                 |                       | 36                            |                        |
| Hilmar Drain @ Central Ave | Irrigation | 8/10/2006   |                            |                          |                                   |                                   |                                  | 13                     | 1000                     |                                           |                           | 0.003                     |                           |                 |                       |                               |                        |
| Hilmar Drain @ Central Ave | Irrigation | 9/14/2006   |                            |                          | 773                               | 510                               |                                  | 20                     |                          |                                           |                           |                           |                           |                 |                       |                               |                        |

| SITE NAME                  | SEASON     | SAMPLE DATE | OXYGEN, DISSOLVED, <7 MG/L | PH, <6.5 AND > 8.5 UNITS | SPECIFIC CONDUCTIVITY, >700 µS/CM | TOTAL DISSOLVED SOLIDS, >450 MG/L | AMMONIA <sup>1</sup> , >1.5 MG/L | NITRATE AS N, >10 MG/L | E. COLI, >235 MPN/100 ML | COPPER, TOTAL <sup>2</sup> , > 1,300 µG/L | CHLORPYRIFOS, >0.0.15 µG/L | DDD (p,p'), >0.00083 µG/L | DDE (p,p'), >0.00059 µG/L | DIURON, >2 µG/L | C. DUBIA, (% CONTROL) | S. CAPRICORNUTUM, (% CONTROL) | H. AZTECA, (% CONTROL) |
|----------------------------|------------|-------------|----------------------------|--------------------------|-----------------------------------|-----------------------------------|----------------------------------|------------------------|--------------------------|-------------------------------------------|----------------------------|---------------------------|---------------------------|-----------------|-----------------------|-------------------------------|------------------------|
| Hilmar Drain @ Central Ave | Storm      | 2/11/2007   |                            |                          |                                   |                                   | 13                               |                        | 2400                     | 84 (10.1)                                 |                            |                           |                           |                 |                       |                               |                        |
| Hilmar Drain @ Central Ave | Storm      | 3/1/2007    |                            |                          | 1396                              | 790                               |                                  |                        |                          |                                           |                            |                           |                           |                 |                       |                               |                        |
| Hilmar Drain @ Central Ave | Storm      | 3/7/2007    |                            | 8.79                     | 1633                              |                                   |                                  |                        |                          |                                           |                            |                           |                           |                 |                       |                               |                        |
| Hilmar Drain @ Central Ave | Irrigation | 4/17/2007   |                            |                          | 1106                              | 700                               |                                  |                        | 1100                     |                                           |                            |                           |                           | 3.3             |                       | 69                            |                        |
| Hilmar Drain @ Central Ave | Irrigation | 5/15/2007   |                            |                          | 1030                              | 640                               |                                  | 22                     | 440                      |                                           |                            |                           |                           |                 |                       |                               |                        |
| Hilmar Drain @ Central Ave | Irrigation | 6/19/2007   |                            |                          | 869                               | 600                               |                                  | 21                     | 1700                     |                                           |                            |                           |                           | 6.6             |                       |                               |                        |
| Hilmar Drain @ Central Ave | Irrigation | 7/17/2007   |                            |                          | 717                               | 460                               |                                  | 15                     | 340                      |                                           |                            |                           |                           |                 |                       |                               |                        |
| Hilmar Drain @ Central Ave | Irrigation | 8/21/2007   |                            |                          | 793                               | 520                               |                                  | 18                     |                          |                                           |                            |                           |                           |                 |                       |                               |                        |
| Hilmar Drain @ Central Ave | Irrigation | 9/11/2007   |                            |                          | 703                               | 460                               |                                  | 18                     | 2400                     |                                           |                            |                           |                           |                 |                       |                               |                        |
| Hilmar Drain @ Central Ave | Storm      | 1/24/2008   |                            |                          | 1528                              | 970                               |                                  |                        |                          |                                           |                            |                           |                           |                 |                       |                               |                        |
| Hilmar Drain @ Central Ave | Storm      | 2/26/2008   |                            |                          | 1476                              | 910                               |                                  |                        |                          |                                           |                            |                           |                           |                 |                       |                               |                        |
| Hilmar Drain @ Central Ave | Sediment   | 3/4/2008    |                            |                          | 1429                              |                                   |                                  |                        |                          |                                           |                            |                           |                           |                 |                       |                               | 91                     |
| Hilmar Drain @ Central Ave | Sediment   | 3/28/2008   | 6.30                       |                          | 1111                              |                                   |                                  |                        |                          |                                           |                            |                           |                           |                 |                       |                               |                        |
| Hilmar Drain @ Central Ave | Irrigation | 4/22/2008   |                            |                          | 1482                              | 960                               |                                  |                        | 390                      |                                           |                            |                           |                           |                 |                       | 45                            |                        |
| Hilmar Drain @ Central Ave | Irrigation | 4/29/2008   |                            |                          |                                   |                                   |                                  |                        |                          |                                           |                            |                           |                           | 3.43            |                       | 59                            |                        |
| Hilmar Drain @ Central Ave | Irrigation | 4/29/2008   | 4.48                       |                          | 809                               |                                   |                                  |                        |                          |                                           |                            |                           |                           |                 |                       | 59                            |                        |
| Hilmar Drain @ Central Ave | Irrigation | 5/20/2008   |                            |                          | 963                               | 680                               |                                  | 20                     | 440                      |                                           |                            |                           |                           |                 |                       |                               |                        |
| Hilmar Drain @ Central Ave | Irrigation | 6/17/2008   |                            |                          | 1060                              | 650                               |                                  |                        | 1000                     |                                           |                            |                           |                           |                 |                       |                               |                        |
| Hilmar Drain @ Central Ave | Irrigation | 7/22/2008   |                            |                          | 1074                              | 710                               |                                  | 21                     | 270                      |                                           |                            |                           |                           |                 |                       |                               |                        |

| SITE NAME                       | SEASON     | SAMPLE DATE | OXYGEN, DISSOLVED, <7 MG/L | pH, <6.5 AND > 8.5 UNITS | SPECIFIC CONDUCTIVITY, >700 µS/CM | TOTAL DISSOLVED SOLIDS, >450 MG/L | AMMONIA <sup>1</sup> , >1.5 MG/L | NITRATE AS N, >10 MG/L | E. COLI, >235 MPN/100 ML | COPPER, TOTAL <sup>2</sup> , > 1,300 µG/L | CHLORPYRIFOS, >0.0.15 µG/L | DDD (p,p'), >0.00083 µG/L | DDE (p,p'), >0.00059 µG/L | DIURON, >2 µG/L | C. DUBIA, (% CONTROL) | S. CAPRICORNUTUM, (% CONTROL) | H. AZTECA, (% CONTROL) |
|---------------------------------|------------|-------------|----------------------------|--------------------------|-----------------------------------|-----------------------------------|----------------------------------|------------------------|--------------------------|-------------------------------------------|----------------------------|---------------------------|---------------------------|-----------------|-----------------------|-------------------------------|------------------------|
| Hilmar Drain @ Central Ave      | Irrigation | 8/19/2008   |                            |                          | 1590                              | 1000                              |                                  |                        |                          |                                           |                            |                           | 0.0056                    |                 |                       |                               |                        |
| Hilmar Drain @ Mitchell Rd      | Irrigation | 7/22/2008   | 6.93                       |                          | 995                               |                                   |                                  | 28                     |                          |                                           |                            |                           |                           |                 |                       | 70                            |                        |
| Reclamation Drain @ Williams Rd | Irrigation | 7/22/08     |                            |                          | 1558                              |                                   |                                  |                        |                          |                                           |                            |                           |                           |                 |                       |                               |                        |
| Hilmar Drain @ Mitchell Rd      | Irrigation | 7/29/2008   | 1.81                       |                          | 770                               |                                   |                                  |                        |                          |                                           |                            |                           |                           |                 |                       | 22                            |                        |
| Hilmar Drain @ Central Ave      | Sediment   | 8/28/2008   | 6.32                       |                          | 1172                              |                                   |                                  |                        |                          |                                           |                            |                           |                           |                 |                       |                               | 0                      |
| Hilmar Drain @ Central Ave      | Irrigation | 9/23/2008   |                            |                          | 943                               | 640                               |                                  | 26                     |                          |                                           |                            |                           |                           |                 |                       | 73                            |                        |
| Hilmar Drain @ Central Ave      | Irrigation | 9/30/2008   |                            |                          | 733                               |                                   |                                  |                        |                          |                                           |                            |                           |                           |                 |                       | 75                            |                        |
| Hilmar Drain @ Central Ave      | Sediment   | 10/2/2008   |                            |                          | 1241                              |                                   |                                  |                        |                          |                                           |                            |                           |                           |                 |                       |                               | 0                      |
| Hilmar Drain @ Central Ave      | Irrigation | 4/21/2009   |                            |                          | 904                               |                                   |                                  |                        |                          |                                           |                            |                           |                           |                 |                       |                               |                        |
| Hilmar Drain @ Central Ave      | Irrigation | 9/22/2009   |                            |                          | 934                               |                                   |                                  |                        |                          |                                           |                            |                           |                           |                 |                       |                               |                        |
| Constituent Priority            |            |             | E                          | E                        | E                                 | E                                 | E                                | C                      | E                        | C                                         | A/B                        | NP                        | NP                        | C               | NP                    | D                             | D                      |

