Appendix I

San Joaquin County & Delta Water Quality Coalition

High Priority Site Subwatershed Analysis

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HIGH PRIORITY SITE SUBWATERSHEDS (2008 – 2010)

I. DUCK CREEK @ HWY 4

Management Plan Constituents

Priority A/B

- Chlorpyrifos
- Diazinon

Priority D

- *Ceriodaphnia dubia* water column toxicity

Priority E

- Dissolved Oxygen
- *E. coli*
- pH
- *Selenastrum capricornutum* water column toxicity

Description of Duck Creek Site Subwatershed

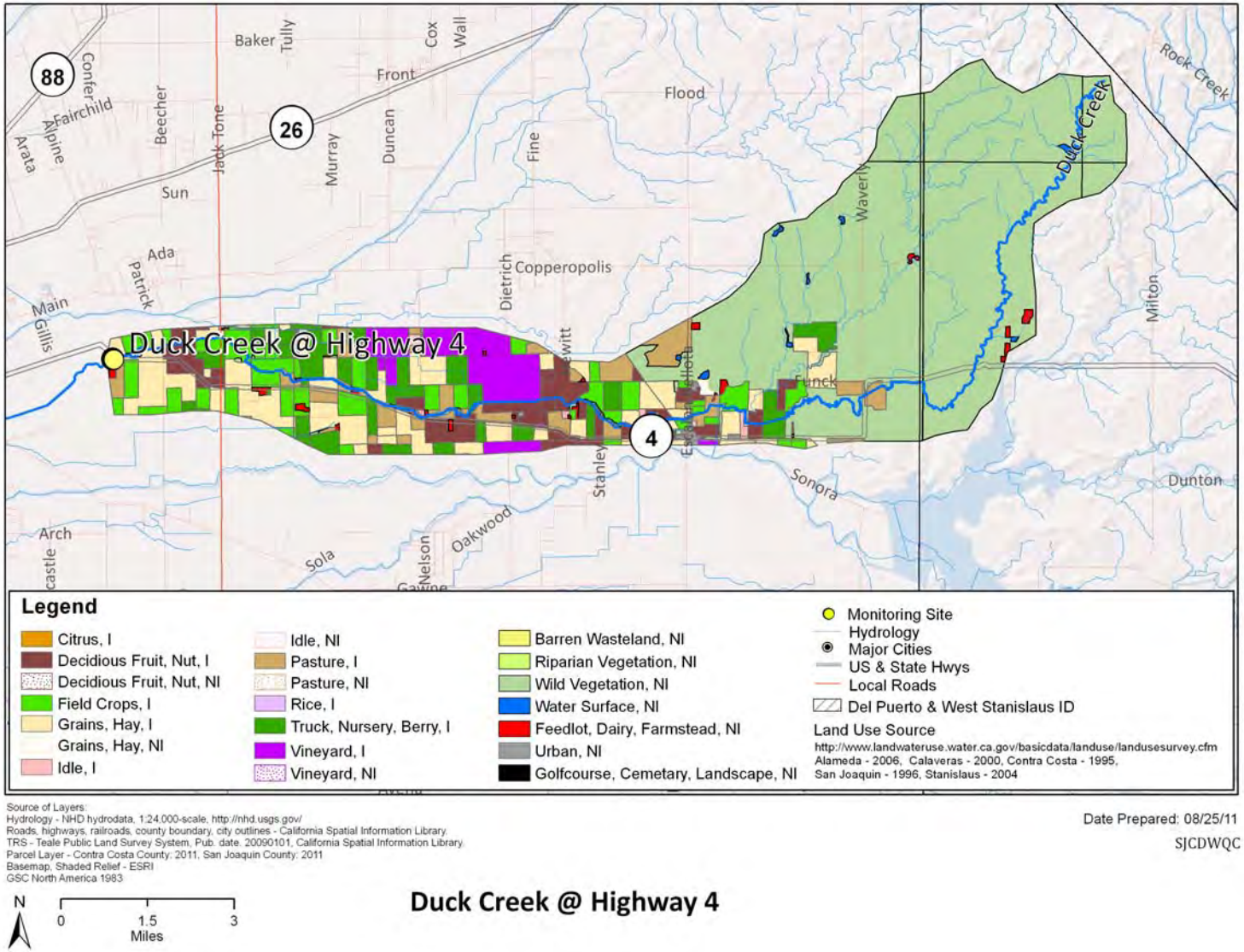
Duck Creek @ Highway 4 (12,958 irrigated acres) – This site is located just to the east of the city of Stockton. This site subwatershed includes an upstream location (Duck Creek @ Drais Rd) which was sampled in 2008. The sampling location target coordinates are listed in Table I-1. Duck Creek drains a section of southern San Joaquin County between Stockton and the Lone Tree Creek site subwatershed. During the summer, flow is typically low in the creek. The creek channel was dredged over several months early in the 2007 irrigation season. The predominant land uses for irrigated agriculture are grains, hay and field crops. There are also relatively large amounts of deciduous nuts, truck farm/nursery, berry crops, irrigated pasture and vineyards in this site subwatershed. Figure I-1 illustrates the land use within this site subwatershed area.

Table I-1. Duck Creek site subwatershed sampling locations coordinates.

Site Name	Station Code	Target Latitude	Target Longitude
Duck Creek @ Highway 4*	531XDCAHF	37.9491	-121.1812
Duck Creek @ Drais Rd [U]	531XDCADR	37.9348	-121.0841

[U] Upstream sites
*Original SJCDWQC sampling site

Figure I-1. Duck Creek @ Hwy 4 site subwatershed land use map.



Subwatershed Monitoring History

Monitoring was initiated at Duck Creek @ Hwy 4 during the irrigation season of 2004 (Table I-2). Duck Creek @ Hwy 4 was not monitored during 2005, but sampling resumed during the irrigation season of 2006 and continued through the irrigation season of 2011. Table I-3 lists specific information on the analyses conducted across each of the monitoring seasons.

The Duck Creek @ Hwy 4 site subwatershed is a rotating Assessment Monitoring location within the French Camp Slough @ Airport Way Zone (Zone 2). Normal Monitoring occurred in 2004 and in 2006 through 2008 under the 2006 MRPP. Assessment Monitoring at Duck Creek @ Hwy 4 began under the current 2008 MRPP in October 2008 and was scheduled to continue through 2009. However, in March 2009 (Effective April 1, 2009) the Coalition received approval to revise their monitoring schedule, and Assessment Monitoring at Duck Creek @ Hwy 4 was rescheduled for 2012.

Additional MPM for chlorpyrifos was initiated at Duck Creek @ Hwy 4 in 2007 (September). Management Plan Monitoring continued in 2008 (May, July and September) at an upstream location (Duck Creek @ Drais Rd) in an effort to identify the sources of exceedances. In 2009, toxicity to *C. dubia* and *S. capricornutum* were added to the Duck Creek MPM schedule due to a second exceedance of both constituents in April 2008 (MPM occurred from April-September in 2009). In 2010, MPM was conducted for chlorpyrifos (all months of the irrigation season), diazinon (February), toxicity to *C. dubia* (April, July and September), and toxicity to *S. capricornutum* (February, April and May). During 2011, MPM was conducted for chlorpyrifos (April-September), diazinon (February), and toxicity to *C. dubia* (April, July, and September) and *S. capricornutum* (February, April, and May) at this site. Table I-4 lists all MPM dates and constituents for the Duck Creek subwatershed from 2007 through 2011.

During 2010, additional samples were collected for chlorpyrifos, diazinon, and sediment toxicity to *H. azteca* as part of a DPR grant to reduce the impact of agricultural discharge on water quality. DPR grant monitoring began in June 2010 and continued through February 2011 (Table I-4).

Duck Creek is currently on California's 2008-2010 303d List of Impaired Waterbodies for chlorpyrifos, *E. coli* and mercury.

Table I-2. Duck Creek @ Hwy 4 site subwatershed sampling events per season and year (including MPM).

Year	Season	Events Sampled	Events Not Sampled[1]	Total
2004	Irrigation	2	0	**2**
2005	Storm	NA	NA	**NA**
	Irrigation	NA	NA	**NA**
2006	Storm	NA	NA	**NA**
	Irrigation	5	0	**5**
2007	Storm	2	0	**2**
	Irrigation	7	0	**7**
2008	Storm	2	0	**2**
	Irrigation	6	0	**6**
	Fall	2	0	**2**
2009	Winter	3	0	**3**
	Storm	NA	NA	**NA**
	Irrigation	6	0	**6**
	Fall	NA	NA	**NA**
2010	Winter	1	0	**1**
	Storm	NA	NA	**NA**
	Irrigation	6	0	**6**
	Fall	3	0	**3**
2011	Winter	2	0	**2**
	Storm	NA	NA	**NA**
	Irrigation	6	0	**6**
	Fall	NA	NA	**NA**

[1] 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 I-3. Duck Creek @ Hwy 4 site subwatershed analyses performed per sampling season and year.

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

Method	Analyte	2004	2006	2007		2008			2009				2010				2011			
		Irrigation	Irrigation	Storm	Irrigation	Storm	Irrigation	Fall	Winter	Storm*	Irrigation	Fall*	Winter	Storm*	Irrigation	Fall	Winter	Storm*	Irrigation	Fall*
Field and Physical Parameters																				
NA	pH	2	5	3	8	3	9	2	3		6		1		7	3	2		6	
NA	Specific Conductivity	2	5	3	8	3	9	2	3		6		1		7	3	2		6	
NA	Dissolved Oxygen	2	4	3	8	3	9	2	3		6		1		7	3	2		6	
EPA 160.1	Dissolved Solids	2	5	2	6	2	6	2	3											
EPA 160.2	Suspended Solids					1		2	3											
EPA 180.1	Turbidity	2	5	2	6	2	6	2	3											
SM 9223 B	*E. coli*	2	5	2	6	2	6	2	3											
EPA 110.2	Color	2	5	2	6	1	6													
EPA 415.1	TOC	2	5	2	6	2	6	2	3											
Walkley-Black	TOC (sediment)														1					
ASTM D422	Grain size (sediment)														1					
EPA 405.1	BOD		1	2	2															
Carbamates																				
EPA 8321A	Aldicarb		5	2	6	2	6	2	3											
EPA 8321A	Carbaryl		5	2	6	2	6	2	3											
EPA 8321A	Carbofuran		5	2	6	2	6	2	3											
EPA 8321A	Methiocarb		5	2	6	2	6	2	3											
EPA 8321A	Methomyl		5	2	6	2	6	2	3											
EPA 8321A	Oxamyl		5	2	6	2	6	2	3											
Organochlorines																				
EPA 8081A	DDD		5	2	6	2	6	2	3											
EPA 8081A	DDE		5	2	6	2	6	2	3											
EPA 8081A	DDT		5	2	6	2	6	2	3											
EPA 8081A	Dicofol		5	2	6	2	6	2	3											
EPA 8081A	Dieldrin		5	2	6	2	6	2	3											
EPA 8081A	Endrin		5	2	6	2	6	2	3											
EPA 8081A	Methoxychlor		5	2	6	2	6	2	3											

Method	Analyte	2004	2006	2007		2008			2009				2010				2011			
		Irrigation	Irrigation	Storm	Irrigation	Storm	Irrigation	Fall	Winter	Storm*	Irrigation	Fall*	Winter	Storm*	Irrigation	Fall	Winter	Storm*	Irrigation	Fall*
Organophosphates																				
EPA 8141A	Azinphos methyl		5	2	6	2	6	2	3											
EPA 8141A	Chlorpyrifos	2	5	2	7	2	6	2	3		6					3	2		6	
EPA 8141A	Diazinon	2	5	2	6	2	6	2	3							3	2			
EPA 8141A	Dichlorvos					1		2	3											
EPA 8141A	Dimethoate		5	2	6	2	6	2	3											
EPA 8141A	Disulfoton		5	2	6	2	6	2	3											
EPA 8141A	Demeton-s					1		2	3											
EPA 8141A	Malathion		5	2	6	2	6	2	3											
EPA 8321A	Methamidophos		5	2	6	2	6	2	3											
EPA 8141A	Methidathion		5	2	6	2	6	2	3											
EPA 8141A	Parathion, Methyl		5	2	6	2	6	2	3											
EPA 8141A	Phorate		5	2	6	2	6	2	3											
EPA 8141A	Phosmet		5	2	6	2	6	2	3											
Group A Pesticides																				
EPA 8081A	Aldrin					1		2	3											
EPA 8081A	Chlordane					1		2	3											
EPA 8081A	Endosulfan I					1		2	3											
EPA 8081A	Endosulfan II					1		2	3											
EPA 8081A	HCH, alpha					1		2	3											
EPA 8081A	HCH, beta					1		2	3											
EPA 8081A	HCH, delta					1		2	3											
EPA 8081A	HCH, gamma					1		2	3											
EPA 8081A	Heptachlor					1		2	3											
EPA 8081A	Heptachlor epoxide					1		2	3											
EPA 8081A	Toxaphene					1		2	3											
Pyrethroids																				
EPA 8081A	Bifenthrin		5	2	6	1	6													
EPA 8081A	Cypermethrin	2	5	2	6	1	6													
EPA 8081A	Cyhalothrin, lambda	2	5	2	6	1	6													
EPA 8081A	Permethrin	2	5	2	6	1	6													

Method	Analyte	2004	2006	2007		2008			2009				2010				2011			
		Irrigation	Irrigation	Storm	Irrigation	Storm	Irrigation	Fall	Winter	Storm*	Irrigation	Fall*	Winter	Storm*	Irrigation	Fall	Winter	Storm*	Irrigation	Fall*
EPA 8081A	Cyfluthrin		5	2	6	1	6													
EPA 8081A	Esfenvalerate/ Fenvalerate	2	5	2	6	1	6													
Triazines																				
EPA 619	Atrazine		5	2	6	2	6	2	3											
EPA 619	Cyanazine		5	2	6	2	6	2	3											
EPA 8321A	Diuron		5	2	6	2	6	2	3											
EPA 547M	Glyphosate		5	2	6	2	6	2	3											
EPA 8321A	Linuron		5	2	6	2	6	2	3											
EPA 8141A	Molinate		5	2	6	1	6													
EPA 549.2M	Paraquat dichloride		5	2	6	2	6	2	3											
EPA 619	Simazine		5	2	6	2	6	2	3											
EPA 8141A	Thiobencarb		5	2	6	1	6													
EPA 8141A	Trifluralin					1		2	3											
Metals (Total)																				
EPA 200.8	Arsenic					1	6	2	3											
EPA 200.8	Boron					1	6	2	3											
EPA 200.8	Cadmium					1	6	2	3											
EPA 200.8	Copper					1	6	2	3											
EPA 200.8	Lead					1	6	2	3											
EPA 200.8	Molybdenum					1		2	3											
EPA 200.8	Nickel					1	6	2	3											
EPA 200.8	Selenium					1	6	2	3											
EPA 200.8	Zinc					1	6	2	3											
Metals (Dissolved)																				
EPA 200.8	Cadmium					1		2	3											
EPA 200.8	Copper					1		2	3											
EPA 200.8	Lead					1		2	3											
EPA 200.8	Nickel					1		2	3											
EPA 200.8	Zinc					1		2	3											
Nutrients																				
EPA 350.2	Ammonia as N					1	6	2	3											

Method	Analyte	2004	2006	2007		2008			2009				2010				2011			
		Irrigation	Irrigation	Storm	Irrigation	Storm	Irrigation	Fall	Winter	Storm*	Irrigation	Fall*	Winter	Storm*	Irrigation	Fall	Winter	Storm*	Irrigation	Fall*
SM 2340 C	Hardness as CaCO3					1	6	2	3											
EPA 300.0	Nitrate as N						6													
EPA 354.1	Nitrite as N						6													
EPA 353.2	Nitrate + Nitrite as N					1		2	3											
EPA 351.3	Nitrogen, Total Kjeldahl					1	6	2	3											
EPA 365.2	OrthoPhosphate as P					1	6	2	3											
EPA 365.2	Phosphate as P					1	6	2	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	*Ceriodaphnia dubia*	2	6	2	6	2	8	2	5		3				3				3	
EPA 821-02-012	*Pimephales promelas*	2	5	2	6	2	6	2	5											
EPA 821-02-013	*Selenastrum capricornutum*	2	5	3	6	2	8	2	5		2		1		2		1		2	
EPA 600/R-99-064	*Hyalella azteca*	2	1	1	1		1								2					

*Site not sampled in 2005, 2009 storm and fall seasons, 2010 storm season, and 2011 storm and fall seasons.

Table I-4. Duck Creek site subwatershed Management Plan Monitoring schedule (2007-2011).

Site Name	Sample Date	Monitoring Type	Chlorpyrifos	Diazinon	*C. dubia*	*S. capricornutum*	*H. azteca*
Duck Creek @ Hwy 4	25-Sep-07	A	X				
Duck Creek @ Drais Rd	5-May-08	U	X				
Duck Creek @ Drais Rd	15-Jul-08	U	X				
Duck Creek @ Drais Rd	16-Sep-08	U	X				
Duck Creek @ Hwy 4	14-Apr-09	MPM	X		X	X	
Duck Creek @ Hwy 4	12-May-09	MPM	X			X	
Duck Creek @ Hwy 4	9-Jun-09	MPM	X				
Duck Creek @ Hwy 4	14-Jul-09	MPM	X		X		
Duck Creek @ Hwy 4	11-Aug-09	MPM	X				
Duck Creek @ Hwy 4	15-Sep-09	MPM	X		X		
Duck Creek @ Hwy 4	9-Feb-10	MPM		X		X	
Duck Creek @ Hwy 4	13-Apr-10	MPM	X		X	X	
Duck Creek @ Hwy 4	11-May-10	MPM	X			X	
Duck Creek @ Hwy 4	8-Jun-10	MPM	X[1]	X[2]			
Duck Creek @ Hwy 4	13-Jul-10	MPM	X[1]	X[2]	X		
Duck Creek @ Hwy 4	10-Aug-10	MPM	X[1]	X[2]			
Duck Creek @ Hwy 4	7-Sep-10	MPM	X[1]	X[2]	X		X[2]
Duck Creek @ Hwy 4	12-Oct-10	MPM	X[2]	X[2]			
Duck Creek @ Hwy 4	9-Nov-10	MPM	X[2]	X[2]			
Duck Creek @ Hwy 4	7-Dec-10	MPM	X[2]	X[2]			
Duck Creek @ Hwy 4	11-Jan-11	MPM	X[2]	X[2]			
Duck Creek @ Hwy 4	8-Feb-11	MPM	X[2]	X[1]		X	
Duck Creek @ Hwy 4	12-Apr-11	MPM	X		X	X	
Duck Creek @ Hwy 4	24-May-11	MPM	X			X	
Duck Creek @ Hwy 4	28-Jun-11	MPM	X				
Duck Creek @ Hwy 4	26-Jul-11	MPM	X		X		
Duck Creek @ Hwy 4	23-Aug-11	MPM	X				
Duck Creek @ Hwy 4	20-Sep-11	MPM	X		X		

[1]MPM and Department of Pesticide Regulation (DPR) grant monitoring.
[2]DPR grant monitoring
A – Additional sampling
U – Upstream sampling
X – Constituent sampled for Management Plan Monitoring (MPM).

Exceedance History

Ambient water monitoring within the Duck Creek subwatershed was initiated in the 2004 irrigation sampling season. Samples collected from sampling the Duck Creek site subwatersheds (Duck Creek @ Hwy 4 and Duck Creek @ Drais Rd), from 2006 through 2011 resulted in exceedances of the WQTLs for DO (37), pH (4), *E. coli* (6), chlorpyrifos (19), diazinon (1), and malathion (1). Toxicity to *C. dubia* (7)*, S. capricornutum* (3) and *H. azteca* (1) occurred (Table I-5).

Samples from 2011 included exceedances of the WQTL for DO (4), chlorpyrifos (1), and one for *C. dubia* toxicity.

All exceedances are listed in Table I-5 by season and date and are based on WQTLs listed in the introduction of the SJCDWQC 2008 Management Plan (approved January 23, 2009). The priority level (A-E) assigned to each constituent is listed in the bottom row of Table I-5 and is determined using the SJCDWQC Management Plan prioritization process flow chart (MPUR 2010 Figure 3, page 17). The highest priority constituents for the Duck Creek subwatershed are chlorpyrifos and diazinon (A/B) and *C. dubia* toxicity (D). There was no change to constituent priority following 2011 exceedances.

Table I-5. Duck Creek site subwatershed exceedances (2006-2011).

The WQTLs are listed in the header after the analyte. Data sorted by season and date. 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	Chlorpyrifos, > 0.015 µg/L	Diazinon, > 0.1 µg/L	Malathion, > 0 µg/L	*C. dubia*, (% Control)	*S. capricornutum*, (% Control)	*H. azteca*, (% Control)
Duck Creek @ Hwy 4	Irrigation	5/16/2006	5.6		2400	0.029					
Duck Creek @ Hwy 4	Irrigation	6/20/2006	4.5		330						
Duck Creek @ Hwy 4	Irrigation	7/18/2006	5.5								
Duck Creek @ Hwy 4	Irrigation	8/15/2006		6.43							
Duck Creek @ Hwy 4	Irrigation	9/19/2006				0.15			0		
Duck Creek @ Hwy 4	Storm	2/11/2007			820						
Duck Creek @ Hwy 4	Storm	2/28/2007			2400		0.11			77	
Duck Creek @ Hwy 4	Storm	3/6/2007	5.8								
Duck Creek @ Hwy 4	Irrigation	4/10/2007			290						
Duck Creek @ Hwy 4	Irrigation	6/12/2007		8.66							
Duck Creek @ Hwy 4	Irrigation	7/10/2007	6.67			0.024					
Duck Creek @ Hwy 4	Irrigation	8/9/2007	6.54								
Duck Creek @ Hwy 4	Irrigation	9/4/2007	6.99			0.025					
Duck Creek @ Hwy 4	Irrigation	9/25/2007	5.83			0.029					
Duck Creek @ Hwy 4	Storm	1/23/2008			240						
Duck Creek @ Hwy 4	Irrigation	4/15/2008				0.057			0	42	
Duck Creek @ Hwy 4	Irrigation	4/23/2008							0		
Duck Creek @ Drais Rd	*Irrigation*	*5/13/2008*	*6*	*6.05*		*0.42*					
Duck Creek @ Hwy 4	Irrigation	5/13/2008	6.95	6.31						6	
Duck Creek @ Hwy 4	Irrigation	6/10/2008	6.89			0.11		0.22			
Duck Creek @ Drais Rd	*Irrigation*	*7/15/2008*	*2.66*								
Duck Creek @ Hwy 4	Irrigation	7/15/2008	5.87			0.066			0		
Duck Creek @ Hwy 4	Irrigation	7/22/2008	4.92						0		
Duck Creek @ Hwy 4	Irrigation	8/12/2008	6			0.017					
Duck Creek @ Hwy 4	Irrigation	8/13/2008	5.34								
Duck Creek @ Drais Rd	*Irrigation*	*9/16/2008*	*3.99*								
Duck Creek @ Hwy 4	Irrigation	9/16/2008	5.92			0.027					
Duck Creek @ Hwy 4	Fall	11/4/2008	5.38								
Duck Creek @ Hwy 4	Winter	3/10/2009	5.4								
Duck Creek @ Hwy 4	Irrigation	5/12/2009	6.43								

Site Name	Season	Sample Date	Oxygen, Dissolved, < 7 mg/L	pH, <6.5 and >8.5 units	*E. coli*, > 235 MPN/100 mL	Chlorpyrifos, > 0.015 µg/L	Diazinon, > 0.1 µg/L	Malathion, > 0 µg/L	*C. dubia*, (% Control)	*S. capricornutum*, (% Control)	*H. azteca*, (% Control)
Duck Creek @ Hwy 4	Irrigation	6/9/2009	6.74			0.07					
Duck Creek @ Hwy 4	Irrigation	7/14/2009	4.5			0.15			0		
Duck Creek @ Hwy 4	Irrigation	8/11/2009	4.6			0.031					
Duck Creek @ Hwy 4	Irrigation	9/15/2009	5.62								
Duck Creek @ Hwy 4	Irrigation	4/13/2010	6.60								
Duck Creek @ Hwy 4	Irrigation	5/11/2010				0.055					
Duck Creek @ Hwy 4	Irrigation	6/8/2010	0.44								
Duck Creek @ Hwy 4	Irrigation	7/13/2010	6.48			0.02					
Duck Creek @ Hwy 4	Irrigation	8/10/2010	5.07			0.30					
Duck Creek @ Hwy 4	Irrigation	9/7/2010	6.11			0.023					
Duck Creek @ Hwy 4	Sediment	9/14/2010	4.51								17
Duck Creek @ Hwy 4	Fall	10/12/2010	5.60								
Duck Creek @ Hwy 4	Fall	11/9/2010	6.01								
Duck Creek @ Hwy 4	Irrigation	6/28/2011	5.57								
Duck Creek @ Hwy 4	Irrigation	7/26/2011	6.30								
Duck Creek @ Hwy 4	Irrigation	8/23/2011	6.15								
Duck Creek @ Hwy 4	Irrigation	9/20/2011	6.54			0.12			35		
		Constituent Priority	**E**	**E**	**E**	**A/B**	**A/B**	**NP**	**D**	**E**	**NP**

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

2007 - 2011 Management Plan Monitoring Results

All monitoring results for high priority management plan constituents in the Duck Creek @ Hwy 4 subwatershed are listed in Table I-6. These constituents include chlorpyrifos, diazinon and water column toxicity to *C. dubia* and *S. capricornutum*.

Chlorpyrifos was added to the Duck Creek MPM schedule in 2007 after samples exceeded the WQTL twice during the 2006 irrigation season. During 2007, Normal Monitoring and additional chlorpyrifos MPM (September) occurred at Duck Creek @ Highway 4 and resulted in exceedances in July and September. During 2008 Normal Monitoring, chlorpyrifos was sampled at Duck Creek @ Hwy 4 and at Duck Creek @ Drais Rd (May, July and September) during upstream MPM. Samples collected during every irrigation month of Normal Monitoring resulted in an exceedance of the chlorpyrifos WQTL, except May; however, an exceedance did occur in samples collected in May from the upstream MPM location at Drais Rd. Both Normal Monitoring and MPM for chlorpyrifos occurred in 2009. Due to the monitoring schedule change, Normal Monitoring only occurred from January through March and no exceedances occurred. During 2009 MPM, exceedances of the chlorpyrifos WQTL occurred (June, July and August). In 2010, MPM resulted in four exceedances (May, July, August and September). Samples were collected to analyze for chlorpyrifos as part of DPR grant monitoring from June 2010 through February 2011. During September 2011, one exceedance of chlorpyrifos occurred in MPM. In 2012, Duck Creek @ Hwy 4 is scheduled for Assessment Monitoring where chlorpyrifos samples will be analyzed monthly.

The single exceedance of diazinon in samples collected from Duck Creek @ Hwy 4 during February 2007 led to the constituent being prioritized as a high priority constituent the following year. Diazinon has been monitored continuously in February at Duck Creek @ Hwy 4 since 2008, including Normal Monitoring (2009), MPM (2010), and DPR grant monitoring (2010). In 2011, there were no detections of diazinon during DPR grant monitoring in January or MPM in February.

Toxicity to *C. dubia* was added to the MPM schedule in 2009 after the first exceedance occurred in September 2006 and a second exceedance in April 2008. In 2009, MPM was conducted for *C. dubia* toxicity (April, July and September). The July samples were toxic to *C. dubia* and coincided with an exceedance of chlorpyrifos from the same sampling event. In 2010 and 2011, MPM also occurred during months of past exceedances (April, July and September), no toxicity occurred in 2010; however, the September 2011 sample was toxic and again coincided with a chlorpyrifos exceedance. As stated above, in 2012 Duck Creek @ Hwy 4 is scheduled for Assessment Monitoring, and toxicity to *C. dubia* will be analyzed for during every sampling event.

This first toxicity to *S. capricornutum* occurred in February 2007 (during storm sampling). Following toxicities during the 2008 irrigation season (April and May), toxicity to *S. capricornutum* was added to the MPM schedule in 2009. The TIE's conducted on the April and May 2008 toxicities were inconclusive, as the samples lost toxicity prior to the initiation of the TIE. *S. capricornutum* continued to be monitored as part of MPM in 2010 and 2011, and is scheduled for MPM in 2012 (February, April and May).

Table I-6. Duck 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 (@ Hwy 4)	Date	NA	NA	NA	4/10/07	5/22/07	6/12/07	7/10/07	8/07/07	9/04/07	NA	NA	NA
	Chlorpyrifos (µg/L)	NA	NA	NA	<0.003	<0.003	<0.003	**0.024**	<0.003	**0.025**	NA	NA	NA
2007 MPM A (@ Hwy 4)	Date	NA	NA	NA	NA	NA	NA	NA	NA	9/25/07	NA	NA	NA
	Chlorpyrifos (µg/L)	NA	NA	NA	NA	NA	NA	NA	NA	**0.029**	NA	NA	NA
2008 NM (@Hwy 4)	Date	1/23/08	NA	NA	4/15/08	5/13/08	6/10/08	7/15/08	8/12/08	9/16/08	10/14/08	11/4/08	12/9/08
	Chlorpyrifos (µg/L)	0.0081	NA	NA	**0.057**	<0.003	**0.110**	**0.066**	**0.017**	**0.027**	<0.003	<0.003	<0.003
	Diazinon (µg/L)	0.018	NA	NA	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004
2008 MPM US (@ Drais Rd)	Date	NA	NA	NA	NA	5/13/08	NA	7/15/08	NA	9/16/08	NA	NA	NA
	Chlorpyrifos (µg/L)	NA	NA	NA	NA	**0.420**	NA	<0.003	NA	<0.003	NA	NA	NA
2009 NM (@Hwy 4)[1]	Date	1/13/09	2/10/09	3/10/09	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Chlorpyrifos (µg/L)	0.005	0.0037	<0.003	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Diazinon (µg/L)	0.012	<0.004	<0.004	NA	NA	NA	NA	NA	NA	NA	NA	NA
	C. dubia toxicity (% Control)	100	100	100	NA	NA	NA	NA	NA	NA	NA	NA	NA
	S. capricornutum toxicity (% Control)	136	188	147	NA	NA	NA	NA	NA	NA	NA	NA	NA
2009 MPM (@ Hwy 4)	Date	NA	NA	NA	4/14/09	5/12/09	6/09/09	7/14/09	8/11/09	9/15/09	NA	NA	NA
	Chlorpyrifos (µg/L)	NA	NA	NA	<0.003	0.011	**0.070**	**0.150**	**0.031**	<0.003	NA	NA	NA
	C. dubia toxicity (% Control)	NA	NA	NA	100	NA	NA	**0**	NA	100	NA	NA	NA
	S. capricornutum toxicity (% Control)	NA	NA	NA	516	498	NA	NA	NA	NA	NA	NA	NA
2010 MPM (@ Hwy 4)	Date	NA	2/9/10	NA	4/13/10	5/11/10	6/8/10	7/13/10	8/10/10	9/7/10	10/12/10	11/9/10	12/7/10
	Chlorpyrifos (µg/L)	NA	NA	NA	<0.003	**0.055**	<0.003	**0.02**	**0.3**	**0.023**	<0.003*	<0.003*	<0.003*
	Diazinon (µg/L)	NA	<0.004	NA	NA	NA	<0.004*	<0.004*	<0.004*	<0.004*	<0.004*	<0.004*	<0.004*
	C. dubia toxicity (% Control)	NA	NA	NA	100	NA	NA	100	NA	100	NA	NA	NA
	S. capricornutum toxicity (% Control)	NA	660	NA	992	1136	NA	NA	NA	NA	NA	NA	NA
	H. azteca toxicity (% Control)	NA	NA	NA	NA	NA	NA	NA	NA	**17**	NA	NA	NA

	Month:	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2011 MPM (@ Hwy 4)	Date	1/11/11	2/8/11	NA	4/12/11	5/24/11	6/28/11	7/26/11	8/23/11	9/20/11	NA	NA	NA
	Chlorpyrifos (µg/L)	<0.003*	0.004*	NA	<0.003	<0.003	<0.003	<0.003	<0.003	**0.12**	NA	NA	NA
	Diazinon (µg/L)	<0.004*	<0.004	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	C. dubia toxicity (% Control)	NA	NA	NA	95	NA	NA	100	NA	**35**	NA	NA	NA
	S. capricornutum toxicity (% Control)	NA	994	NA	1204	826	NA	NA	NA	NA	NA	NA	NA

[1] Assessment Monitoring at Duck Creek @ Hwy 4 began under the current 2008 MRPP in October 2008 and was scheduled to continue through 2009; however, in March 2009 (Effective April 1, 2009) the Coalition received approval to revise their monitoring schedule, and Assessment Monitoring was rescheduled for 2012.
A – Additional Monitoring, 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 Monitoring, conducted in 2008 only.
*Additional Department of Pesticide Regulation (DPR) grant monitoring.

Load Calculations

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

Load = Discharge (cfs) X 28.317L/ft^3 X Concentration (mg/L X 1000 or µg/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 that samples were collected.

Table I-7. Duck Creek site subwatershed instantaneous load calculations for chlorpyrifos and diazinon.
Sorted by analyte and date.