<sup>1</sup>Ammonia WQTL variable based on pH and temperature.

<sup>2</sup>Total metal WQTL variable based on hardness.

NP – Not Prioritized; less than two exceedances within three consecutive monitoring years and currently no TMDL.

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## 2007-2011 Management Plan Monitoring Results

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All monitoring results for high priority management plan constituents in the Hilmar Drain @ Central Ave subwatershed are listed in Table XV-6. These constituents include chlorpyrifos, copper, diuron, nitrate (including ammonia), *S. capricornutum* toxicity, and *H. azteca* toxicity.

Chlorpyrifos exceeded the WQTL in Hilmar Drain once during July 2006. Since the chlorpyrifos and diazinon TMDL for the Lower San Joaquin River was not approved until October of 2007, chlorpyrifos was not listed on the Hilmar Drain management plan until 2008. Normal Monitoring during 2008 did not result in any chlorpyrifos exceedances (Table XV-6). In 2009, MPM was not scheduled at the site.

Copper exceeded the WQTL twice in the Hilmar Drain subwatershed, during 2006 (July) and 2007 (February); therefore, the constituent was listed on the Hilmar Drain management plan in 2008. The July 2006 copper exceedance coincided with toxicity to *S. capricornutum*. Normal Monitoring occurred for copper during 2008 and upstream MPM also occurred during July 2008 at Hilmar Drain @ Mitchell Rd and Reclamation Drain @ Williams Rd. There were no exceedances of copper during 2008. Copper has not been monitored since 2008 in the Hilmar Drain subwatershed, but MPM for *S. capricornutum* toxicity occurred during 2009 and no toxicity occurred (Table XV-6).

Diuron exceeded the WQTL twice during 2007 monitoring (April and June), one of which coincided with *S. capricornutum* toxicity, and additional MPM occurred for the constituent during 2008 (April and June). Diuron exceeded the WQTL once in 2008 during April additional MPM, which occurred the week after April Normal Monitoring, during which time diuron was detected. Toxicity to *S. capricornutum* occurred during April 2008 Normal Monitoring and was persistent in the resample collected a week later; the toxic algae samples coincided with the April diuron exceedance (Tables XV-5 and XV-6). Monitoring for diuron has not occurred within the subwatershed since but MPM in 2009 resulted in no toxicity to *S. capricornutum*.

During 2006, nitrate first exceeded the WQTL (August and September) as well as ammonia (July). In 2007, MPM did not occur at Hilmar Drain, but five exceedances of nitrate (May-September) and the second exceedance of ammonia (February) occurred during Normal Monitoring. Upstream MPM occurred for nitrate and ammonia at Hilmar Drain @ Mitchell Rd and Reclamation Drain @ Williams Rd during July 2008, and nitrate exceeded the WQTL only at the Mitchell Rd site. Nitrate exceedances also occurred during Normal Monitoring at the Hilmar Drain @ Central Ave in 2008 (May, July, and September, Table XV-6). Nitrate and ammonia have not been monitored in the subwatershed since 2008.

The second *S. capricornutum* toxicity in Hilmar Drain occurred during April 2007, and the constituent was listed on the management plan as of 2008. Upstream MPM in July 2008 at Hilmar Drain @ Mitchell Rd and Reclamation Drain @ Williams Rd sites resulted in toxicity at the Mitchell Rd site only (Table XV-6). Toxicity to *S. capricornutum* also occurred during Normal Monitoring in 2008 (April and September).

Toxicity to *S. capricornutum* was the only constituent for which MPM occurred in 2009 (April and September); toxic samples did not occur during either monitoring event. Toxicity to *S. capricornutum* in the Hilmar Drain subwatershed was associated with exceedances of copper 2006 (July) and diuron in 2007 and 2008 (April).

Sediment toxicity to *H. azteca* first occurred in September 2005 and occurred again during Normal Monitoring in both 2008 (March and August) samples. Sediment toxicity was listed in the 2009 management plan for Hilmar Drain, but no MPM has occurred for the constituent.

Management Plan Monitoring will occur for all management plan constituents during months of historical exceedances during 2012.



**Table XV-6. Hilmar Drain site subwatershed monitoring results for high priority constituents.**

Exceedance values are in bold. Resampling (RS) due to toxicity not included in table.