Site Name	Analyte Name	Sample Date	Discharge cfs	Concentration µg/L	Loading Rate µg/sec
Duck Creek @ Hwy 4	Chlorpyrifos	05/16/06	12.68	0.029	10.41
Duck Creek @ Hwy 4	Chlorpyrifos	09/19/06	6.02	0.15	25.57
Duck Creek @ Hwy 4	Chlorpyrifos	07/10/07	14.43	0.024	9.81
Duck Creek @ Hwy 4	Chlorpyrifos	09/04/07	0	0.025	0
Duck Creek @ Hwy 4	Chlorpyrifos	09/25/07	2.16	0.029	1.77
Duck Creek @ Hwy 4	Chlorpyrifos	01/23/08	2.11	0.0081	0.48
Duck Creek @ Hwy 4	Chlorpyrifos	04/15/08	13.07	0.057	21.10
Duck Creek @ Hwy 4	Chlorpyrifos	06/10/08	15.51	0.11	48.31
Duck Creek @ Hwy 4	Chlorpyrifos	07/15/08	13.67	0.066	25.55
Duck Creek @ Hwy 4	Chlorpyrifos	08/12/08	4.97	0.017	2.39
Duck Creek @ Hwy 4	Chlorpyrifos	09/16/08	20.8	0.027	15.90
Duck Creek @ Hwy 4*	Chlorpyrifos	01/13/09	0	0.0048	0
Duck Creek @ Hwy 4	Chlorpyrifos	01/13/09	0	0.005	0
Duck Creek @ Hwy 4	Chlorpyrifos	02/10/09	0	0.0037	0
Duck Creek @ Hwy 4	Chlorpyrifos	05/12/09	5.57	0.011	1.73
Duck Creek @ Hwy 4	Chlorpyrifos	06/09/09	11.54	0.07	22.87
Duck Creek @ Hwy 4	Chlorpyrifos	07/14/09	23.44	0.15	99.56
Duck Creek @ Hwy 4	Chlorpyrifos	05/11/10	18.49	0.055	28.80
Duck Creek @ Hwy 4	Chlorpyrifos	07/13/10	20.73	0.02	11.74
Duck Creek @ Hwy 4	Chlorpyrifos	09/07/10	14.56	0.023	9.48
Duck Creek @ Hwy 4	Chlorpyrifos	02/08/11	0	0.004	0
Duck Creek @ Hwy 4	Diazinon	02/11/07	0	0.055	0
Duck Creek @ Hwy 4	Diazinon	02/28/07	45.83	0.11	142.75
Duck Creek @ Hwy 4	Diazinon	01/23/08	2.11	0.018	1.08
Duck Creek @ Hwy 4	Diazinon	01/13/09	0	0.012	0

*Field Duplicate

Source Identification and Outreach

The Coalition addressed source identification for the Duck Creek @ Hwy 4 subwatershed in the 2011 MPUR and, in the following sections, includes 2011 monitoring results and Pesticide Use Report (PUR) data as they expand upon that discussion. The Coalition focuses its efforts on applied pesticides. The PUR data were available for review through May 2011 for San Joaquin County. Given that any data included after May 2011 is preliminary, yearly evaluations are only considered complete through 2010.

In 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. From 2009 through 2011, MPM continued at the Duck Creek @ Hwy 4 site during months of past exceedances to assess water quality in the subwatershed as outreach in the area progressed.

Since the Duck Creek subwatershed became high priority in 2008, the Coalition has actively engaged in grower outreach and education to address the Duck Creek management plan's priority constituents. The Coalition organized meetings and mailings to educate growers about management practices and their importance in achieving acceptable water quality. Individual grower meetings and follow up meetings with targeted members informed growers about management practices as well as assessed current and newly implemented management practices. Furthermore, 12 additional contacts were made in 2010 via individual meetings to growers who farm adjacent to the creek and currently use chlorpyrifos. As a result of these meetings, eight of the twelve growers contacted implemented new management practices in 2010; one of the 12 growers contacted implemented additional practices to those already implemented in 2009. Additional focused outreach in 2010 represents a total of 2,552 enrolled irrigated acres. While new management practices (including reducing the use of chlorpyrifos or switching to a different product) were implemented as a result of these efforts, water quality data indicates that it would be beneficial for growers to implement additional management practices specific to chlorpyrifos.

Topics to be discussed during additional outreach meetings include managing storm and irrigation runoff (including improving water infiltration, capturing and/or recycling runoff water, and treating runoff with Landguard or PAM), reducing drift to water sources (including noting application conditions, equipment, product choice, buffer zones, and application method) as well as discontinuing, reducing, or changing the type of pesticide used (switching from liquid to granule form). Additional outreach is scheduled to occur in 2012.

Priority A/B Constituents

Chlorpyrifos and diazinon are both priority A/B constituents included in the Duck Creek @ Hwy 4 site subwatershed management plan.

Chlorpyrifos

Nineteen exceedances of the chlorpyrifos WQTL (0.015 µg/L) occurred during the irrigation season in samples collected from 2006 through 2011 during Normal Monitoring and MPM, including one

exceedance at the upstream sampling location in 2008 (Table I-5). Five of the 19 exceedances were associated with *C. dubia* toxicity.

The PUR data for chlorpyrifos were reviewed for the period 2004 through available 2011 data for the number of applications, amount of the active ingredient (AI) applied (pounds applied), and acres treated (Table I-8, Figure I-2). The greatest chlorpyrifos use occurred in 2006 (8,054 lbs AI), while the lowest use occurred in 2010 (3,607 lbs AI). Although use in 2009 did increase, overall use of chlorpyrifos in this subwatershed decreased significantly since 2006. Peak use of chlorpyrifos consistently occurs from March through July (Table I-8, Figure I-2). Exceedances do not always occur during months of the greatest use (Figure I-2).

The Coalition also uses PUR data to assess which crops receive the most applications of chlorpyrifos (Table I-9). The highest amounts of chlorpyrifos applied from 2004 through 2011 were associated with walnuts (31,296 lbs AI) followed by corn (2,587 lbs AI) and alfalfa (2,543 lbs AI). The Coalition focused its outreach to target growers farming these crops. The most common product containing chlorpyrifos used within this subwatershed was Lorsban (Table I-9).

Table I-8. Duck Creek site subwatershed chlorpyrifos applications, lbs AI applied, and acres treated by month (2004-2011).

PUR data available through May 2011 for San Joaquin County; all PUR data after May 2011 are preliminary. If a month is not included in the table, no applications were made.

Month/Year	Number of Chlorpyrifos Applications	Pounds of AI Applied	Acres Treated
March, 2004	15	573.7	484
April, 2004	4	384.4	360
May, 2004	13	1024.9	569
June, 2004	6	755.3	662.5
July, 2004	17	2042.5	1032
August, 2004	19	1955.5	1115
September, 2004	1	120.1	60
October, 2004	14	1197.5	533.8
March, 2005	10	274.9	343
April, 2005	6	225.7	383
May, 2005	11	1361.9	881
June, 2005	12	973.6	486.5
July, 2005	24	2346.0	1771
August, 2005	13	784.1	634.5
September, 2005	4	75.1	140
October, 2005	1	80.4	80
March, 2006	1	18.6	40
April, 2006	2	38.5	50
May, 2006	24	2205.8	1456
June, 2006	14	1450.3	933.5
July, 2006	18	1942.9	1534
August, 2006	20	1170.7	1015
September, 2006	4	173.7	293
October, 2006	1	114.1	57
March, 2007	13	806.2	672.2
April, 2007	11	509.4	563.2
May, 2007	12	1138.2	776.7
June, 2007	5	644.0	364
July, 2007	9	628.3	679
August, 2007	8	293.6	264
September, 2007	1	46.0	23
October, 2007	1	42.5	42.5
March, 2008	13	756.5	642
April, 2008	9	358.7	360
May, 2008	14	1429.6	750
June, 2008	1	24.0	24
July, 2008	15	1053.2	820
August, 2008	1	34.0	17
February, 2009	1	1.6	46.8
March, 2009	14	492.4	618
April, 2009	2	23.0	23

Month/Year	Number of Chlorpyrifos Applications	Pounds of AI Applied	Acres Treated
May, 2009	18	1442.9	1082
June, 2009	10	867.5	442.8
July, 2009	23	2103.9	1179
August, 2009	9	583.3	418
September, 2009	1	46.0	23
October, 2009	1	80.8	43
November, 2009	4	525.8	280
March, 2010	6	208.0	255
April, 2010	18	1267.1	1550
May, 2010	1	4.5	12
June, 2010	6	915.4	466
July, 2010	14	607.7	502
August, 2010	11	513.7	429
September, 2010	4	90.3	120
May, 2011	5	292.3	197
June, 2011	1	75.1	40
July, 2011	2	105.2	56
August, 2011	4	527.7	281
September, 2011	3	64.8	34.5
Summaries by Year			
2004 Total	89	8053.9	4816.28
2005 Total	81	6121.6	4719
2006 Total	84	7114.6	5378.5
2007 Total	60	4108.2	3384.6
2008 Total	53	3656.1	2613
2009 Total	83	6167.2	4155.6
2010 Total	60	3606.6	3334
2011 Total	15	1065.1	608.5
Total	**525**	**39893.4**	**29009.48**

Figure I-2. Duck Creek @ Hwy 4 site subwatershed lbs chlorpyrifos applied by month (2004-2011).

PUR data available through May 2011 for San Joaquin County; all PUR data after May 2011 are preliminary. Asterisk (*) denotes months with exceedances.

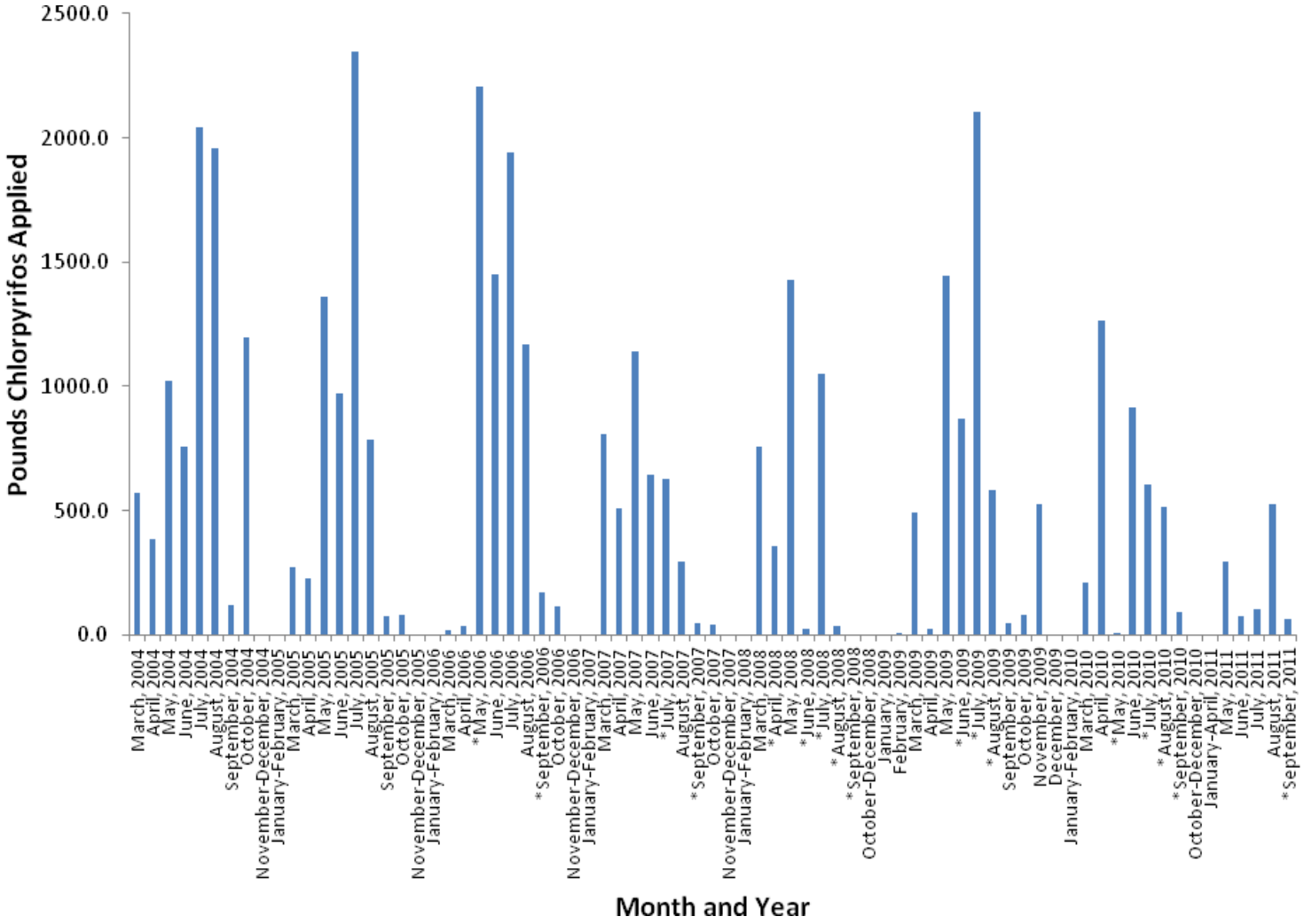


Table I-9. Duck Creek @ Hwy 4 subwatershed chlorpyrifos PUR data (2004-2011).

PUR data available through May 2011 for San Joaquin County; all PUR data after May 2011 are preliminary.

Chemical Name	Commodity	Product Name	Lbs AI Applied
CHLORPYRIFOS	ALFALFA (FORAGE - FODDER) (ALFALFA HAY)	GOVERN 4E INSECTICIDE	20.2
		LOCK-ON INSECTICIDE	1844.1
		LORSBAN 4E-HF	334.0
		LORSBAN-4E	345.1
	APPLE	LORSBAN 4E-HF	346.6
		LORSBAN ADVANCED	165.3
		LORSBAN-4E	601.7
	CORN (FORAGE - FODDER)	CHLORPYRIFOS 4E AG	130.3
		GOVERN 4E INSECTICIDE	72.7
		LORSBAN 15G GRANULAR INSECTICIDE	1906.1
		LORSBAN-4E	18.0
		NUFOS 15G	460.4
	GRAPES	LORSBAN 4E-HF	1197.5
		LORSBAN-4E	120.1
	GRAPES (WINE)	LORSBAN ADVANCED	606.6
		NUFOS 4E	123.6
	N-OUTDR CONTAINER/FLD GRWN PLANTS	DURSBAN 50W INSECTICIDE IN WATER SOLUBLE PACKETS	111.4
		ESTATE INSECTICIDE	21.6
	ONION (DRY, SPANISH, WHITE, YELLOW, RED, ETC.)	LORSBAN 15G GRANULAR INSECTICIDE	82.0
	SOIL APPLICATION, PREPLANT-OUTDOOR (SEEDBEDS,ETC.)	LORSBAN 15G GRANULAR INSECTICIDE	90.0
	WALNUT (ENGLISH WALNUT, PERSIAN WALNUT)	CHLORPYRIFOS 4E AG	607.3
		DURSBAN 4E-N	114.1
		GOVERN 4E INSECTICIDE	4361.5
		LORSBAN 4E INSECTICIDE	2164.4
		LORSBAN 4E-HF	2607.8
		LORSBAN ADVANCED	2556.7
		LORSBAN-4E	17534.0
		NUFOS 4E	1350.7

ALFALFA - Total Pounds Chlorpyrifos Applied	**2543.4**
APPLE - Total Pounds Chlorpyrifos Applied	**1113.5**
CORN - Total Pounds Chlorpyrifos Applied	**2587.4**
GRAPES - Total Pounds Chlorpyrifos Applied	**2047.8**
N-OUTDR CONTAINER - Total Pounds Chlorpyrifos Applied	**132.9**
ONION - Total Pounds Chlorpyrifos Applied	**82.0**
SOIL APPLICATION - Total Pounds Chlorpyrifos Applied	**90.0**
WALNUT - Total Pounds Chlorpyrifos Applied	**31296.4**
Total Pounds Chlorpyrifos Applied (2004-2011)	**39893.4**

Previous analyses conducted by the Coalition and reported in the 2009 MPUR suggest that the chlorpyrifos concentration in the Duck Creek waterway increases as both the application rate and the total pounds applied increase. These results prompted the Coalition to focus on management of chlorpyrifos in this watershed by providing information to growers to determine if irrigation return flows are managed properly, specifically to growers whose parcels have the potential to drain to the creek. Representatives of the Coalition also discussed spray drift management with growers that farm parcels adjacent to the creek.