|                                                               | MONTH:                                       | JAN     | FEB      | MAR      | APR        | MAY       | JUN       | JUL       | AUG       | SEP       |
|---------------------------------------------------------------|----------------------------------------------|---------|----------|----------|------------|-----------|-----------|-----------|-----------|-----------|
| <b>2007 NM<br/>(@ Central Ave)</b>                            | Date                                         | NA      | 02/11/07 | 03/01/07 | 04/17/07   | 05/15/07  | 06/19/07  | 07/17/07  | 08/21/07  | 09/11/07  |
|                                                               | Nitrate as N (mg/L)                          | NA      | 2.9      | 8.5      | 8.2        | <b>22</b> | <b>21</b> | <b>15</b> | <b>18</b> | <b>18</b> |
| <b>2008 NM<br/>(@ Central Ave)</b>                            | Date                                         | 1/24/08 | 2/26/08  | 3/4/08   | 4/22/08    | 5/20/08   | 6/17/08   | 7/22/08   | 8/19/08   | 9/23/08   |
|                                                               | Ammonia as N (mg/L)                          | 0.96    | 0.14     | NA       | 0.12       | 0.16      | 0.23      | <0.05     | <0.05     | <0.05     |
|                                                               | Nitrate as N (mg/L)                          | 9.3     | 5.9      | NA       | 6.7        | <b>20</b> | 6.9       | <b>21</b> | 7.1       | <b>26</b> |
|                                                               | Copper, total (µg/L)                         | 9.4     | 4.4      | NA       | 4.6        | 4.8       | 6.6       | 5.9       | 4.4       | 5.7       |
|                                                               | Chlorpyrifos (µg/L)                          | <0.003  | <0.003   | NA       | <0.003     | <0.003    | <0.003    | <0.003    | <0.003    | <0.003    |
|                                                               | Diuron (µg/L)                                | 0.52    | <0.2     | NA       | 0.23       | <0.2      | <0.2      | <0.2      | <0.2      | <0.2      |
|                                                               | <i>S. capricornutum</i> toxicity (% Control) | 173     | 111      | NA       | <b>45</b>  | 178       | 242       | 105       | 159       | <b>73</b> |
| <b>2008 MPM A<br/>(@ Central Ave)</b>                         | Date                                         | NA      | NA       | NA       | 4/29/08    | NA        | 6/3/08    | 7/22/08   | NA        | 9/30/08   |
|                                                               | Diuron (µg/L)                                | NA      | NA       | NA       | <b>3.4</b> | NA        | <0.2      | NA        | NA        | NA        |
| <b>2008 MPM US<br/>(@ Mitchell Rd)</b>                        | Date                                         | NA      | NA       | NA       | NA         | NA        | NA        | 7/22/08   | NA        | NA        |
|                                                               | Ammonia as N (mg/L)                          | NA      | NA       | NA       | NA         | NA        | NA        | <0.05     | NA        | NA        |
|                                                               | Nitrate as N (mg/L)                          | NA      | NA       | NA       | NA         | NA        | NA        | <b>28</b> | NA        | NA        |
|                                                               | Copper, total (µg/L)                         | NA      | NA       | NA       | NA         | NA        | NA        | 5.5       | NA        | NA        |
|                                                               | <i>S. capricornutum</i> toxicity (% Control) | NA      | NA       | NA       | NA         | NA        | NA        | <b>70</b> | NA        | NA        |
| <b>2008 MPM US<br/>(Reclamation Drain @<br/>Williams Ave)</b> | Date                                         | NA      | NA       | NA       | NA         | NA        | NA        | 7/22/08   | NA        | NA        |
|                                                               | Ammonia as N (mg/L)                          | NA      | NA       | NA       | NA         | NA        | NA        | 0.2       | NA        | NA        |
|                                                               | Nitrate as N (mg/L)                          | NA      | NA       | NA       | NA         | NA        | NA        | 2.6       | NA        | NA        |
|                                                               | Copper, total (µg/L)                         | NA      | NA       | NA       | NA         | NA        | NA        | 10        | NA        | NA        |
|                                                               | <i>S. capricornutum</i> toxicity (% Control) | NA      | NA       | NA       | NA         | NA        | NA        | 108       | NA        | NA        |
| <b>2009 MPM<br/>(@ Central Ave)</b>                           | Date                                         | NA      | NA       | NA       | 4/21/09    | NA        | NA        | NA        | NA        | 9/22/09   |
|                                                               | <i>S. capricornutum</i> toxicity (% Control) | NA      | NA       | NA       | 316        | NA        | NA        | NA        | NA        | 221       |

A – Additional MPM conducted in 2008 only.

MPM – Management Plan Monitoring (see Table 4 for MPM schedule)

NA – Not applicable. No monitoring occurred on this date for this constituent.

NM – Normal Monitoring

US – Upstream MPM conducted in 2008 only.

## Load Calculations

Loads have been calculated for all chlorpyrifos, copper, diuron and nitrate + nitrite detections in the site subwatershed based on the following formula (Table XV-7):

$$\text{Load} = \text{Discharge (cfs)} \times 28.317\text{L/ft}^3 \times \text{Concentration (mg/L} \times 1000 \text{ or } \mu\text{g/L)}.$$

The load values for constituents in this report represent instantaneous loads only. These values should not be used to extrapolate loading over any period of time (e.g. weekly, monthly, seasonal or annual). The primary purpose for reporting instantaneous loads is to provide a normalization of the concentrations by flow for various constituents at the time the samples were collected.

**Table XV-7. Hilmar Drain @ Central Ave site subwatershed instantaneous load calculations for chlorpyrifos, copper, diuron, and nitrate + nitrite.**

Sorted by analyte and date. Upstream sites are italicized.

| SITE NAME                               | ANALYTE NAME  | SAMPLE DATE     | DISCHARGE CFS | CONCENTRATION $\mu\text{G/L}$ | LOADING RATE $\mu\text{G/SEC}$ |
|-----------------------------------------|---------------|-----------------|---------------|-------------------------------|--------------------------------|
| Hilmar Drain @ Central Ave              | Chlorpyrifos  | 07/13/06        | 0.73          | 0.016                         | 0.33                           |
| Hilmar Drain @ Central Ave              | Chlorpyrifos  | 07/17/07        | 3.54          | 0.015                         | 1.50                           |
| Hilmar Drain @ Central Ave              | Copper        | 05/18/06        | 1.22          | 5.8                           | 200.37                         |
| Hilmar Drain @ Central Ave              | Copper        | 06/15/06        | 31.75         | 4.4                           | 3955.88                        |
| Hilmar Drain @ Central Ave              | Copper        | 07/13/06        | 0.73          | 31                            | 640.81                         |
| Hilmar Drain @ Central Ave              | Copper        | 08/10/06        | 25.87         | 4.1                           | 3003.50                        |
| Hilmar Drain @ Central Ave              | Copper        | 09/14/06        | 14.18         | 6.8                           | 2730.44                        |
| Hilmar Drain @ Central Ave              | Copper        | 02/11/07        | 22.5          | 84                            | 53519.13                       |
| Hilmar Drain @ Central Ave              | Copper        | 03/01/07        | 0             | 7.2                           | 0                              |
| Hilmar Drain @ Central Ave              | Copper        | 04/17/07        | 1.33          | 8.5                           | 320.12                         |
| Hilmar Drain @ Central Ave              | Copper        | 05/15/07        | 3.98          | 5.5                           | 619.86                         |
| Hilmar Drain @ Central Ave*             | Copper        | 06/19/07        | 5.27          | 13                            | 1940.00                        |
| Hilmar Drain @ Central Ave              | Copper        | 06/19/07        | 5.27          | 11                            | 1641.54                        |
| Hilmar Drain @ Central Ave              | Copper        | 07/17/07        | 3.54          | 9.1                           | 912.20                         |
| Hilmar Drain @ Central Ave              | Copper        | 08/21/07        | 8.34          | 5                             | 1180.82                        |
| Hilmar Drain @ Central Ave              | Copper        | 09/11/07        | 13.12         | 4.4                           | 1634.68                        |
| Hilmar Drain @ Central Ave              | Copper        | 01/24/08        | 0.38          | 9.4                           | 101.15                         |
| Hilmar Drain @ Central Ave              | Copper        | 02/26/08        | 0.13          | 4.4                           | 16.20                          |
| Hilmar Drain @ Central Ave              | Copper        | 04/22/08        | 2.11          | 4.6                           | 274.84                         |
| Hilmar Drain @ Central Ave              | Copper        | 05/20/08        | 3.44          | 4.8                           | 467.57                         |
| Hilmar Drain @ Central Ave              | Copper        | 06/17/08        | 1.21          | 6.6                           | 226.14                         |
| Hilmar Drain @ Central Ave              | Copper        | 07/22/08        | 4.48          | 5.9                           | 748.47                         |
| <i>Hilmar Drain @ Mitchell Rd</i>       | <i>Copper</i> | <i>07/22/08</i> | <i>2.98</i>   | <i>5.5</i>                    | <i>464.12</i>                  |
| <i>Reclamation Drain @ Williams Ave</i> | <i>Copper</i> | <i>07/22/08</i> | <i>0.45</i>   | <i>10</i>                     | <i>127.43</i>                  |
| Hilmar Drain @ Central Ave              | Copper        | 08/19/08        | 2.03          | 4.4                           | 252.93                         |
| Hilmar Drain @ Central Ave*             | Copper        | 09/23/08        | 12.47         | 6.1                           | 2153.99                        |
| Hilmar Drain @ Central Ave              | Copper        | 09/23/08        | 12.47         | 5.7                           | 2012.74                        |
| Hilmar Drain @ Central Ave              | Diuron        | 04/17/07        | 1.33          | 3.3                           | 124.28                         |
| Hilmar Drain @ Central Ave*             | Diuron        | 06/19/07        | 5.27          | 3.2                           | 477.54                         |
| Hilmar Drain @ Central Ave              | Diuron        | 06/19/07        | 5.27          | 6.6                           | 984.92                         |
| Hilmar Drain @ Central Ave              | Diuron        | 01/24/08        | 0.38          | 0.52                          | 5.60                           |

| SITE NAME                  | ANALYTE NAME | SAMPLE DATE | DISCHARGE CFS | CONCENTRATION µG/L | LOADING RATE µG/SEC |
|----------------------------|--------------|-------------|---------------|--------------------|---------------------|
| Hilmar Drain @ Central Ave | Diuron       | 04/22/08    | 2.11          | 0.23               | 13.74               |
| Hilmar Drain @ Central Ave | Diuron       | 04/29/08    | 0.29          | 3.4                | 27.92               |

\*Field duplicate

### Source Identification and Outreach

The Coalition evaluates past monitoring results and associated PUR data to develop a source identification and outreach strategy. During 2008 and 2009, the Coalition conducted MPM during the months when exceedances historically occurred to better characterize water quality in the subwatershed. The Coalition also monitored high priority constituents at two upstream locations (Hilmar Drain @ Mitchell Rd and Reclamation Drain @ Williams Ave) during 2008 to attempt to partition constituent loads to specific parcels within the subwatershed. The Coalition also reviews PUR data to determine the most frequent crop type and timing associated with pesticide applications. From these actions, the Coalition derived an outreach strategy, which is detailed in the following sections.

The Hilmar Drain @ Central Ave subwatershed is a high priority subwatershed as of 2012 and will remain so through 2014. The Coalition will actively engage in grower outreach and education to address the Hilmar Drain management plan's highest priority constituents. The Coalition organized grower meetings and mailings to educate growers about management practices and their importance in achieving acceptable water quality. Individual grower meetings with targeted members are planned to inform growers about management practices as well as to assess current and expected future implementation of additional management practices.

### Priority A/B Constituents

Chlorpyrifos is the only A/B constituent for the Hilmar Drain subwatershed.

#### Chlorpyrifos

The WQTL for chlorpyrifos (0.015 µg/L) was exceeded once in the Hilmar Drain subwatershed during July 2006. A detection of chlorpyrifos (0.015 µg/L) during July 2007 monitoring also occurred. Neither was associated with *C. dubia* toxicity.

To determine an outreach strategy, the Coalition reviewed PUR data for the number of monthly chlorpyrifos applications, pounds of active ingredient applied, and acres treated (Table XV-8 and Figure XV-2). Chlorpyrifos is applied in mid to late summer in the Hilmar Drain to alfalfa and corn as well as almond orchards (Table XV-9). However, after August 2005, there were no chlorpyrifos applications prior to the July 2006 exceedance. Historically, chlorpyrifos use in the subwatershed is low (48 lbs AI in 2007), but use increased in recent years as 467 lbs AI were applied in 2011, 386 lbs AI of which were applied in July alone (complete PUR data only available through October 2011).

**Table XV-8. Hilmar Drain @ Central Ave site subwatershed chlorpyrifos applications, lbs AI applied, and acres treated by month (2005-2011).**

PUR data available through October 2011 for Merced County. If month is not included in table, no applications were made.

| MONTH/YEAR               | NUMBER OF CHLORPYRIFOS APPLICATIONS | POUNDS OF AI APPLIED | ACRES TREATED |
|--------------------------|-------------------------------------|----------------------|---------------|
| January, 2005            | 1                                   | 3.0                  | 9.0           |
| March, 2005              | 3                                   | 59.6                 | 133.0         |
| July, 2005               | 4                                   | 233.4                | 260.0         |
| August, 2005             | 1                                   | 3.0                  | 4.0           |
| August, 2006             | 1                                   | 21.5                 | 43.0          |
| July, 2007               | 2                                   | 48.3                 | 60.0          |
| March, 2008              | 3                                   | 50.8                 | 108.0         |
| July, 2008               | 6                                   | 155.5                | 240.0         |
| August, 2008             | 1                                   | 21.5                 | 43.0          |
| July, 2009               | 1                                   | 30.0                 | 60.0          |
| April, 2010              | 1                                   | 34.4                 | 17.0          |
| June, 2010               | 1                                   | 10.2                 | 20.0          |
| July, 2010               | 2                                   | 19.5                 | 38.0          |
| July, 2011               | 7                                   | 386.8                | 409.0         |
| August, 2011             | 2                                   | 80.1                 | 94.0          |
| <b>Summaries by Year</b> |                                     |                      |               |
| 2005 Total               | 9                                   | 299.0                | 406.0         |
| 2006 Total               | 1                                   | 21.5                 | 43.0          |
| 2007 Total               | 2                                   | 48.3                 | 60.0          |
| 2008 Total               | 10                                  | 227.9                | 391.0         |
| 2009 Total               | 1                                   | 30.0                 | 60.0          |
| 2010 Total               | 4                                   | 64.1                 | 75.0          |
| 2011 Total               | 9                                   | 467.0                | 503.0         |
| <b>Total</b>             | <b>36</b>                           | <b>1157.8</b>        | <b>1538.0</b> |

**Figure XV-2. Hilmar Drain @ Central Ave site subwatershed lbs chlorpyrifos applied by month (2005-2011).**

Asterisk (\*) denotes months with exceedances. PUR data available through October 2011 for Merced County.