Since 2007, Coalition outreach included grower meetings and the mailing/distribution of information. A complete list of Coalition outreach in high priority subwatersheds during 2011 is provided in the Performance Goals and Schedules section of this report. The Coalition focused on outreach to growers who used chlorpyrifos within the last two years and contacted grower permittees associated with the targeted growers. Beginning in the fall of 2008, the Coalition made several individual contacts with permittees and/or growers to discuss the Duck Creek management plan strategy and relevant management practices. The Coalition also hosted a subwatershed grower meeting in November 2008 and invited members and growers to various informational meetings from 2009 through 2011, most recently a meeting hosted by MVP Safety Consulting in December 2011. The main focus of these meetings was to further expand their grower audience as well as highlight chlorpyrifos management practices. Although meetings focused mainly on chlorpyrifos exceedances, all water quality results were reviewed and discussed including exceedances of the diazinon WQTL, *C. dubia* and *S. capricornutum* toxicities, and exceedances of the WQTLs for *E. coli*, pH, and DO. 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. The Coalition received surveys back from all 35 targeted members and thus achieved 100% of targeted grower contact/response.

The Coalition contacted members in 2010 to determine what additional management practices were implemented in 2009 and if additional practices were planned for 2010. Of the initial 35 targeted growers, 19 members were required to participate in filling out a follow up survey. To date, 100% of the follow up meetings with growers in the Duck Creek subwatershed are completed by all members who planned to implement new management practices. Additionally, 12 members within the Duck Creek subwatershed were targeted for additional focused outreach and were contacted in 2010 to discuss management practices associated with chlorpyrifos use. Of the 12 growers who were contacted for additional focused outreach in 2010, nine implemented new management practices as a result of the additional outreach, bringing the total number of members in Duck Creek with newly implemented practices to 28. Of these 28 growers, 62% of acres with recorded practices reduced use of pesticides found in exceedances, 19% of acres with recorded practices are using center grass rows, grass waterways/grass filter strips, 11% of acres with recorded practices reduced runoff water volumes using irrigation management and 8% of acres with recorded practices installed sprinkler or micro irrigation.

To date, 39 members (including members contacted as part of additional focused outreach in 2010) representing 6,310 acres within the Duck Creek @ Hwy 4 subwatershed have been contacted. The grower's acreages with newly implemented management practices represent 89% (4,427 acres) of the 4,978 originally targeted acres. The Coalition assessed results in the First Priority Summary of Management Practices section of this report.

During 2011, MPM at Duck Creek @ Hwy 4 resulted in additional exceedance of the chlorpyrifos WQTL in September. Due to the continued exceedances of the chlorpyrifos WQTL in 2011, the Coalition will conduct MPM in 2012 to assess the water quality in Duck Creek. Duck Creek @ Hwy 4 is scheduled for

MPM for chlorpyrifos from April through September 2011. Furthermore, in 2012, an additional three growers representing 563 member acres are targeted for supplementary focused outreach based on their recent use of chlorpyrifos and associations with the recent exceedances. Outreach will focus mainly on discontinuing the use of chlorpyrifos; however, improved management practices such as recycling runoff water and using buffer zones will be discussed for all pesticides in use.

Diazinon

The concentration of diazinon in a sample collected during storm monitoring in February 2007 exceeded the WQTL of 0.1µg/L (Table I-5). This is the only exceedance of diazinon that occurred in this subwatershed since Coalition monitoring was initiated in 2004 and sources of this exceedance were discussed in the June 30, 2008 SAMR. During 2011, MPM for diazinon (February) and DPR grant monitoring for diazinon (January and February) resulted in no exceedances.

The PUR data from 2004 through data available for 2011 for the Duck Creek @ Hwy 4 subwatershed were reviewed for diazinon use. The largest amount of diazinon was applied in 2007 (566 lbs AI) while the smallest amount was applied in 2009 (40 lbs AI), see Table I-10, Figure I-3. The amount of diazinon applied in this subwatershed in 2010 (292 lbs AI) decreased by almost 50% compared to 2007 (566 lbs AI).

The Coalition also reviewed PUR data for diazinon applications in the Duck Creek @ Hwy 4 subwatershed to determine which crops received the greatest amount (Table I-11). Cherry orchards received the greatest number of pounds of applied diazinon from 2005 to 2011 (2,104 lbs or 80% of the reported use of diazinon in the subwatershed). During focused outreach, the Coalition focused its efforts on growers farming orchards, specifically prior to winter dormant sprays. Conversations with growers in 2009 indicated that many growers are moving away from the practice of dormant sprays; 2011 PUR data support this statement as there were no applications of diazinon from September 2010 through March 2011 (Table I-10).

Table I-10. Duck Creek @ Hwy 4 site subwatershed diazinon applications, lbs AI applied, and acres treated by month (2004-2011).

PUR data available through May 2011 for San Joaquin County; all PUR data after May 2011 are preliminary. If a month is not included in the table, no applications were made.

Month/Year	Number of Diazinon Applications	Pounds of AI Applied	Acres Treated
February, 2004	1	14.2	28.5
March, 2004	3	179.8	95.2
August, 2004	2	8.0	16
September, 2004	1	9.0	18
October, 2004	1	20.0	40
February, 2005	1	20.8	41.3
March, 2005	2	144.0	158
August, 2005	1	3.5	7
October, 2005	1	5.0	10

Month/Year	Number of Diazinon Applications	Pounds of AI Applied	Acres Treated
December, 2005	1	260.0	130
February, 2006	4	38.5	48
April, 2006	1	130.0	130
October, 2006	1	5.0	10
January, 2007	2	263.0	136
February, 2007	2	60.5	121
March, 2007	2	146.0	138
July, 2007	1	73.5	49
November, 2007	1	23.0	46
February, 2008	2	273.0	156
March, 2008	2	22.5	45
April, 2008	2	260.0	260
August, 2008	1	2.1	231
March, 2009	1	16.0	8
June, 2009	1	24.3	48.5
February, 2010	1	16.0	8
March, 2010	1	2.0	4
April, 2010	8	251.9	215.5
August, 2010	1	22.5	15
April, 2011	2	260.0	260
May, 2011	2	17.3	11.5
July, 2011	1	30.0	15
September, 2011	1	30.0	15
Summaries by Year			
2004 Total	8	231.0	197.7
2005 Total	6	433.3	346.3
2006 Total	6	173.5	188
2007 Total	8	566.0	490
2008 Total	7	557.6	692
2009 Total	2	40.3	56.5
2010 Total	11	292.4	242.5
2011 Total	6	337.3	301.5
Total	**54**	**2631.4**	**2514.5**

Figure I-3. Duck Creek @ Hwy 4 site subwatershed lbs diazinon applied by month (2004-2011).

PUR data available through May 2011 for San Joaquin County; all PUR data after May 2011 are preliminary. Asterisk (*) denotes months with exceedances.

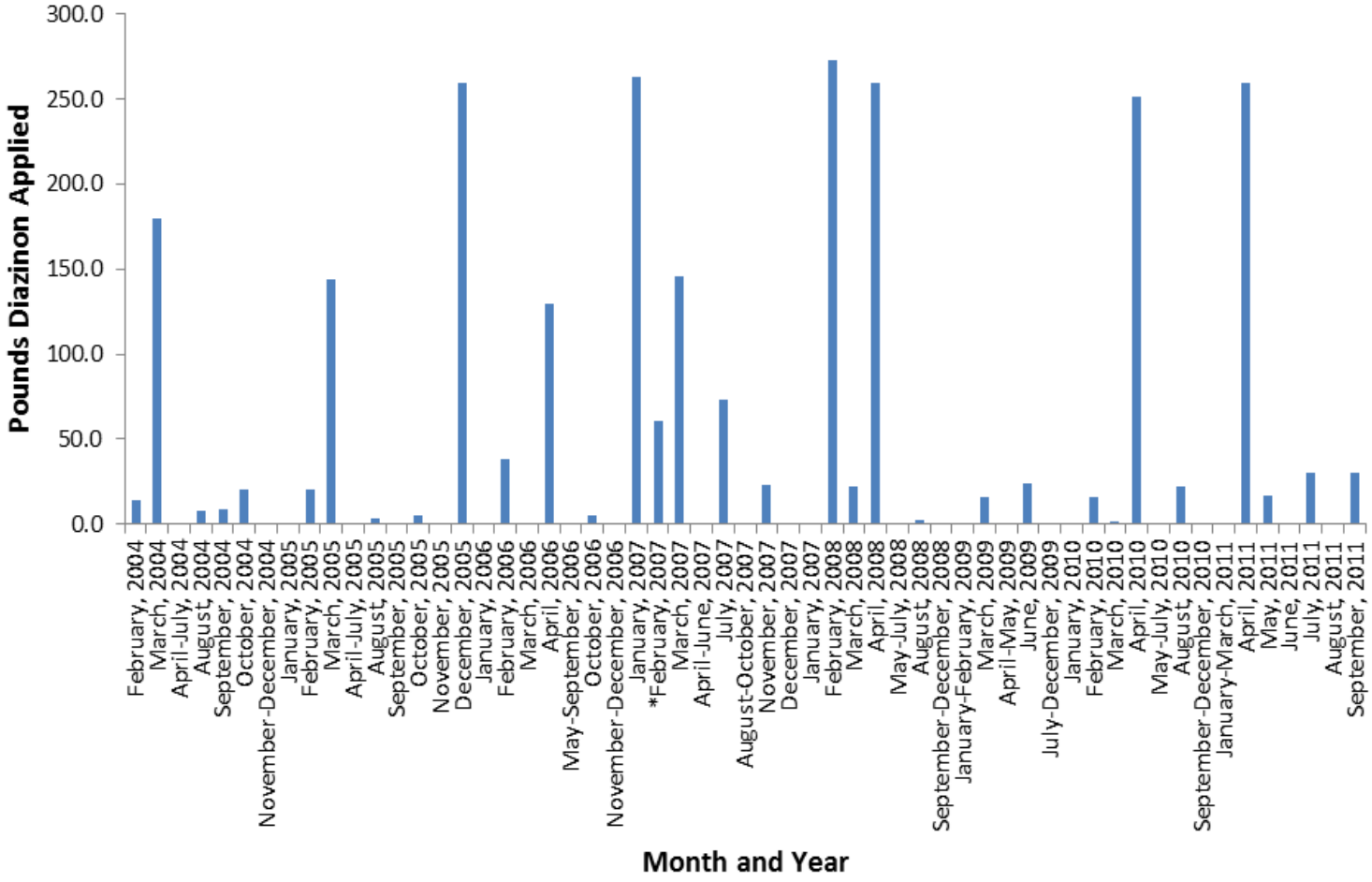


Table I-11. Duck Creek @ Hwy 4 site subwatershed diazinon PUR data (2004-2011).

PUR data available through May 2011 for San Joaquin County; all PUR data after May 2011 are preliminary.

Chemical Name	Commodity	Product Name	Lbs AI Applied
DIAZINON	APPLE	CLEAN CROP DIAZINON 50 WP	176.0
		DIAZINON 50W	82.5
	CHERRY	DIAZINON 50W	2103.8
	N-OUTDR CONTAINER/FLD GRWN PLANTS	DIAZINON 4E	20.8
		DIAZOL 50 W	71.0
		DIAZOL AG 500	5.3
		DREXEL D-264 EC500 INSECTICIDE	76.1
		GOWAN DIAZINON 4E	62.0
		PRENTOX DIAZINON 4E INSECTICIDE	18.0
	WALNUT (ENGLISH WALNUT, PERSIAN WALNUT)	DIAZINON 50 WP	16.0

APPLE - Total Pounds Diazinon Applied	**258.5**
CHERRY - Total Pounds Diazinon Applied	**2103.8**
N-OUTDR CONTAINER - Total Pounds Diazinon Applied	**253.1**
WALNUT - Total Pounds Diazinon Applied	**16.0**
Total Pounds Diazinon Applied (2004-2011)	**2631.4**

The Coalition's strategy for addressing diazinon exceedances in the Duck Creek subwatershed involved contacting specific growers whose parcels have the potential to drain to the creek. Targeted outreach that occurred within this subwatershed is described under the chlorpyrifos outreach section and included discussions of management practices relevant to storm water retention.

Priority D Constituents

Water column toxicity to *C. dubia* is the only priority D constituent in the Duck Creek @ Hwy 4 management plan.

C. dubia toxicity

Water column toxicity to *C. dubia* occurred most recently in September 2011 from samples collected during MPM at Duck Creek @ Hwy 4 (Table I-5). Prior to 2011, toxicity to *C. dubia* occurred once in 2009 during July MPM, twice during April and July 2008 Normal Monitoring (samples collected to test for persistence of toxicity were also toxic) and once in September 2006 during Normal Monitoring. All toxicities have coincided with chlorpyrifos exceedances.

The Coalition believes that additional focused outreach scheduled for 2012 will aid in eliminating chlorpyrifos in the waterway and will continue to reduce toxicity to *C. dubia.* Therefore, the Coalition will carry out its efforts with outreach as explained above under the chlorpyrifos section to address the toxicity.

Priority E Constituents

Priority E constituents include DO, pH, *E. coli* and *S. capricornutum* toxicity. Although these constituents will remain low priority, the Coalition will collect priority E constituent monitoring data for DO, pH, *E. coli* and *S. capricornutum* toxicity during 2012 Assessment Monitoring. Priority E constituents have been discussed during targeted outreach and will continue to be discussed at annual grower meetings. To address *E. coli* exceedances, the Coalition plans to participate in the focus group along with other Coalitions and Regional Board staff to develop a joint Work Plan to characterize potential agricultural sources of *E. coli* and identify management practices to prevent discharges to surface waters.

2011 MPM (February, April, and May) did not result in *S. capricornutum* toxicity. Previously, algae toxicity occurred in February 2007 and April and May of 2008, although none were accompanied by exceedances of WQTLs for herbicides or copper. Outreach for toxicity to *S. capricornutum* is included as a part of general outreach that encourages management practices to improve overall watershed quality.

Evaluation

Duck Creek is a first priority subwatershed within the SJCDWQC and has technically completed its focused outreach (2008-2010).

Individual surveys to document current management practices and follow up contacts to assess newly implemented practices were completed by 100% of targeted growers. The First Priority Summary of Management Practices section of this report summarizes the results of these contacts. However, due to continued exceedances of the chlorpyrifos WQTL and associated *C. dubia* toxicity in 2010 and 2011, the Coalition is expanding its outreach efforts to growers with recent reported use of chlorpyrifos. Additional focused outreach began in 2010 and is scheduled to continue through 2012. Outreach includes grower notification, management practice education, tracking of management practice implementation, and providing information to growers on special studies of management practice efficacy. In the case of additional focused outreach, individual meetings are scheduled with growers to review their operation and to discuss management practices and pesticides currently in use.

While the acres treated and pounds of chlorpyrifos applied have decreased significantly since 2006, chlorpyrifos exceeded the WQTL again in September 2011. Historically usage was low in September, suggesting that one or a few applications are consistently responsible for the exceedances. Duck Creek is scheduled for Assessment Monitoring and MPM in 2012 which will better evaluate water quality in regards to chlorpyrifos and other high priority constituents. If any additional exceedances of priority A-D constituents occur, the Coalition will discuss with the Regional Board necessary actions. The Coalition will continue to conduct outreach on a general and focused level throughout 2012.

Although chlorpyrifos remains a high priority constituent in the Duck Creek management plan, monitoring for both pH and diazinon resulted in zero exceedances 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 these constituents from the Duck Creek management plan.