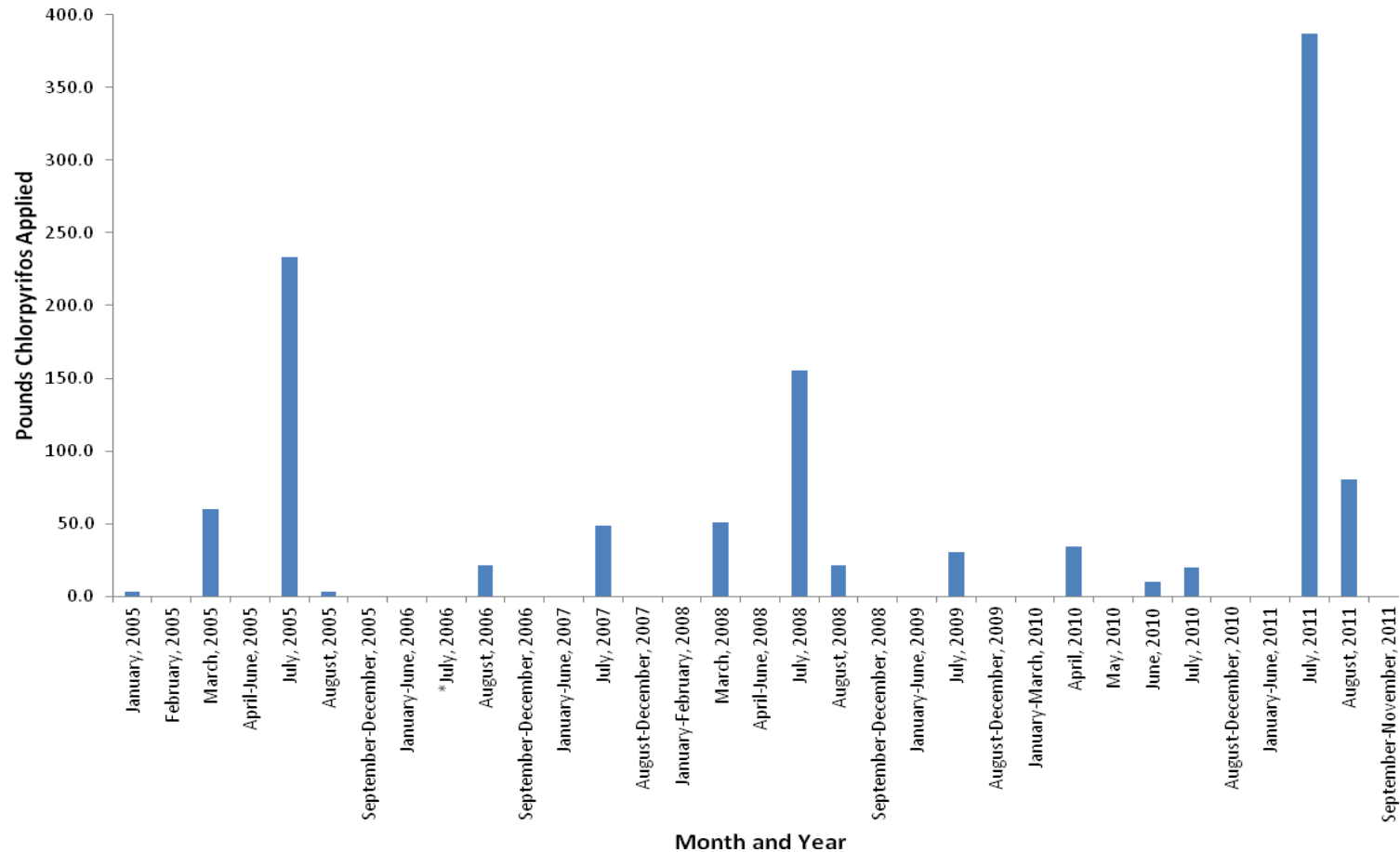


**Table XV-9. Hilmar Drain @ Central Ave site subwatershed chlorpyrifos PUR data (2005-2011).**

PUR data available through October 2011 for Merced County.

| CHEMICAL NAME                                    | COMMODITY                               | PRODUCT NAME                     | LBS AI APPLIED |
|--------------------------------------------------|-----------------------------------------|----------------------------------|----------------|
| CHLORPYRIFOS                                     | ALFALFA (FORAGE - FODDER) (ALFALFA HAY) | LOCK-ON INSECTICIDE              | 154.7          |
|                                                  |                                         | NUFOS 4E                         | 110.4          |
|                                                  | ALMOND                                  | LORSBAN 4E-HF                    | 6.0            |
|                                                  | CORN (FORAGE - FODDER)                  | LORSBAN ADVANCED                 | 318.3          |
|                                                  |                                         | NUFOS 4E                         | 402.6          |
|                                                  |                                         | WARHAWK                          | 131.3          |
|                                                  | SWEET POTATO                            | LORSBAN 15G GRANULAR INSECTICIDE | 34.4           |
| ALFALFA - Total Pounds Chlorpyrifos Applied      |                                         |                                  | 265.1          |
| ALMOND - Total Pounds Chlorpyrifos Applied       |                                         |                                  | 6.0            |
| CORN - Total Pounds Chlorpyrifos Applied         |                                         |                                  | 852.2          |
| SWEET POTATO - Total Pounds Chlorpyrifos Applied |                                         |                                  | 34.4           |
| Total Pounds Chlorpyrifos Applied (2005-2011)    |                                         |                                  | 1157.8         |

Given the increased use of chlorpyrifos in recent years, proper management of irrigation tailwater and also storm water runoff are more necessary than ever. The Coalition will focus outreach efforts to growers applying chlorpyrifos during the irrigation season to row crops and orchards; spray drift management will also be discussed. Relatively, few growers apply chlorpyrifos, and the Coalition's strategy will be to focus on growers with the potential to drain (including spray drift) to Hilmar Drain.

Since 2007, Coalition outreach included grower meetings and the mailing/distribution of information to all members in the subwatershed. While the subwatershed is a high priority, outreach will be targeted to specific growers farming parcels adjacent to the waterway and applying or have applied chlorpyrifos. From these criteria, the Coalition compiled a list of targeted growers.

The Coalition began scheduling individual contact meetings with targeted growers. Although meetings are focused mainly on chlorpyrifos exceedances, all water quality results are reviewed and discussed including exceedances of DO, *E. coli*, SC, TDS, pH, copper, diuron, ammonia, nitrate, *S. capricornutum* and *H. azteca* toxicity. The Coalition encourages the implementation of practices to improve management of irrigation and storm water runoff as well as to reduce spray drift. The Coalition plans to contact three targeted growers accounting for 1,230 acres of direct drainage within the subwatershed.

Management Plan Monitoring is scheduled to occur during months of past exceedances for 2012 through 2014 in the Hilmar Drain subwatershed. These data will allow the Coalition to evaluate improvements in water quality as recommended management practice implementation occurs.

### *Priority C Constituents*

Copper and diuron are listed as priority C constituents for the Hilmar Drain management plan.

## Copper

Copper exceeded the WQTL twice in the subwatershed (July 2006 and February 2007). The July 2006 exceedance coincided with toxicity to *S. capricornutum*. However, Normal Monitoring and MPM during 2008 did not result in any additional copper exceedances, despite the occurrence of *S. capricornutum* toxicity.

The Coalition reviews PUR data for the number of applications of copper, amount of active ingredient applied (pounds applied), and acres treated within the Hilmar Drain subwatershed (Table XV-10, Figure XV-3). Copper use peaked in 2006 (734 lbs AI) and has since declined (355 lbs AI in 2011; complete PUR data only available through October 2011). Relatively few copper applications occur in the subwatershed, but the ratio of lbs AI applied to acres is relatively high. Prior to the July 2006 exceedance, the most recent application of copper was in April 2005. However, the exceedance in February 2007 coincided with heavy applications in January and February 2007 (months which accounted for the bulk of applications in 2007). Copper is primarily applied in the dormant season (November-February) and start of the irrigation season (March) in this subwatershed (Table XV-11). Almonds orchards are the only crop with copper applications in the Hilmar Drain subwatershed.

**Table XV-10. Hilmar Drain @ Central Ave site subwatershed copper applications, lbs AI applied, and acres treated by month (2005-2011).**

PUR data available through October 2011 for Merced County. If month is not included in table, no applications were made.

| MONTH/YEAR               | NUMBER OF COPPER APPLICATIONS | POUNDS OF AI APPLIED | ACRES TREATED |
|--------------------------|-------------------------------|----------------------|---------------|
| January, 2005            | 2                             | 442.0                | 64.0          |
| February, 2005           | 3                             | 104.0                | 95.0          |
| January, 2006            | 2                             | 508.2                | 70.0          |
| February, 2006           | 3                             | 99.9                 | 79.0          |
| March, 2006              | 3                             | 87.8                 | 114.0         |
| April, 2006              | 1                             | 38.5                 | 50.0          |
| January, 2007            | 2                             | 420.8                | 70.0          |
| February, 2007           | 2                             | 76.1                 | 64.0          |
| March, 2007              | 1                             | 8.6                  | 14.0          |
| February, 2008           | 1                             | 12.1                 | 15.0          |
| March, 2008              | 1                             | 4.0                  | 10.0          |
| February, 2009           | 2                             | 92.4                 | 60.0          |
| February, 2010           | 4                             | 188.2                | 95.0          |
| March, 2010              | 2                             | 47.0                 | 61.0          |
| January, 2011            | 2                             | 132.2                | 25.5          |
| February, 2011           | 4                             | 156.2                | 109.0         |
| March, 2011              | 3                             | 66.1                 | 84.0          |
| <b>Summaries by Year</b> |                               |                      |               |
| 2005 Total               | 5                             | 545.9                | 159.0         |
| 2006 Total               | 9                             | 734.4                | 313.0         |
| 2007 Total               | 5                             | 505.4                | 148.0         |
| 2008 Total               | 2                             | 16.1                 | 25.0          |
| 2009 Total               | 2                             | 92.4                 | 60.0          |
| 2010 Total               | 6                             | 235.2                | 156.0         |

| MONTH/YEAR   | NUMBER OF COPPER APPLICATIONS | POUNDS OF AI APPLIED | ACRES TREATED |
|--------------|-------------------------------|----------------------|---------------|
| 2011 Total   | 9                             | 354.6                | 218.5         |
| <b>Total</b> | <b>38</b>                     | <b>2484.0</b>        | <b>1079.5</b> |



**Figure XV-3. Hilmar Drain @ Central Ave site subwatershed lbs copper applied by month (2005-2011).**

Asterisk (\*) denotes months with exceedances. PUR data available through October 2011 for Merced County.

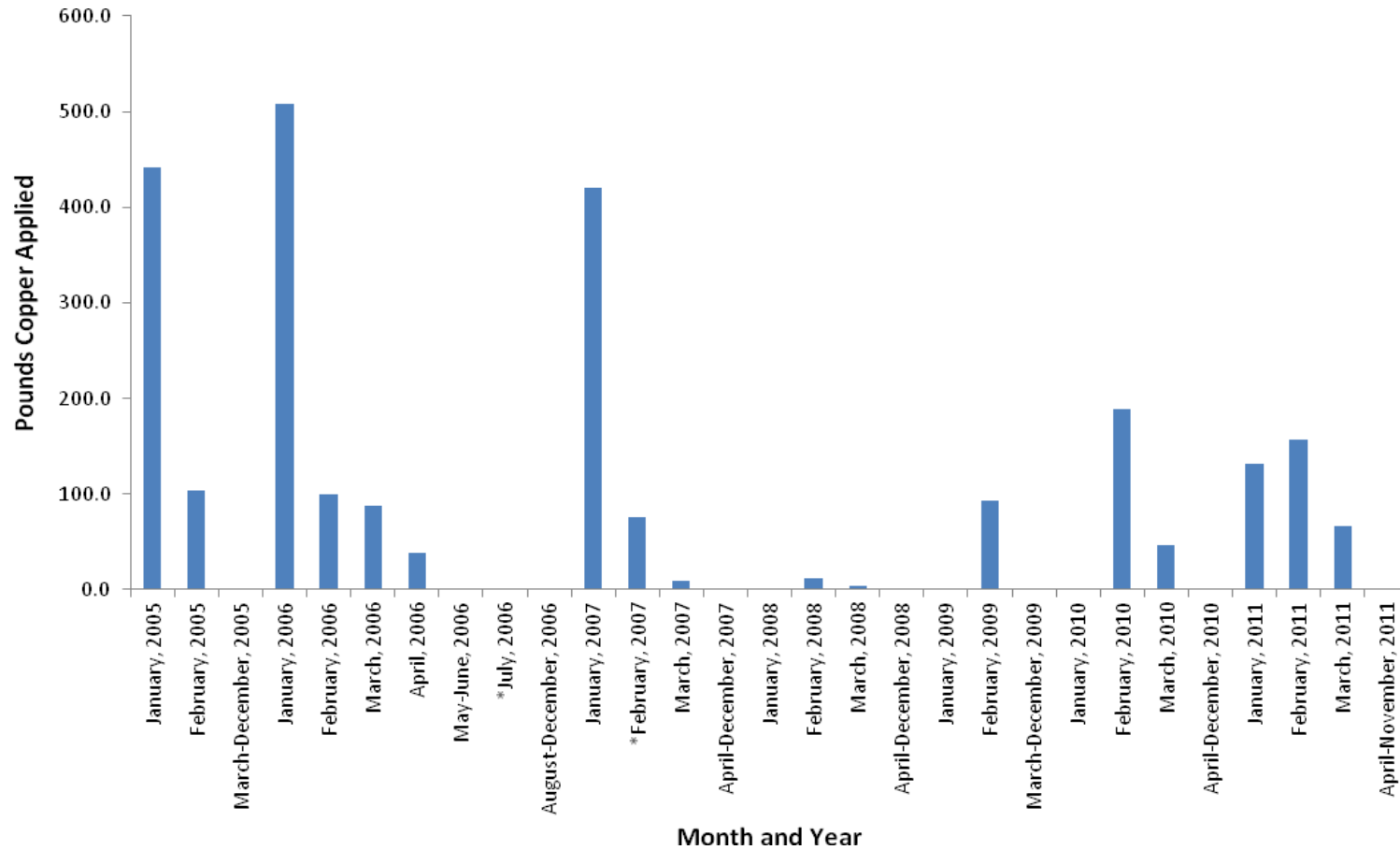


**Table XV-11. Hilmar Drain @ Central Ave site subwatershed copper PUR data (2005-2011).**

PUR data available through October 2011 for Merced County.

| CHEMICAL NAME                           | COMMODITY | PRODUCT NAME                             | LBS AI APPLIED |
|-----------------------------------------|-----------|------------------------------------------|----------------|
| COPPER                                  | ALMOND    | CHAMPION WETTABLE POWDER                 | 423.5          |
|                                         |           | CUPROFIX ULTRA 40 DISPERSS               | 246.0          |
|                                         |           | DUPONT KOCIDE 2000 FUNGICIDE/BACTERICIDE | 16.1           |
|                                         |           | KOCIDE 101                               | 692.2          |
|                                         |           | KOCIDE DF                                | 377.0          |
|                                         |           | NORDOX 75 WG                             | 107.7          |
|                                         |           | NU-COP 50 WP                             | 69.3           |
|                                         |           | NU-COP 50DF                              | 552.1          |
| ALMOND - Total Pounds Copper Applied    |           |                                          | 2484.0         |
| Total Pounds Copper Applied (2005-2011) |           |                                          | 2484.0         |

It appears that only a few growers within the Hilmar Drain subwatershed are responsible for the offsite movement of copper to the waterway. The Coalition noted in the 2008 Management Plan that a single TRS was most likely the source of both copper exceedances (page 359, Table XVI-6). In addition, as discussed above, copper is heavily used in the subwatershed but has few applications, indicating that only a few growers may be contributing to the exceedances of copper. The Coalition also noted in the 2008 Management Plan that although copper is applied to agriculture in the winter and spring months, it is also applied heavily by dairy operations which will not receive outreach from the Coalition. The Coalition is targeting growers with potential to drain who applied copper and encourages them to review their operations to improve irrigation and storm water management and eliminate spray drift. This is consistent with the strategy to address priority A/B constituent exceedances.

### Diuron

Diuron exceeded the WQTL three times in the subwatershed, in 2007 (April and June) and 2008 (April). Both April exceedances coincided with toxicity to *S. capricornutum*.

The Coalition reviewed PUR data for the number of applications of diuron, amount of active ingredient applied (pounds applied), and acres treated (Tables XV-12 and XV-13, Figure XV-4). Diuron use on alfalfa and corn in the Hilmar Drain subwatershed has tapered off since 2007 (321 lbs AI), and there were only a few, if any, applications per year in 2008 through 2011 (complete PUR data only available through October 2011). The exceedances occurred several weeks after previous applications, indicating diuron is most likely being transported to the drain several weeks after applications either via storm or irrigation runoff.