II. LONE TREE CREEK @ JACK TONE RD

Management Plan Constituents

Priority A/B

- Chlorpyrifos
- Diazinon

Priority C

- Copper
- Diuron

Priority D

- *Ceriodaphnia dubia* water column toxicity
- *Hyalella azteca* sediment toxicity
- *Pimephales promelas* water column toxicity
- *Selenastrum capricornutum* water column toxicity

Priority E

- Ammonia
- Dissolved Oxygen
- *E. coli*
- pH
- Specific Conductivity
- Total Dissolved Solids

Description of Lone Tree Creek Site Subwatershed

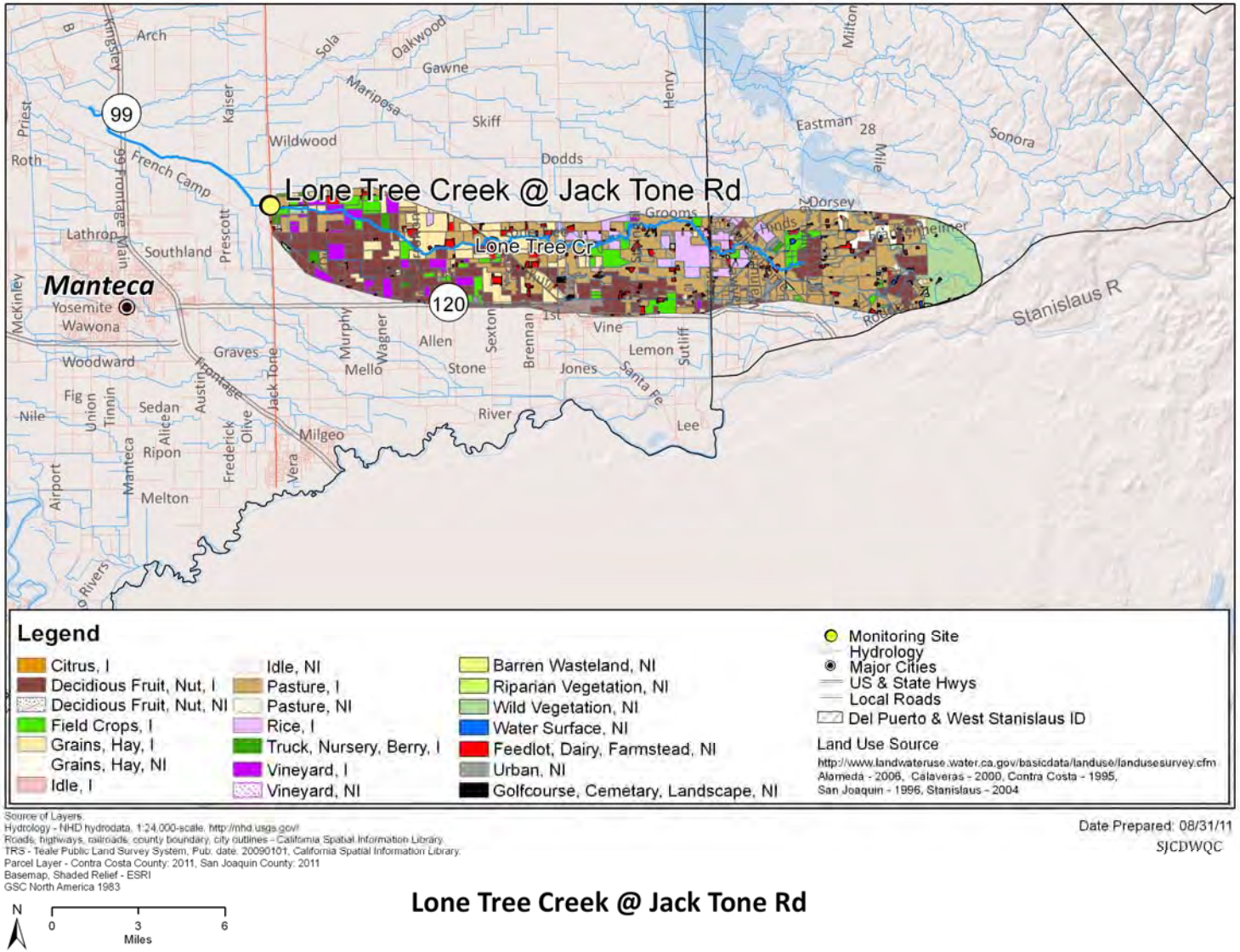
Lone Tree Creek @ Jack Tone Rd (25,789 irrigated acres) – This site is upstream from the French Camp Slough @ Airport Way site. Lone Tree Creek drains a large portion of the southern SJCDWQC region and confluences downstream with Littlejohns Creek and eventually French Camp Slough, flowing through urban areas before emptying into the Delta. The sampling location target coordinates are listed in Table II-1. The main agricultural land use upstream consists of deciduous nuts, field crops, grains, irrigated pastures, and several dairies. Figure II-1 illustrates the land use within this site subwatershed area. Lone Tree Creek is a 20-mile-long modified natural channel. This ephemeral stream carries natural runoff, agricultural supply and return flows to Littlejohns Creek during periods of high flow and irrigation. This site subwatershed includes upstream monitoring locations (Lone Tree Creek @ Brennan Rd and Lone Tree Creek @ Valley Home Rd) which were sampled in 2008.

Table II-1. Lone Tree Creek site subwatershed sampling locations coordinates.

Site Name	Station Code	Target Latitude	Target Longitude
Lone Tree Creek @ Jack Tone Rd*	531XLTCJR	37.8376	-121.1438
Lone Tree Creek @ Brennan Rd[u]	535XLTABR	37.8255	-121.0159
Lone Tree Creek @ Valley Home Rd[u]	535LTCVHR	37.8202	-120.9022

[u]Upstream sites
*Original SJCDWQC sampling site

Figure II-1. Lone Tree Creek @ Jack Tone Rd site subwatershed land use map.



Subwatershed Monitoring History

Monitoring was initiated at Lone Tree Creek @ Jack Tone Rd during the irrigation season of 2004 and continued through 2011 (Table II-2). Table II-3 lists specific information on the analyses conducted across each of the monitoring seasons.

The Lone Tree Creek site subwatershed is a rotating Assessment Monitoring location within the SJCDWQC French Camp Slough @ Airport Way Zone (Zone 2). Normal Monitoring occurred in 2008 under the 2006 MRPP. Lone Tree Creek @ Jack Tone Rd is scheduled for Assessment Monitoring in 2026 under the current 2008 MRPP.

Additional MPM for chlorpyrifos was initiated at Lone Tree Creek @ Jack Tone Rd in 2007 (July and August). One year of upstream MPM monitoring occurred at Lone Tree Creek @ Brennan Rd and Lone Tree Creek @ Valley Home Rd for copper and chlorpyrifos in 2008. The upstream monitoring was initiated in an attempt to better characterize upstream contributions to the water quality impairments in Lone Tree Creek. In 2009, MPM resumed at Lone Tree Creek @ Jack Tone Rd during the irrigation season for *S. capricornutum* toxicity (April-May), chlorpyrifos (July-August), and copper (July-September). In 2010, MPM occurred for *S. capricornutum* toxicity (January-May), copper (January-February and July-September), chlorpyrifos (January-February and July-August), diazinon, and diuron (January-February). In 2011, MPM for copper (January, February, July, August and October), chlorpyrifos (January, February, July and August), diazinon and diuron (January and February), water column toxicity to *S. capricornutum* (January-May), and sediment toxicity to *H. azteca* (March and September) occurred. Table II-4 lists all MPM dates and constituents for the Lone Tree Creek subwatershed from 2007 through 2011.

During 2010, additional samples were collected for chlorpyrifos, diazinon, and sediment toxicity to *H. azteca* as part of a DPR grant to reduce the impact of agricultural discharge on water quality (Table II-4). The DPR grant monitoring began in June 2010 and continued through February 2011.

Lone Tree Creek is currently on California's 2008-2010 303d List of Impaired Waterbodies for ammonia, biochemical (biological) oxygen demand (BOD), chlorpyrifos, diuron, *E. coli*, sediment toxicity and unknown water column toxicity.

Table II-2. Lone Tree Creek @ Jack Tone Rd site subwatershed sampling events per season and year (including MPM).

Year	Season	Events Sampled	Events Not Sampled[1]	Total
2004	Irrigation	2	0	**2**
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	NA	NA	**NA**
2009	Winter	NA	NA	**NA**
	Storm	NA	NA	**NA**
	Irrigation	5	0	**5**
	Fall	NA	NA	**NA**
2010	Winter	2	0	**2**
	Storm	1	0	**1**
	Irrigation	6	0	**6**
	Fall	3	0	**3**
2011	Winter	3	0	**3**
	Storm	NA	NA	**NA**
	Irrigation	5	0	**5**
	Fall	NA	NA	**NA**

[1] 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. Lone Tree Creek @ Jack Tone 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																							
NA	pH	2	3	5	4	5	3	9	3	9				5		2	1	7	3	3		6	
NA	Specific Conductivity	2	3	5	4	5	3	9	3	9				5		2	1	7	3	3		6	
NA	Dissolved Oxygen	2	3	4	3	4	3	9	3	9				5		2	1	7	3	3		6	
EPA 160.1	Dissolved Solids	2	2	5	2	5	2	6	1	6													
EPA 160.2	Suspended Solids																						
EPA 180.1	Turbidity	2	2	5	2	5	2	7	1	6													
SM 9223 B	*E. coli*	2	2	5	2	6	2	7	1	6													
EPA 110.2	Color	2	2	5	2	5	2	7	1	6													
EPA 415.1	Total Organic Carbon	2	2	5	2	7	2	6	1	6													
Walkley-Black	Total Organic Carbon (sediment)																			1		1	
ASTM D422 or ASTM D4464	Grain size (sediment)																			1		1	
EPA 405.1	BOD					2	2	2															
Carbamates																							
EPA 8321A	Aldicarb					5	2	6	1	6													
EPA 8321A	Carbaryl					5	2	6	1	6													
EPA 8321A	Carbofuran					5	2	6	1	6													
EPA 8321A	Methiocarb					5	2	6	1	6													
EPA 8321A	Methomyl					5	2	6	1	6													
EPA 8321A	Oxamyl					5	2	6	1	6													
Organochlorines																							
EPA 8081A	DDD					5	2	6	1	6													
EPA 8081A	DDE					5	2	6	1	6													
EPA 8081A	DDT					5	2	6	1	6													
EPA 8081A	Dicofol					5	2	6	1	6													
EPA 8081A	Dieldrin					5	2	6	1	6													
EPA 8081A	Endrin					5	2	6	1	6													
EPA 8081A	Methoxychlor					5	2	6	1	6													
Organophosphates																							
EPA 8141A	Azinphos methyl					5	2	6	1	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 8141A	Chlorpyrifos	2	2	5	2	5	2	8	1	6				2		1	1	4	3	2		2	
EPA 8141A	Diazinon	2	2	5	2	5	2	6	1	6						1	1	4	3	2			
EPA 8141A	Dimethoate					5	2	6	1	6													
EPA 8141A	Disulfoton					5	2	6	1	6													
EPA 8141A	Malathion					5	2	6	1	6													
EPA 8321A	Methamidophos					5	2	6	1	6													
EPA 8141A	Methidathion					5	2	6	1	6													
EPA 8141A	Parathion, Methyl					5	2	6	1	6													
EPA 8141A	Phorate					5	2	6	1	6													
EPA 8141A	Phosmet					5	2	6	1	6													
Pyrethroids																							
EPA 8081A	Bifenthrin			1	2	5	2	6	1	6													
EPA 8081A	Cypermethrin	2	2	5	2	5	2	6	1	6													
EPA 8081A	Cyhalothrin, lambda	2	2	5	2	5	2	6	1	6													
EPA 8081A	Permethrin	2	2	5	2	5	2	6	1	6													
EPA 8081A	Cyfluthrin			1	2	5	2	6	1	6													
EPA 8081A	Esfenvalerate/ Fenvalerate	2	2	5	2	5	2	6	1	6													
Triazines																							
EPA 619	Atrazine					5	2	6	1	6													
EPA 619	Cyanazine					5	2	6	1	6													
EPA 8321A	Diuron					5	2	6	1	6						1	1			2			
EPA 547M	Glyphosate					5	2	6	1	6													
EPA 8321A	Linuron					5	2	6	1	6													
EPA 8141A	Molinate					5	2	6	1	6													
EPA 549.2M	Paraquat dichloride					5	2	6	1	6													
EPA 619	Simazine					5	2	6	1	6													
EPA 8141A	Thiobencarb					5	2	6	1	6													
Metals (Total)																							
EPA 200.8	Arsenic					6	2	6	1	6													
EPA 200.8	Boron					6	2	6	1	6													
EPA 200.8	Cadmium					6	2	6	1	6													
EPA 200.8	Copper					6	2	6	1	6				3		1	1	3		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	Storm*	Irrigation	Fall*
EPA 200.8	Lead					6	2	6	1	6													
EPA 200.8	Molybdenum																						
EPA 200.8	Nickel					6	2	6	1	6													
EPA 200.8	Selenium					6	2	2	1	6													
EPA 200.8	Zinc					6	2	6	1	6													
Metals (Dissolved)																							
EPA 200.8	Cadmium																						
EPA 200.8	Copper													3		1	1	3		2		3	
EPA 200.8	Lead																						
EPA 200.8	Nickel																						
EPA 200.8	Zinc																						
Nutrients																							
EPA 300.0	Nitrate as NO3					6	2	6	1	6													
EPA 353.2	Nitrate + Nitrite as N																						
EPA 354.1	Nitrite as N					6	2	6	1	6													
EPA 350.2	Ammonia as N					6	2	6	1	6													
SM 2340 C	Hardness as CaC03					6	2	6	1	6				3		1	1	3		2		3	
EPA 365.2	Phosphate as P					6	2	6	1	6													
EPA 365.2	OrthoPhosphate as P					6	2	6	1	6													
EPA 351.3	Nitrogen, Total Kjeldahl					6	2	6	1	6													
Sediment Pesticides																							
EPA 8270M_NCI	Bifenthrin																						
EPA 8270M_NCI	Chlorpyrifos																						
EPA 8270M_NCI	Cyfluthrin																						
EPA 8270M_NCI	Cyhalothrin, lambda																						
EPA 8270M_NCI	Cypermethrin																						
EPA 8270M_NCI	Deltamethrin: Tralomethrin																						
EPA 8270M_NCI	Esfenvalerate/ Fenvalerate																						
EPA 8270M_NCI	Fenpropathrin																						
EPA 8270M_NCI	Permethrin																						
Toxicity																							
EPA 821-02-012	*Ceriodaphnia dubia*	2	2	5	2	5	3	7	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 821-02-012	*Pimephales promelas*	2	3	5	2	5	3	7	2	6													
EPA 821-02-013	*Selenastrum capricornutum*	2	3	5	3	5	4	7	2	8				2		2	1	2		3		2	
EPA 600/R-99-064	*Hyalella azteca*	2		3	1	1	1	1	1	1								1		1		1	

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

Table II-4. Lone Tree Creek site subwatershed Management Plan Monitoring schedule (2007-2011).

Site Name	Sample Date	Monitoring Type	Copper	Total Metals	Chlorpyrifos	Diazinon	Diuron	*S. capricornutum*	*H. azteca*
Lone Tree Creek @ Jack Tone Rd	30-Jul-07	A			X				
Lone Tree Creek @ Jack Tone Rd	28-Aug-07	A			X				
Lone Tree Creek @ Valley Home Rd	13-May-08	U		X					
Lone Tree Creek @ Valley Home Rd	10-Jun-08	U		X					
Lone Tree Creek @ Valley Home Rd	15-Jul-08	U		X					
Lone Tree Creek @ Brennan Rd	15-Jul-08	U		X	X				
Lone Tree Creek @ Valley Home Rd	12-Aug-08	U		X					
Lone Tree Creek @ Brennan Rd	12-Aug-08	U		X	X				
Lone Tree Creek @ Valley Home Rd	16-Sep-08	U		X					
Lone Tree Creek @ Brennan Rd	16-Sep-08	U		X					
Lone Tree Creek @ Jack Tone Rd	14-Apr-09	MPM						X	
Lone Tree Creek @ Jack Tone Rd	12-May-09	MPM						X	
Lone Tree Creek @ Jack Tone Rd	14-Jul-09	MPM	X		X				
Lone Tree Creek @ Jack Tone Rd	11-Aug-09	MPM	X		X				
Lone Tree Creek @ Jack Tone Rd	15-Sep-09	MPM	X						
Lone Tree Creek @ Jack Tone Rd	13-Jan-10	MPM	X		X	X	X	X	
Lone Tree Creek @ Jack Tone Rd	9-Feb-10	MPM	X		X	X	X	X	
Lone Tree Creek @ Jack Tone Rd	16-Mar-10	MPM						X	
Lone Tree Creek @ Jack Tone Rd	13-Apr-10	MPM						X	
Lone Tree Creek @ Jack Tone Rd	11-May-10	MPM						X	
Lone Tree Creek @ Jack Tone Rd	8-Jun-10	MPM			X[2]	X[2]			
Lone Tree Creek @ Jack Tone Rd	13-Jul-10	MPM	X		X[1]	X[2]			
Lone Tree Creek @ Jack Tone Rd	10-Aug-10	MPM	X		X[1]	X[2]			
Lone Tree Creek @ Jack Tone Rd	7-Sep-10	MPM	X		X[2]	X[2]			X[2]
Lone Tree Creek @ Jack Tone Rd	12-Oct-10	MPM			X[2]	X[2]			
Lone Tree Creek @ Jack Tone Rd	9-Nov-10	MPM			X[2]	X[2]			
Lone Tree Creek @ Jack Tone Rd	7-Dec-10	MPM			X[2]	X[2]			
Lone Tree Creek @ Jack Tone Rd	11-Jan-11	MPM	X		X[1]	X[1]	X	X	
Lone Tree Creek @ Jack Tone Rd	8-Feb-11	MPM	X		X[1]	X[1]	X	X	
Lone Tree Creek @ Jack Tone Rd	8-Mar-11	MPM						X	X
Lone Tree Creek @ Jack Tone Rd	12-Apr-11	MPM						X	
Lone Tree Creek @ Jack Tone Rd	24-May-11	MPM						X	
Lone Tree Creek @ Jack Tone Rd	26-Jul-11	MPM	X		X				
Lone Tree Creek @ Jack Tone Rd	23-Aug-11	MPM	X		X				
Lone Tree Creek @ Jack Tone Rd	20-Sep-11	MPM	X						
Lone Tree Creek @ Jack Tone Rd	14-Oct-11	MPM							X

[1]MPM and Department of Pesticide Regulation (DPR) grant monitoring.
[2]DPR grant monitoring only.
A – Additional sampling.
U – Upstream sampling.
X – Constituent sampled for Management Plan Monitoring (MPM).