**Table XV-12. Hilmar Drain @ Central Ave site subwatershed diuron applications, lbs AI applied, and acres treated by month (2005-2011).**

No diuron PUR reported for 2005 and 2011. If month is not included in table, no applications were made.

| MONTH/YEAR    | NUMBER OF DIURON APPLICATIONS | POUNDS OF AI APPLIED | ACRES TREATED |
|---------------|-------------------------------|----------------------|---------------|
| January, 2006 | 4                             | 196.8                | 123.0         |

|                          |           |              |              |
|--------------------------|-----------|--------------|--------------|
| December, 2006           | 3         | 241.7        | 124.0        |
| January, 2007            | 1         | 62.9         | 43.0         |
| February, 2007           | 1         | 1.6          | 4.0          |
| June, 2007               | 1         | 0.7          | 18.0         |
| December, 2007           | 6         | 255.3        | 233.0        |
| February, 2008           | 1         | 62.8         | 43.0         |
| January, 2009            | 3         | 102.4        | 128.0        |
| January, 2010            | 3         | 35.3         | 59.0         |
| <b>Summaries by Year</b> |           |              |              |
| 2006 Total               | 7         | 438.5        | 247.0        |
| 2007 Total               | 9         | 320.5        | 298.0        |
| 2008 Total               | 1         | 62.8         | 43.0         |
| 2009 Total               | 3         | 102.4        | 128.0        |
| 2010 Total               | 3         | 35.3         | 59.0         |
| <b>Total</b>             | <b>23</b> | <b>959.4</b> | <b>775.0</b> |

**Figure XV-4. Hilmar Drain @ Central Ave site subwatershed lbs diuron applied by month (2005-2011).**

Asterisk (\*) denotes months with exceedances. No diuron PUR reported for 2005 and 2011.

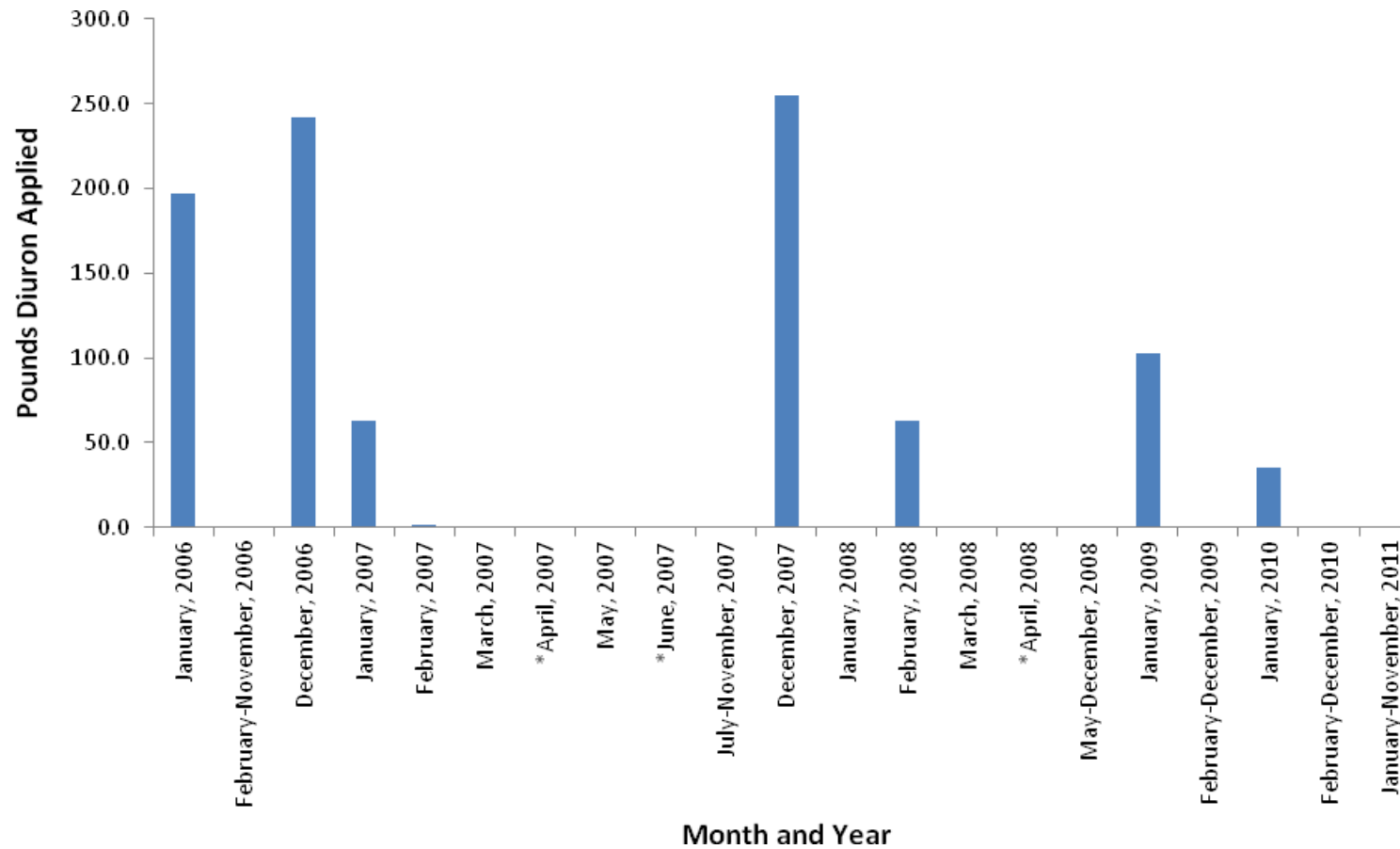


**Table XV-13. Hilmar Drain @ Central Ave site subwatershed diuron PUR data (2005-2011).**

No diuron applications reported for 2005 and 2011.

| CHEMICAL NAME                               | COMMODITY                               | PRODUCT NAME                  | LBS AI APPLIED |
|---------------------------------------------|-----------------------------------------|-------------------------------|----------------|
| DIURON                                      | ALFALFA (FORAGE - FODDER) (ALFALFA HAY) | DIREX 4L                      | 484.3          |
|                                             |                                         | DIREX 80DF                    | 196.8          |
|                                             |                                         | DUPONT DIREX 4L HERBICIDE     | 276.1          |
|                                             | CORN (FORAGE - FODDER)                  | KARMEX DF HERBICIDE           | 0.7            |
|                                             | RIGHTS OF WAY                           | DU PONT KROVAR I DF HERBICIDE | 1.6            |
| ALFALFA - Total Pounds Diuron Applied       |                                         |                               | 957.2          |
| CORN - Total Pounds Diuron Applied          |                                         |                               | 0.7            |
| RIGHTS OF WAY - Total Pounds Diuron Applied |                                         |                               | 1.6            |
| Total Pounds Diuron Applied (2005-2011)     |                                         |                               | 959.4          |

Similar to copper, it appears that only a few growers within the Hilmar Drain subwatershed are responsible for the offsite movement of diuron to the waterway. The Coalition noted in the 2008 Management Plan that only one TRS had an application in the month prior to the June 2007 exceedance (page 361, Table XVI-8). As discussed above, the Coalition believes diuron is moving to the waterway via mismanaged irrigation tailwater and storm water. The Coalition's strategy is targeting growers with the potential to drain that have applied or are applying diuron and encouraging them to review their operations to improve irrigation and storm water management. This is consistent with the strategy to address priority A/B constituent exceedances.

#### Nitrate + Nitrite / Nitrate

There were 13 nitrate exceedances in the Hilmar Drain subwatershed (including one exceedance at the subwatershed's upstream sampling location at Mitchell Rd).

Nitrate exceedances typically occur during the late spring through summer months (May, June, July, August, and September). Nitrate has not been monitored in the subwatershed since September 2008. In October 2008, the Coalition replaced separate analysis of nitrate and nitrite with the combined analysis of nitrate + nitrite; as such, all future monitoring of nitrate in the Hilmar Drain subwatershed will be for the combined analysis.

Sources of nitrate in the subwatershed were discussed in the Hilmar Drain Source Identification section of the 2008 Management Plan. Fertilizers and/or organic matter from irrigated pasture, dairies, leaking septic systems, and effluent from waste treatment facilities are all possible sources of nitrate that have the potential to enter surface waters through above ground runoff or shallow subsurface flows. In the Hilmar Drain subwatershed, there are a relatively large number of dairy operations, and pastureland is located adjacent to the Central Ave sampling location. The Coalition suspects that these dairy operations and pastureland are contributing significantly to the high concentrations of nitrate in the drain. The Coalition is addressing nitrate during the subwatershed target and general grower outreach efforts by encouraging growers to improve management of nutrient and irrigation tailwater.