Exceedance History

Ambient water monitoring within the Lone Tree Creek subwatershed was initiated in the 2004 irrigation sampling season in the Jack Tone Road site subwatershed. Samples collected from Lone Tree Creek subwatersheds (Lone Tree Creek @ Brennan Rd, Lone Tree Creek @ Jack Tone Rd, and Lone Tree Creek @ Valley Home Rd) from 2004 through 2011 resulted in exceedances of WQTLs for DO (26), pH (6), SC (1), TDS (2), ammonia (4), *E. coli* (29), DDT (1), DDE (1), copper (8), lead (1), chlorpyrifos (10), cypermethrin (1), diazinon (2), diuron (3), simazine (1), and thiobencarb (2). Toxicity to *C. dubia* (2), *P. promelas* (3) *S. capricornutum* (10) and *H. azteca* (2) occurred.

Samples from 2011 monitoring included two exceedances of the WQTL for pH.

The priority level (A-E) assigned to each constituent is listed in the bottom row of Tables II-5 and II-6. The highest priority constituents for the Lone Tree Creek subwatershed are chlorpyrifos, diazinon (A/B), copper, diuron (C), and toxicity to *C. dubia*, *P. promelas*, *S. capricornutum*, and *H. azteca* (D). There was no change to constituent priority following 2011 exceedances.

Table II-5. Lone Tree Creek site subwatershed low priority exceedances (2004-2011).
The WQTLs are listed in the header after the analyte. Data sorted by season and date. Upstream sites are 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	Ammonia[1], >1.5 mg/L	*E. coli*, > 235 MPN/100 ml	DDE (p,p'), >0.00059 µg/L	DDT (p,p'), >0.00059 µg/L
Lone Tree Creek @ Jack Tone Rd	Irrigation	8/24/2004	6.3					500		
Lone Tree Creek @ Jack Tone Rd	Storm	2/16/2005	6					1600		
Lone Tree Creek @ Jack Tone Rd	Storm	3/21/2005		8.58				900		
Lone Tree Creek @ Jack Tone Rd	Irrigation	5/17/2005						900		
Lone Tree Creek @ Jack Tone Rd	Irrigation	6/21/2005						500		
Lone Tree Creek @ Jack Tone Rd	Irrigation	7/19/2005	6.1					900		
Lone Tree Creek @ Jack Tone Rd	Irrigation	8/16/2005	6.9					500		
Lone Tree Creek @ Brennan Rd	*Irrigation*	*9/20/2005*	*5.1*					*1600*		
Lone Tree Creek @ Jack Tone Rd	Irrigation	9/20/2005	4.5					1600		
Lone Tree Creek @ Brennan Rd	*Storm*	*2/27/2006*			*1370*	*730*		*1600*		
Lone Tree Creek @ Jack Tone Rd	Storm	2/27/2006		9				900		
Lone Tree Creek @ Brennan Rd	*Storm*	*3/15/2006*						*1600*		
Lone Tree Creek @ Jack Tone Rd	Storm	3/15/2006	6.3					1600		
Lone Tree Creek @ Brennan Rd	*Storm*	*3/24/2006*	*3.3*							
Lone Tree Creek @ Jack Tone Rd	Storm	3/24/2006	6.7							

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	Ammonia[1], >1.5 mg/L	*E. coli*, > 235 MPN/100 mL	DDE (p,p'), >0.00059 µg/L	DDT (p,p'), >0.00059 µg/L
Lone Tree Creek @ Jack Tone Rd	Irrigation	5/16/2006	6.7					2400		
Lone Tree Creek @ Jack Tone Rd	Irrigation	6/20/2006	4.7					2400		
Lone Tree Creek @ Jack Tone Rd	Irrigation	7/18/2006	5.6					770		
Lone Tree Creek @ Jack Tone Rd	Irrigation	8/15/2006	6.62					920		
Lone Tree Creek @ Jack Tone Rd	Storm	2/11/2007	5.54				2.8	2400		
Lone Tree Creek @ Jack Tone Rd	Storm	2/28/2007					2.1	2400		
Lone Tree Creek @ Jack Tone Rd	Irrigation	5/22/2007						730		
Lone Tree Creek @ Jack Tone Rd	Irrigation	6/12/2007						580		
Lone Tree Creek @ Jack Tone Rd	Irrigation	7/10/2007					2.5	2400		
Lone Tree Creek @ Jack Tone Rd	Irrigation	8/7/2007						1400	0.058	0.031
Lone Tree Creek @ Jack Tone Rd	Storm	1/23/2008	3.79			580	10	>2400		
Lone Tree Creek @ Jack Tone Rd	Irrigation	4/15/2008	5.85					650		
Lone Tree Creek @ Valley Home Rd	*Irrigation*	*5/13/2008*	*5.29*	*5.91*						
Lone Tree Creek @ Jack Tone Rd	Irrigation	5/13/2008	4.65	6.1				1300		
Lone Tree Creek @ Valley Home Rd	*Irrigation*	*6/10/2008*	*6.62*							
Lone Tree Creek @ Jack Tone Rd	Irrigation	6/10/2008						690		
Lone Tree Creek @ Valley Home Rd	*Irrigation*	*7/15/2008*	*6.07*							
Lone Tree Creek @ Jack Tone Rd	Irrigation	7/15/2008						460		
Lone Tree Creek @ Brennan Rd	*Irrigation*	*8/12/2008*	*6.66*							
Lone Tree Creek @ Valley Home Rd	*Irrigation*	*8/12/2008*	*4.2*							
Lone Tree Creek @ Jack Tone Rd	Irrigation	8/12/2008						310		
Lone Tree Creek @ Valley Home Rd	*Irrigation*	*9/16/2008*	*5.93*							
Lone Tree Creek @ Jack Tone Rd	Irrigation	7/14/2009	6.61							
Lone Tree Creek @ Jack Tone Rd	Irrigation	8/11/2009	5.95							
Lone Tree Creek @ Jack Tone Rd	Irrigation	1/13/2010	3.61							
Lone Tree Creek @ Jack Tone Rd	Winter	02/08/2011		9.09						
Lone Tree Creek @ Jack Tone Rd	Winter	03/08/2011		9.14						
		Constituent Priority	**E**	**E**	**E**	**E**	**E**	**E**	**NP**	**NP**

[1]Ammonia WQTL variable based on pH and temperature.
NP – Not Prioritized; less than two exceedances within three consecutive monitoring years and currently no TMDL.

Table II-6. Lone Tree Creek site subwatershed high priority exceedances (2004-2011).

The WQTLs are listed in the header after the analyte. Data sorted by season and date. Upstream sites are italicized.

Site Name	Season	Sample Date	Copper, Total[1], > 1,300 µg/L	Lead, Total[1], > 15 µg/L	Chlorpyrifos, >0.015 µg/L	Cypermethrin, >0.002 µg/L	Diazinon, >0.1 µg/L	Diuron[1], >2 µg/L	Simazine[1], > 4 µg/L	Thiobencarb[1], >ND µg/L	*C. dubia*, (% Control)	*P. promelas*, (% Control)	*S. capricornutum*, (% Control)	*H. azteca*, (% Control)
Lone Tree Creek @ Jack Tone Rd	Storm	2/16/2005										0	77	
Lone Tree Creek @ Jack Tone Rd	Irrigation	5/17/2005												95
Lone Tree Creek @ Jack Tone Rd	Irrigation	7/19/2005			0.036	0.03								
Lone Tree Creek @ Jack Tone Rd	Irrigation	8/16/2005			0.019									
Lone Tree Creek @ Brennan Rd	*Storm*	*2/27/2006*			*0.018*						*0*	*0*	*74*	
Lone Tree Creek @ Brennan Rd	*Storm*	*3/15/2006*											*56*	
Lone Tree Creek @ Jack Tone Rd	Storm	3/15/2006											57	
Lone Tree Creek @ Brennan Rd	*Storm*	*3/24/2006*											*83*	
Lone Tree Creek @ Jack Tone Rd	Storm	4/27/2006												80
Lone Tree Creek @ Jack Tone Rd	Irrigation	7/18/2006			0.019									
Lone Tree Creek @ Jack Tone Rd	Irrigation	8/15/2006	8.9 (6.4)											
Lone Tree Creek @ Jack Tone Rd	Storm	2/11/2007	21 (12.4)	3.8 (3.6)	0.052		0.14	12						
Lone Tree Creek @ Jack Tone Rd	Storm	2/28/2007	19 (13.9)					4.3	4.1				31	
Lone Tree Creek @ Jack Tone Rd	Irrigation	5/22/2007								0.5				
Lone Tree Creek @ Jack Tone Rd	Irrigation	6/12/2007								0.12				
Lone Tree Creek @ Jack Tone Rd	Irrigation	7/10/2007	12 (5.3)		0.035									
Lone Tree Creek @ Jack Tone Rd	Irrigation	8/7/2007	4.6 (4.1)											
Lone Tree Creek @ Jack Tone Rd	Irrigation	9/4/2007	3.5 (3.1)											
Lone Tree Creek @ Jack Tone Rd	Storm	1/23/2008	40 (21.1)		1.7		0.2	4.9			0	75	61	

Site Name	Season	Sample Date	Copper, Total[1], > 1,300 µg/L	Lead, Total[1], > 15 µg/L	Chlorpyrifos, >0.015 µg/L	Cypermethrin, >0.002 µg/L	Diazinon, >0.1 µg/L	Diuron[1], >2 µg/L	Simazine[1], > 4 µg/L	Thiobencarb[1], >ND µg/L	*C. dubia*, (% Control)	*P. promelas*, (% Control)	*S. capricornutum*, (% Control)	*H. azteca*, (% Control)
Lone Tree Creek @ Jack Tone Rd	Irrigation	4/15/2008											83	
Lone Tree Creek @ Jack Tone Rd	Irrigation	4/23/2008											72	
Lone Tree Creek @ Jack Tone Rd	Irrigation	5/13/2008											7	
Lone Tree Creek @ Valley Home Rd	*Irrigation*	*7/15/2008*	*7 (6.5)*											
Lone Tree Creek @ Jack Tone Rd	Irrigation	8/11/2009			0.1									
Lone Tree Creek @ Jack Tone Rd	Irrigation	1/13/2010			1.1									
Lone Tree Creek @ Jack Tone Rd	Irrigation	7/13/2010			0.27									
		Constituent Priority	**C**	**NP**	**A/B**	**NP**	**A/B**	**C**	**NP**	**NP[R]**	**D**	**D**	**D**	**D**

[1]Total metal WQTL variable based on hardness.
NP – Not Prioritized; less than two exceedances within three consecutive monitoring years and currently no TMDL.
NP[R] – Not Prioritized; thiobencarb is only applied to rice and therefore will be managed under the Rice Coalition.

2007 - 2011 Management Plan Monitoring Results

All monitoring results for high priority management plan constituents in the Lone Tree Creek @ Jack Tone Rd subwatershed are in Table II-7. These constituents include chlorpyrifos, copper, diazinon, diuron, water column toxicity to *S. capricornutum*, and sediment toxicity to *H. azteca*.

Chlorpyrifos was added to the Lone Tree Creek @ Jack Tone Rd MPM schedule in 2007 after exceedances of the WQTL during irrigation sampling in 2005 (July and August) and storm and irrigation sampling in 2006 (February and July). During 2007 Normal Monitoring, there were exceedances of the chlorpyrifos WQTL in July through September. However, no exceedances occurred in samples collected during additional MPM in July or August. In 2008, Normal Monitoring occurred in the Lone Tree Creek subwatershed and an exceedance of the chlorpyrifos WQTL occurred during a storm event in January. Also in 2008, upstream sampling at Lone Tree Creek @ Brennan Rd was conducted (July and August), resulting in no exceedances of chlorpyrifos. In 2009, MPM occurred (July and August) and samples resulted in an exceedance of the chlorpyrifos WQTL in August. In 2010, sampling for chlorpyrifos in January and February was added to the MPM schedule due to exceedances during previous storm events. Also in 2010, samples were collected for chlorpyrifos (June and September-December) as part of DPR grant monitoring. There were two exceedances of the WQTL for chlorpyrifos in 2010 (January and July). During 2011 MPM (January, February, July, and August), no exceedances occurred.

Copper was added to the Lone Tree Creek @ Jack Tone Rd MPM schedule in 2009 after exceedances of the WQTL occurred in 2006 (August) and 2007 (February and July-September). In 2008, MPM for total metals occurred at both upstream locations Lone Tree Creek @ Valley Home Rd (May-September) and Lone Tree Creek @ Brennan Rd (July-September) in addition to scheduled 2008 Normal Monitoring at Lone Tree Creek @ Jack Tone Rd. Exceedances of the WQTL for total copper occurred during 2008 Normal Monitoring (January) and during upstream MPM at Lone Tree Creek @ Valley Home Rd (July). During 2009, MPM occurred for copper (July-September) at Lone Tree Creek @ Jack Tone Rd and no exceedances occurred. Samples collect for MPM in 2010 and 2011 (January, February, and July-September) resulted in no exceedances of the copper WQTL.

S. capricornutum was added to the Lone Tree Creek @ Jack Tone Rd MPM schedule in 2009 (April and May) after detection of toxicity during Normal Monitoring in 2008. Management Plan Monitoring in 2009, 2010 and 2011 (January-May) resulted in no toxicity to *S. capricornutum*. January, February, and March were added to the MPM schedule in 2010 due to toxicity during these months. Prior to 2010, monitoring was not required during Winter Season unless there was a storm event. Due to the irregularity of storms, it was decided to monitor during all months of the winter season. Otherwise, it would be very difficult to remove a constituent from MPM if a storm did not occur during the month of the past storm exceedance. In 2012, *S. capricornutum* is scheduled for MPM.

Diazinon was added to the Lone Tree Creek @ Jack Tone Rd MPM schedule in 2009 after exceedances of the WQTL during Normal Monitoring in February of 2007 and January 2008. Prior to 2010, the Coalition only sampled during the winter season if there was a concurrent storm event. In 2009, there were no storm events to sample for diazinon. In 2010, the Coalition began sampling during the winter season

whether or not a storm event was captured. This change was initiated to allow for continuous sampling of constituents that exceeded the WQTL throughout the winter season. During 2010 and 2011, MPM for diazinon (January and February) occurred and there were no exceedances of the WQTL. Monitoring for the DPR grant (June-December) also occurred in 2010 for diazinon and no exceedances occurred. In 2012, MPM will continue for diazinon while the Coalition awaits approval to remove the constituent.

Diuron was added to the Lone Tree Creek @ Jack Tone Rd management plan in 2008 due to two exceedances of the WQTL in 2007 February storm samples. During 2008 Normal Monitoring, January storm samples resulted in an exceedance of the WQTL. As with diazinon, diuron was not sampled in 2009. In 2010 and 2011, MPM resulted in no exceedances of the WQTL. In 2012, MPM for diuron will take place.

Sediment toxicity to *H. azteca* was added to the Lone Tree Creek @ Jack Tone Rd management plan as a result of toxicity in May 2005 and in April 2006. During 2007 and 2008 (March and August) Normal Monitoring, no sediment toxicity to *H. azteca* occurred. In 2009, MPM took place; however, sediment was not monitored. Samples collected in 2010 (September) for DPR grant monitoring and in 2011 for MPM (March and September) did not result in toxicity to *H. azteca* during either year. In 2012, MPM is scheduled to occur for *H. azteca* sediment toxicity.

Table II-7. Lone Tree 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 (@ Jack Tone Rd)	Date	NA	2/11/07	NA	4/10/07	5/22/07	6/12/07	7/10/07	8/07/07	9/04/07		NA	NA	NA
	Copper (µg/L)	NA	NA	NA	3.4	4.8	5.1	**12.0**	**4.6**	**3.5**		NA	NA	NA
	Chlorpyrifos (µg/L)	NA	**0.052**	NA	<0.003	<0.003	0.011	**0.035**	<0.003	<0.003		NA	NA	NA
2007 MPM A (@ Jack Tone Rd)	Date	NA	2/28/07	NA	NA	NA	NA	7/30/07	8/28/07	NA		NA	NA	NA
	Copper (µg/L)	NA	**19**	NA	NA	NA	NA	NA	NA	NA		NA	NA	NA
	Chlorpyrifos (µg/L)	NA	NA	NA	NA	NA	NA	0.01	<0.003	NA		NA	NA	NA
2008 NM (@ Jack Tone Rd)	Date	1/23/08	NA	NA	4/15/08	5/13/08	6/10/08	7/15/08	8/12/08	9/16/08		NA	NA	NA
	Copper (µg/L)	NA	NA	NA	3.5	4.5	3	3.6	3.5	2.2		NA	NA	NA
	Chlorpyrifos (µg/L)	**1.7**	NA	NA	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003		NA	NA	NA
2008 MPM US (@ Valley Home Rd)	Date	NA	NA	NA	NA	5/13/08	6/10/08	7/15/08	8/12/08	9/16/08		NA	NA	NA
	Copper (µg/L)	NA	NA	NA	NA	4.6	5.7	**7.0**	3.7	3.8		NA	NA	NA
	Chlorpyrifos (µg/L)	NA	NA	NA	NA	NA	NA	NA	NA	NA		NA	NA	NA
2008 MPM US (@ Brennan Rd)	Date	NA	NA	NA	NA	NA	NA	7/15/08	8/12/08	9/16/08		NA	NA	NA
	Chlorpyrifos (µg/L)	NA	NA	NA	NA	NA	NA	<0.003	<0.003	NA		NA	NA	NA
	Copper (µg/L)	NA	NA	NA	NA	NA	NA	3.8	3.3	2.9		NA	NA	NA
2009 MPM (@ Jack Tone Rd)	Date	NA	NA	NA	4/14/09	5/12/09	NA	7/14/09	8/11/09	9/15/09		NA	NA	NA
	Copper, dissolved(µg/L)	NA	NA	NA	NA	NA	NA	2.3	2.7	1.5		NA	NA	NA
	Copper, total (µg/L)	NA	NA	NA	NA	NA	NA	3.6	4.4	2.2		NA	NA	NA
	Chlorpyrifos (µg/L)	NA	NA	NA	NA	NA	NA	<0.003	**0.100**	NA		NA	NA	NA
	S. capricornutum toxicity (% Control)	NA	NA	NA	778	584	NA	NA	NA	NA		NA	NA	NA
2010 MPM (@ Jack Tone Rd)	Date	1/13/10	2/9/10	3/16/10	4/13/10	5/11/10	6/8/10	7/13/10	8/10/10	9/7/10	9/14/10	10/12/10	11/9/10	12/7/10
	Copper, dissolved(µg/L)	7	8.7	NA	NA	NA	NA	2.2	2.3	2.8	NA	NA	NA	NA
	Copper, total (µg/L)	26	17	NA	NA	NA	NA	3.4	3.7	4.1	NA	NA	NA	NA
	Chlorpyrifos (µg/L)	**1.1**	<0.003	NA	NA	NA	<0.003*	**0.27**	0.015	0.0086*	NA	<0.003*	<0.003*	<0.003*
	Diazinon (µg/L)	0.074	<0.004	NA	NA	NA	<0.004*	<0.004*	<0.004*	<0.004*	NA	<0.004*	<0.004*	<0.004*
	Diuron (µg/L)	0.51	0.26	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	S. capricornutum toxicity (% Control)	636	860	922	2028	1305	NA	NA	NA	NA	NA	NA	NA	NA
	H. azteca toxicity (% Control)	NA	NA	NA	NA	NA	NA	NA	NA	NA	103*	NA	NA	NA

	Month:	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2011 MPM (@ Jack Tone Rd)	Date	1/11/11	2/8/11	3/8/11	4/12/11	5/24/11	NA	7/26/11	8/23/11	9/20/11	10/14/11	NA	NA
	Copper, dissolved(µg/L)	5.2	5	NA	NA	NA	NA	1.5	1.2	1.9	NA	NA	NA
	Copper, total (µg/L)	10	6	NA	NA	NA	NA	2.2	2.3	3.0	NA	NA	NA
	Chlorpyrifos (µg/L)	<0.003	<0.003	NA	NA	NA	NA	<0.003	<0.003	NA	NA	NA	NA
	Diazinon (µg/L)	<0.004	<0.004	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Diuron (µg/L)	1.1	0.37	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	S. capricornutum toxicity (% Control)	638	1131	766	1693	1212	NA	NA	NA	NA	NA	NA	NA
	H. azteca toxicity (% Control)	NA	NA	100	NA	NA	NA	NA	NA	NA	98	NA	NA

A – Additional Monitoring, 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 Monitoring, conducted in 2008 only.
*Additional Department of Pesticide Regulation (DPR) grant monitoring.

Load Calculations

Loads were calculated for the chlorpyrifos, copper, diazinon and diuron detections (Table II-8) based on the following formula:

Load = Discharge (cfs) X 28.317L/ft^3 X Concentration (mg/L X 1000 or µg/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.

Table II-8. Lone Tree Creek site subwatershed instantaneous load calculations for chlorpyrifos, copper, diazinon, and diuron.

Sorted by analyte and date. Upstream sites are italicized.

Site Name	Analyte Name	Sample Date	Discharge cfs	Concentration µg/L	Loading Rate µg/sec
Lone Tree Creek @ Jack Tone Rd	Chlorpyrifos	02/16/05	22.26	0.014	8.82
Lone Tree Creek @ Jack Tone Rd	Chlorpyrifos	08/16/05	25.85	0.019	13.91
Lone Tree Creek @ Jack Tone Rd*	Chlorpyrifos	08/16/05	25.85	0.019	13.91
Lone Tree Creek @ Jack Tone Rd	Chlorpyrifos	02/27/06	0.34	0.014	0.13
Lone Tree Creek @ Brennan Rd	*Chlorpyrifos*	*02/27/06*	*0*	*0.018*	*0*
Lone Tree Creek @ Jack Tone Rd	Chlorpyrifos	03/15/06	27.84	0.013	10.25
Lone Tree Creek @ Jack Tone Rd*	Chlorpyrifos	02/11/07	26.7	0.041	31.00
Lone Tree Creek @ Jack Tone Rd	Chlorpyrifos	02/11/07	26.7	0.052	39.32
Lone Tree Creek @ Jack Tone Rd	Chlorpyrifos	06/12/07	39.21	0.011	12.21
Lone Tree Creek @ Jack Tone Rd	Chlorpyrifos	07/10/07	35.9	0.035	35.58
Lone Tree Creek @ Jack Tone Rd	Chlorpyrifos	07/30/07	26.77	0.01	7.58
Lone Tree Creek @ Jack Tone Rd	Chlorpyrifos	01/23/08	18.88	1.7	908.86
Lone Tree Creek @ Jack Tone Rd	Chlorpyrifos	01/13/10	1.19	1.1	37.07
Lone Tree Creek @ Jack Tone Rd	Chlorpyrifos	07/13/10	23.01	0.27	175.93
Lone Tree Creek @ Jack Tone Rd	Chlorpyrifos	08/10/10	27.32	0.015	11.60
Lone Tree Creek @ Jack Tone Rd	Chlorpyrifos	09/07/10	68.19	0.0086	16.61
Lone Tree Creek @ Jack Tone Rd	Copper	05/16/06	13.95	3.6	1422.08
Lone Tree Creek @ Jack Tone Rd	Copper	08/15/06	49.49	8.9	12472.53
Lone Tree Creek @ Jack Tone Rd	Copper	02/11/07	26.7	21	15877.34
Lone Tree Creek @ Jack Tone Rd*	Copper	02/11/07	26.7	21	15877.34
Lone Tree Creek @ Jack Tone Rd	Copper	02/28/07	7.85	19	4223.48
Lone Tree Creek @ Jack Tone Rd	Copper	04/10/07	24.9	3.4	2397.32
Lone Tree Creek @ Jack Tone Rd	Copper	06/12/07	39.21	5.1	5662.58
Lone Tree Creek @ Jack Tone Rd	Copper	07/10/07	35.9	12	12198.96
Lone Tree Creek @ Jack Tone Rd	Copper	08/07/07	19.43	4.6	2530.92
Lone Tree Creek @ Jack Tone Rd	Copper	01/23/08	18.88	40	21385.00
Lone Tree Creek @ Valley Home Rd	*Copper*	*05/13/08*	*10.83*	*4.6*	*1410.70*
Lone Tree Creek @ Valley Home Rd	*Copper*	*06/10/08*	*7.94*	*5.7*	*1281.57*
Lone Tree Creek @ Jack Tone Rd	Copper	07/15/08	24.15	3.6	2461.88
Lone Tree Creek @ Brennan Rd	*Copper*	*07/15/08*	*33.05*	*3.8*	*3556.33*
Lone Tree Creek @ Valley Home Rd	*Copper*	*07/15/08*	*9.76*	*7*	*1934.62*
Lone Tree Creek @ Jack Tone Rd	Copper	08/12/08	13.94	3.5	1381.59
Lone Tree Creek @ Brennan Rd	*Copper*	*08/12/08*	*12.43*	*3.3*	*1161.54*

Site Name	Analyte Name	Sample Date	Discharge cfs	Concentration µg/L	Loading Rate µg/sec
Lone Tree Creek @ Valley Home Rd	*Copper*	*08/12/08*	*12.89*	*3.7*	*1350.52*
Lone Tree Creek @ Brennan Rd	*Copper*	*09/16/08*	*12.07*	*2.9*	*991.18*
Lone Tree Creek @ Valley Home Rd	*Copper*	*09/16/08*	*8.63*	*3.8*	*928.63*
Lone Tree Creek @ Jack Tone Rd	Copper	01/13/10	1.19	26	876.13
Lone Tree Creek @ Jack Tone Rd	Copper	02/09/10	3.99	17	1920.74
Lone Tree Creek @ Jack Tone Rd	Copper	07/13/10	23.01	3.4	2215.35
Lone Tree Creek @ Jack Tone Rd	Copper	08/10/10	27.32	3.7	2862.40
Lone Tree Creek @ Jack Tone Rd	Copper	09/07/10	68.19	4.1	7916.84
Lone Tree Creek @ Jack Tone Rd	Copper	01/11/11	1.31	10	370.95
Lone Tree Creek @ Jack Tone Rd	Copper	02/08/11	0	6	0
Lone Tree Creek @ Jack Tone Rd	Copper	07/26/11	4.8	2.2	299.03
Lone Tree Creek @ Jack Tone Rd	Copper	08/23/11	27.95	2.3	1820.36
Lone Tree Creek @ Jack Tone Rd	Copper	09/20/11	39.14	3	3324.98
Lone Tree Creek @ Jack Tone Rd	Copper (D)	01/13/10	1.19	7	235.88
Lone Tree Creek @ Jack Tone Rd	Copper (D)	02/09/10	3.99	8.7	982.97
Lone Tree Creek @ Jack Tone Rd	Copper (D)	07/13/10	23.01	2.2	1433.46
Lone Tree Creek @ Jack Tone Rd	Copper (D)	08/10/10	27.32	2.3	1779.33
Lone Tree Creek @ Jack Tone Rd	Copper (D)	09/07/10	68.19	2.8	5406.62
Lone Tree Creek @ Jack Tone Rd	Copper (D)	01/11/11	1.31	5.2	192.90
Lone Tree Creek @ Jack Tone Rd	Copper (D)	02/08/11	0	5	0
Lone Tree Creek @ Jack Tone Rd	Copper (D)	07/26/11	4.8	1.5	203.88
Lone Tree Creek @ Jack Tone Rd	Copper (D)	08/23/11	27.95	1.2	949.75
Lone Tree Creek @ Jack Tone Rd	Copper (D)	09/20/11	39.14	1.9	2105.82
Lone Tree Creek @ Jack Tone Rd	Diazinon	02/16/05	22.26	0.089	56.10
Lone Tree Creek @ Jack Tone Rd	Diazinon	02/27/06	0.34	0.014	0.13
Lone Tree Creek @ Brennan Rd	*Diazinon*	*02/27/06*	*0*	*0.017*	*0*
Lone Tree Creek @ Jack Tone Rd	Diazinon	03/15/06	27.84	0.023	18.13
Lone Tree Creek @ Brennan Rd	*Diazinon*	*03/15/06*	*12.09*	*0.031*	*10.61*
Lone Tree Creek @ Jack Tone Rd*	Diazinon	02/11/07	26.7	0.12	90.73
Lone Tree Creek @ Jack Tone Rd	Diazinon	02/11/07	26.7	0.14	105.85
Lone Tree Creek @ Jack Tone Rd	Diazinon	01/23/08	18.88	0.2	106.92
Lone Tree Creek @ Jack Tone Rd	Diazinon	01/13/10	1.19	0.074	2.49
Lone Tree Creek @ Jack Tone Rd*	Diuron	02/11/07	26.7	5.1	3855.93
Lone Tree Creek @ Jack Tone Rd	Diuron	02/11/07	26.7	12	9072.77
Lone Tree Creek @ Jack Tone Rd	Diuron	02/28/07	7.85	4.3	955.84
Lone Tree Creek @ Jack Tone Rd	Diuron	04/10/07	24.9	0.23	162.17
Lone Tree Creek @ Jack Tone Rd	Diuron	01/23/08	18.88	4.9	2619.66
Lone Tree Creek @ Jack Tone Rd	Diuron	01/13/10	1.19	0.51	17.19
Lone Tree Creek @ Jack Tone Rd	Diuron	02/09/10	3.99	0.26	29.38
Lone Tree Creek @ Jack Tone Rd	Diuron	01/11/11	1.31	1.1	40.80
Lone Tree Creek @ Jack Tone Rd	Diuron	02/08/11	0	0.37	0

Copper (D) – Dissolved Copper
*Field Duplicate

Source Identification and Outreach

The Coalition addressed source identification for the Lone Tree Creek @ Jack Tone Rd subwatershed in the 2011 MPUR and, in the following sections, considers 2011 monitoring results and PUR data. The PUR data are available for review through May 2011 for San Joaquin County and November 2011 for Stanislaus County. Given that any data included after May 2011 is preliminary, yearly evaluations are only considered complete through 2010.

In the past (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. From 2009 through 2011, MPM continued at the Lone Tree Creek @ Jack Tone Rd site during months when exceedances historically occurred to continue to assess water quality in the subwatershed as outreach in the area progressed.

Since the Lone Tree Creek subwatershed became high priority in 2008, the Coalition has actively engaged in grower outreach and education to address the Lone Tree Creek management plan's priority constituents. Grower meetings have been organized and mailings to educate growers about management practices and their importance in achieving acceptable water quality have been sent out. Individual grower meetings and follow up meetings with targeted members have informed growers about management practices as well as assessed current and newly implemented management practices.

While focused outreach is effective for most priority constituents, water quality data from 2010 indicates that it would be beneficial for additional growers to implement management practices specific to chlorpyrifos. The Coalition developed a strategy for additional outreach to growers in the Lone Tree Creek subwatershed for 2012, similar to the strategy outlined in the Duck Creek subwatershed. Similar topics will be discussed with targeted growers in the Lone Tree Creek subwatershed as described in the Duck Creek subwatershed Source ID and Outreach section.

Priority A/B Constituents

Chlorpyrifos and diazinon are listed as priority A/B constituents in the Lone Tree Creek @ Jack Tone Rd subwatershed management plan.

Chlorpyrifos

Ten exceedances of the chlorpyrifos WQTL (0.015 µg/L) occurred in samples collected from 2004 through 2011 during Normal Monitoring and MPM at the Lone Tree Creek site subwatershed, including one exceedance that occurred at an upstream location in 2008 (Table II-6).

The PUR data were reviewed from 2004 to 2011 for the number of applications, the amount of the active ingredient applied (pounds applied), and acres treated (Table II-9, Figure II-2). The greatest use occurred in 2005 (9,441 lbs AI) with the lowest use occurring in 2010 (2,498 lbs AI). The pounds of chlorpyrifos applied in this subwatershed dropped by nearly 75% since 2005. Also of note, the peak use of chlorpyrifos in the month of July decreased significantly since focused outreach began in 2008 (Figure II-2). Despite this, the concentration of chlorpyrifos still exceeded the WQTL in January and July 2010 MPM samples; however, there were zero exceedances of chlorpyrifos in samples collected from Lone Tree Creek during 2011 MPM.

The Coalition also uses PUR data to assess which crops receive the most applications of the constituent of concern (Table II-10). The highest amounts of chlorpyrifos applied from 2004 through 2011 were associated with almonds (16,031 lbs AI), followed by corn (14,590 lbs AI) and walnuts (9,772 lbs AI).