### *Priority D Constituents*

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Sediment toxicity to *H. azteca* and water column toxicity to *S. capricornutum* are the priority D constituents in the Hilmar Drain subwatershed.

#### ***H. azteca* toxicity**

Sediment toxicity to *H. azteca* occurred three times in the Hilmar Drain subwatershed in 2005 (September) and 2008 (March and August); toxicity was persistent only once following the August 2008 toxicity (resample collected in October 2008). The Coalition did not perform TIEs on any of the toxic samples, but did evaluate in previous SAMRs the potential causes based on water column sampling results and PUR data. The Coalition will conduct MPM for sediment toxicity during 2012 and will analyze for pyrethroids and chlorpyrifos in toxic sediment samples to better determine the causes of toxicity.

During outreach, the Coalition discusses the importance of preventing erosion and offsite movement of sediment to waterways. A wide range of potential causes of sediment toxicity were identified in past SAMRs such as, metals, organophosphates and pyrethroids; the Coalition believes eliminating irrigation and storm water runoff to Hilmar Drain will address many of the potential causes of sediment toxicity in the subwatershed.

#### ***S. capricornutum* toxicity**

Toxicity to *S. capricornutum* occurred five times in the Hilmar Drain subwatershed (during the months of April, July, and September); three of these were persistent in the resamples collected one week later. Twice *S. capricornutum* toxicity was associated with diuron exceedances and once it was associated with a copper exceedance. Toxicity Identification Evaluations were performed on the 2008 (April and July) upstream @ Mitchell Rd toxicities, however no data were gained from either resampling events as all toxicity was lost (April) and toxicity could not be determined (July). Associated sample results and PUR data were evaluated by the Coalition in past SAMRs and it was concluded that there could be a wide range of potential causes for the toxicities, including metals, herbicides, and organochlorines.

The Coalition believes that reducing or eliminating the offsite movement of agricultural constituents via mismanaged irrigation and storm water will eliminate *S. capricornutum* toxicity. In addition, specifically targeting growers who apply metals and herbicides will aid in addressing the toxicity. This is consistent with the Coalition's strategy for outreach in the Hilmar Drain subwatershed.

### *Priority E Constituents*

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The priority E constituents listed under the Hilmar Drain Site Subwatershed management plan are ammonia, DO, *E. coli*, pH, SC and TDS.

The Coalition conducted upstream MPM for ammonia at both the Mitchell Rd and Reclamation Drain locations in July of 2008. Two relatively high concentrations of ammonia occurred prior to 2008 (Table XV-5) and the Coalition was attempting to determine the source of the ammonia by collecting more data. The Coalition believes the ammonia exceedances are primarily from the same source responsible

for the nitrate exceedances (dairies and irrigated pastureland in the subwatershed). The Coalition believes its strategy for addressing the nitrate exceedances in Hilmar Drain the Coalition will also address the ammonia exceedances.

Although these constituents will remain low priority, the Coalition will continue to collect monitoring data as a part of Assessment Monitoring and /or MPM. Dissolved oxygen, pH, and SC are field parameters that will be collected during every monitoring event, Assessment and MPM. Ammonia, *E. coli*, and TDS will be monitored during Assessment Monitoring at this site as scheduled in 2020. The priority E constituents are also discussed during individual contacts and will continue to be discussed at annual grower meetings. In addition, the Coalition plans to participate in a focus group along with other Coalitions and Regional Board staff to develop a joint Work Plan to address *E. coli* exceedances by determining the potential agricultural sources of *E. coli* and identifying management practices to prevent discharges to surface waters.

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### Evaluation

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Hilmar Drain @ Central Ave is one of the four fourth priority site subwatersheds within the ESJWQC and is in its first year of focused outreach (2012-2014).

The Coalition petitioned to remove chlorpyrifos from the Hilmar Drain management plan in a letter to the Regional Board on January 6, 2012 because the most recent chlorpyrifos exceedance was in 2006 and the Coalition has since demonstrated during 2007 and 2008 Normal Monitoring two consecutive years with no exceedances. Outreach has proceeded as planned to date and, regardless of the status of chlorpyrifos, will occur for other management plan constituents.

The Coalition plans to focus its resources on identifying sources of agricultural discharge within this subwatershed that could result in water quality impairments and extend outreach to Coalition members as well as set evaluation goals based on the effectiveness of management practices (by considering changes in water quality over time).

The Coalition's strategy for the Hilmar Drain subwatershed is to focus on providing information to growers to review their operation and determine if irrigation return flows and storm water runoff are managed properly. The Coalition targeted growers with crops located adjacent to the waterway and whose agricultural practices may result in the discharge or drift of pesticides, specifically chlorpyrifos, copper, and diuron, into the waterway. Outreach efforts include grower notification, management practice outreach and education, tracking of management practice implementation and providing information on special studies of management practice efficacy.

Targeted growers will complete individual surveys documenting current management practices and assessing future planned practices. The Coalition will assess these results and plan the final stages of outreach, including following up with growers to identify newly implemented practices and future monitoring to evaluate water quality improvement.

In 2012, MPM is scheduled for high priority constituents during months of historical exceedances. However, monitoring for chlorpyrifos resulted in zero exceedances for two or more consecutive years of monitoring during months of past exceedances. A letter was submitted to the Regional Board on January 6, 2012 petitioning to remove the constituent from the active Hilmar Drain @ Central Ave management plan; until the letter is approved, chlorpyrifos will continue to be monitored as scheduled.



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## LOW PRIORITY SUBWATERSHEDS

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The following section describes low priority management plan site subwatersheds at which MPM occurred during 2011. Low priority sites are sampling locations that were not sampled by the Coalition until the 2008 MRPP was approved, and therefore the Coalition does not have a long historical record of water quality data at the site. Management plans were recently initiated at these sites as a result of monitoring and, in order for the Coalition to gain two years of monitoring data for high priority constituents prior to the site rotating to high priority, the Coalition conducts additional monitoring as needed. Figures 1, 2 and 4 in the MPUR (pages 18, 19 and 23) further outline the Coalition's processes for Management Plan evaluation and prioritization of exceedances.

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### Howard Lateral @ Hwy 140

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Howard Lateral @ Hwy 140 is an Assessment Monitoring location in the Merced River @ Santa Fe Zone (Zone 4). The lateral is located just south and west of Livingston Drain, in the central portion of the Coalition region in Merced County. Agricultural land use is predominantly truck/nursery/berry crops and deciduous fruit, but also includes field crops, pasture, grains/hay, vineyard and dairy.

Monitoring was initiated at the site under the current 2008 MRPP. Assessment Monitoring occurred from October 2008 through December 2010. The site rotates to Assessment Monitoring again in 2029.

Results from Assessment Monitoring in October 2008 through December 2010 required the Coalition to establish a management plan for Howard Lateral, which now includes chlorpyrifos, copper, *E. coli*, pH, SC and TDS. The second copper exceedance occurred in April 2010 and the single chlorpyrifos exceedance occurred in June 2010, hence the Coalition is required to conduct two years of additional monitoring for those two constituents in Howard Lateral before the site can become a high priority subwatershed. The Coalition conducted MPM for chlorpyrifos and copper in 2011 and the site is scheduled for MPM in 2012. During 2011 MPM, copper exceeded the calculated WQTL (based on associated hardness concentration) in samples collected in October (1.1 µg/L of copper detected in samples; calculated WQTL was 1.03 µg/L). Howard Lateral @ Hwy 140 is scheduled to become a high priority management plan site in 2015, at which time MPM and focused outreach will occur.