Consequently, the Coalition focused its outreach to target growers farming these crops. The most common product used within this subwatershed containing chlorpyrifos was Lorsban (Table II-10).

Table II-9. Lone Tree Creek @ Jack Tone Rd site subwatershed chlorpyrifos applications, lbs AI applied, and acres treated by month (2004-2011).

PUR data available through May 2011 for San Joaquin County and through November 2011 for Stanislaus County; all PUR data after May 2011 are preliminary. If a month is not included in the table, no applications were made.

Month/Year	Number of Chlorpyrifos Application	Pounds of AI Applied	Acres Treated
January, 2004	3	442.7	223
February, 2004	3	86.3	80.5
March, 2004	12	495.6	838
April, 2004	1	0.4	3.3
May, 2004	34	2358.5	1417
June, 2004	18	1353.8	872
July, 2004	59	3094.1	1648.3
August, 2004	16	697.1	593.5
January, 2005	1	79.1	44
March, 2005	7	268.9	477
May, 2005	21	1955.0	604
June, 2005	31	3190.1	1387.6
July, 2005	59	2587.6	1807
August, 2005	17	710.5	402
September, 2005	3	74.4	248
December, 2005	5	575.6	288.4
January, 2006	4	176.1	98
March, 2006	4	4.7	188
April, 2006	3	269.5	322
May, 2006	20	1440.1	783.5
June, 2006	37	2794.9	2129.1
July, 2006	46	2237.5	1589.8
August, 2006	9	270.6	224
September, 2006	4	256.5	253
October, 2006	3	297.6	152.4
November, 2006	2	249.0	134
January, 2007	5	447.3	240
March, 2007	1	97.2	195
April, 2007	2	26.6	24
May, 2007	23	1101.2	774
June, 2007	37	2976.9	2247
July, 2007	32	2122.2	1153.4
August, 2007	11	172.4	166
October, 2007	1	199.4	100
December, 2007	2	10.0	7.2
March, 2008	4	97.2	195
May, 2008	11	490.0	366.5
June, 2008	12	617.1	488
July, 2008	29	2704.5	1163.1
August, 2008	2	80.0	40
September, 2008	3	94.8	80
October, 2008	1	16.5	8.25
January, 2009	1	4.0	10

Month/Year	Number of Chlorpyrifos Application	Pounds of AI Applied	Acres Treated
March, 2009	4	367.1	218.5
April, 2009	1	70.0	35
May, 2009	8	459.4	233.5
June, 2009	5	215.1	107.4
July, 2009	27	1812.9	952
August, 2009	12	379.5	373
September, 2009	1	18.2	12
October, 2009	4	351.2	186
January, 2010	5	521.7	271
February, 2010	1	2.0	1
March, 2010	3	89.1	125
May, 2010	2	211.6	120
June, 2010	9	601.4	461.7
July, 2010	13	365.2	306.5
August, 2010	14	355.4	252
October, 2010	4	351.2	187
March, 2011	1	37.5	45
May, 2011	3	156.4	80.7
June, 2011	6	390.0	593.5
July, 2011	2	82.8	41
August, 2011	4	505.2	384.5
Summaries by Year			
2004 Total	146	8528.7	5675.6
2005 Total	144	9441.1	5258
2006 Total	132	7996.5	5873.8
2007 Total	114	7153.1	4906.6
2008 Total	62	4100.2	2340.9
2009 Total	63	3677.4	2127.4
2010 Total	51	2497.6	1724.2
2011 Total	16	1172.0	1144.7
Total	**728**	**44566.5**	**29051.1**

Figure II-2. Lone Tree Creek @ Jack Tone Rd site subwatershed lbs chlorpyrifos applied by month (2004-2011).

PUR data available through May 2011 for San Joaquin County and through November 2011 for Stanislaus County; all PUR data after May 2011 are preliminary. Asterisk (*) denotes months with exceedances.

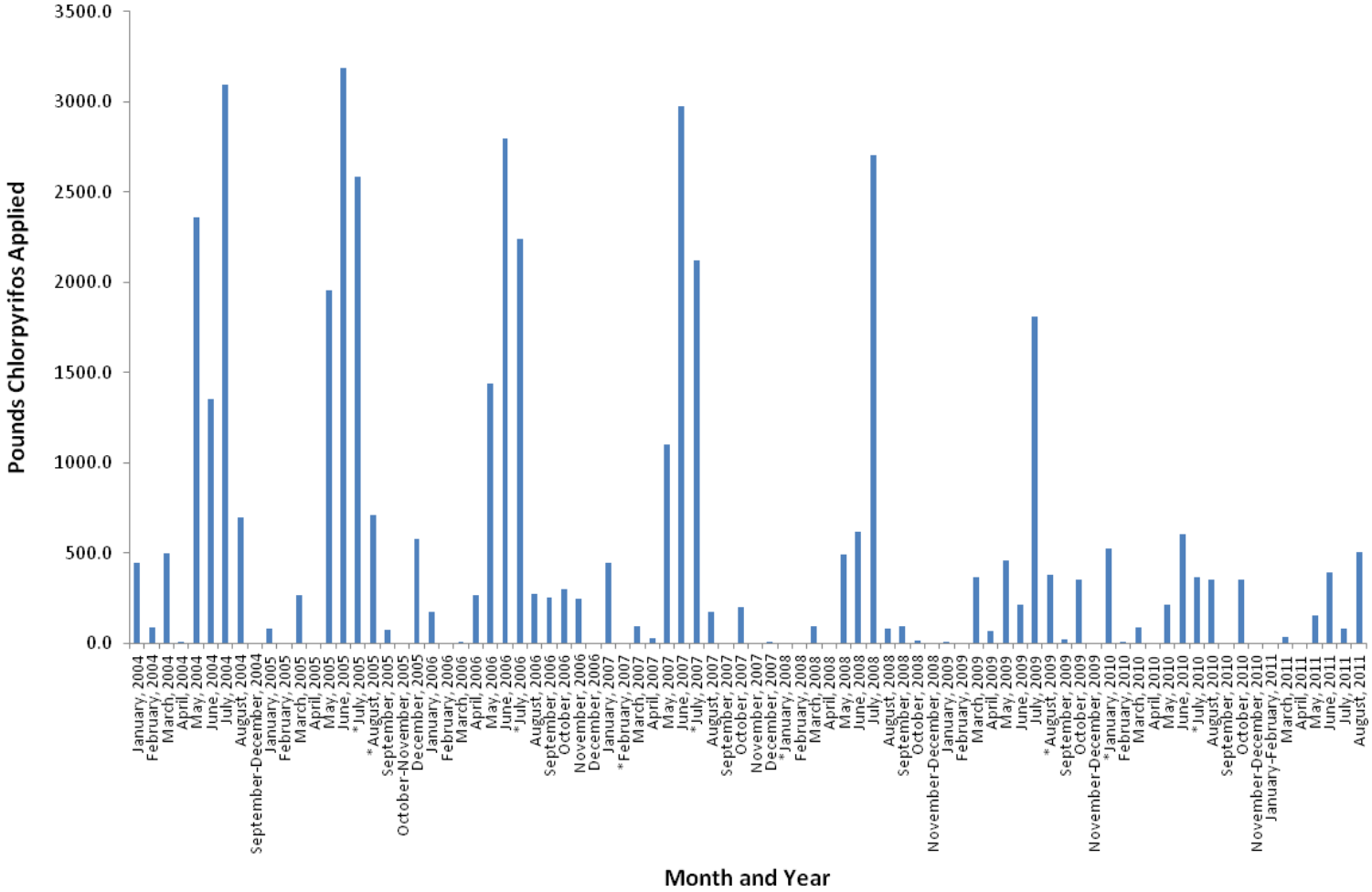


Table II-10. Lone Tree Creek @ Jack Tone Rd site subwatershed chlorpyrifos PUR data (2004-2011).

PUR data available through May 2011 for San Joaquin County and through November 2011 for Stanislaus County; all PUR data after May 2011 are preliminary.

Chemical Name	Commodity	Product Name	Lbs AI Applied
CHLORPYRIFOS	ALFALFA (FORAGE - FODDER) (ALFALFA HAY)	LOCK-ON INSECTICIDE	207.8
		LORSBAN 4E-HF	1197.7
		LORSBAN ADVANCED	117.3
		LORSBAN-4E	250.1
	ALMOND	CHLORPYRIFOS 4E AG	1155.6
		GOVERN 4E INSECTICIDE	251.8
		LORSBAN 4E INSECTICIDE	883.7
		LORSBAN 4E-HF	2070.0
		LORSBAN ADVANCED	1215.2
		LORSBAN-4E	9975.8
		NUFOS 4E	73.2
		WARHAWK	405.3
	APPLE	LORSBAN 4E-HF	84.7
	CORN (FORAGE - FODDER)	LORSBAN 15G GRANULAR INSECTICIDE	8291.4
		LORSBAN 4E-HF	1479.4
		LORSBAN ADVANCED	473.5
		LORSBAN-4E	302.9
		NUFOS 15G	3692.4
		NUFOS 4E	339.3
		WARHAWK	11.4
	GRAPES (WINE)	LORSBAN 4E-HF	860.7
		LORSBAN ADVANCED	702.4
		LORSBAN-4E	739.6
	NECTARINE	LORSBAN 4E INSECTICIDE	5.0
	N-OUTDR GRWN TRNSPLNT/PRPGTV MTRL	WARHAWK	3.0
	PEACH	LORSBAN 4E INSECTICIDE	5.0
	WALNUT (ENGLISH WALNUT, PERSIAN WALNUT)	CHLORPYRIFOS 4E AG	26.2
		GOVERN 4E INSECTICIDE	813.6
		LORSBAN 4E INSECTICIDE	419.5
		LORSBAN 4E-HF	4511.0
		LORSBAN 50W INSECTICIDE IN WATER SOLUBLE PACKETS	1.0
		LORSBAN ADVANCED	393.8
		LORSBAN-4E	3560.2
		NUFOS 4E	46.8

ALFALFA - Total Pounds Chlorpyrifos Applied	**1773.0**
ALMOND - Total Pounds Chlorpyrifos Applied	**16030.6**
APPLE - Total Pounds Chlorpyrifos Applied	**84.7**
CORN - Total Pounds Chlorpyrifos Applied	**14590.4**
GRAPES - Total Pounds Chlorpyrifos Applied	**2302.8**
NECTARINE - Total Pounds Chlorpyrifos Applied	**5.0**
N-OUTDR GRWN TRNSPLNT - Total Pounds Chlorpyrifos Applied	**3.0**
PEACH - Total Pounds Chlorpyrifos Applied	**5.0**
WALNUT - Total Pounds Chlorpyrifos Applied	**9772.0**
Total Pounds Chlorpyrifos Applied (2004-2011)	**44566.5**

Previous analyses conducted by the Coalition and reported in the 2009 MPUR suggest that outreach on the management of chlorpyrifos in this subwatershed should be a combination of providing information to growers across the entire watershed and focusing on specific parcels on an individual basis. The single exceedance in 2008 was associated with two applications to a single section suggesting that only one or two parcels were responsible. Additionally, the elevated concentration in the sample (1.7 µg/L) suggested that surface runoff was the method of transport of chlorpyrifos to Lone Tree Creek. The same assumption can be made concerning the August 2009 and January and July 2010 chlorpyrifos exceedances. Almond, walnut, alfalfa and corn growers are targeted for outreach in this subwatershed. Row crop farmers are advised of methods to better manage their irrigation tailwater and storm water runoff, whereas outreach efforts to orchard growers focus on encouraging management practices to reduce spray drift and improve orchard water management.

Since 2007, Coalition outreach includes grower meetings and the mailing/distribution of information. A complete list of Coalition outreach that occurred in high priority subwatersheds during 2011 is provided in the Performance Goals and Schedules section of this report. The Coalition focused outreach towards growers who had used chlorpyrifos within the last two years and contacted permittees associated with the targeted growers. Beginning in the fall of 2008, the Coalition made several individual contacts with permittees and/or growers to discuss the Lone Tree Creek management plan strategy and relevant management practices. The Coalition also hosted a subwatershed grower meeting in November 2008, invited members to a Mid Valley Agricultural Services hosted grower meeting in March 2009, invited growers to Spray Safe hosted grower meetings in February 2010 and 2011, and hosted a meeting alongside MVP Safety Consulting in December 2011 to further expand their grower audience as well as highlight chlorpyrifos management practices. Although meetings focused mainly on chlorpyrifos exceedances, all water quality results were reviewed and discussed including diazinon, copper and diuron exceedances, *C. dubia*, *S. capricornutum* , *P. promelas* and *H. azteca* toxicities, and ammonia, *E. coli,* DO, SC, pH and TDS exceedances. Grower surveys completed at the meetings, documenting members' current practices and indicating which recommended practices growers anticipate implementing in the upcoming year, have been compiled and assessed. The Coalition contacted 43 targeted growers, accounting for 3,742 acres within the subwatershed. To date, the Coalition has received surveys from all targeted members and has achieved 100% of targeted grower contacts.

The Coalition began following up with growers in 2010 to determine which additional management practices were implemented in 2009 and if additional practices have been planned for 2010. Of the initial 43 targeted growers, 17 members were required to complete a follow up survey. To date, 100% of the follow up meetings with the first priority subwatersheds are completed and all members who had recommended management practices have implemented those practices. Of the 17 growers who implemented management practices 32% of acres with recorded practices reduced the use of pesticides found in exceedances, 30% of acres with recorded practices installed sprinkler or micro irrigation systems, 29% of acres with recorded practices reduced runoff water volumes using irrigation management, 7% of acres with recorded practices installed retention pond/holding basin/return systems , and 2% of acres with recorded practices are using center grass rows, grass waterways/grass

filter strips. The growers who implemented new management practices represent 51% (1,923 acres) of the 3,742 targeted acres.

Chlorpyrifos was scheduled for 2011 MPM in the months of January, February, July and August (January and February were also monitored as part of DPR grant monitoring). There were no exceedances in any of the samples collected; however, due to two chlorpyrifos exceedances in January and July 2010, the Coalition will continue MPM in 2012 to assess the water quality in Lone Tree Creek. Lone Tree Creek is scheduled for MPM of chlorpyrifos in January, February, July and August. Furthermore, in 2012, an additional two growers representing 264 acres are targeted for additional focused outreach based on their recent use of chlorpyrifos and associations to recent exceedances. Outreach will focus mainly on discontinuing the use of chlorpyrifos; however, improved management practices such as recycling runoff water and being mindful of buffer zones will be discussed for all pesticides in use.

Diazinon

The concentration of diazinon in samples exceeded the WQTL two times in the past (Table II-6); both exceedances occurred in samples collected during storm monitoring events (February 2007 and January 2008). The Coalition monitored for diazinon as a part of MPM in January and February 2011 and will continue MPM for diazinon in January and February of 2012.

The PUR data were reviewed from 2004 through available 2011 data for the number of monthly diazinon applications, pounds of active ingredient applied, and acres treated (Table II-11, Figure II-3). Applications of diazinon in this subwatershed typically occur as dormant sprays during December, January, and February, with January receiving the most and largest applications. However, 2010 PUR data indicate that diazinon use, including number of applications in a given month, pounds applied and acres treated per month, significantly decreased in this subwatershed, in particular during January (the month with peak use). Almonds remain the primary commodity receiving applications (Table II-12).

Table II-11. Lone Tree Creek @ Jack Tone Rd site subwatershed diazinon applications, lbs AI applied, and acres treated by month (2004-2011).

PUR data available through May 2011 for San Joaquin County and through November 2011 for Stanislaus County; all PUR data after May 2011 are preliminary. If a month is not included in the table, no applications were made.

Month/Year	Number of Diazinon Applications	Pounds of AI Applied	Acres Treated
January, 2004	29	1027.0	640.3
February, 2004	1	55.8	28
June, 2004	1	20.0	40
December, 2004	8	276.8	182.3
January, 2005	20	1136.0	763.5
February, 2005	5	99.1	57.5
December, 2005	7	305.7	182.5
January, 2006	31	1730.6	1165.5
February, 2006	2	61.5	51
December, 2006	10	156.1	101.5
January, 2007	5	174.6	105.5
February, 2007	5	72.4	41.4
March, 2007	2	17.3	9.4
December, 2007	5	5.3	4.3
January, 2008	11	747.0	481
February, 2008	2	50.0	20
July, 2008	1	2.0	10
January, 2009	2	79.6	50
May, 2009	2	14.9	7.8
June, 2009	2	58.6	98.2
August, 2009	1	1.9	10
December, 2009	11	303.9	121.8
January, 2010	2	17.4	15.5
February, 2010	1	12.6	6
April, 2010	4	65.0	50
June, 2010	1	2.3	1.5
January, 2011	1	22.3	14
Summaries by Year			
2004 Total	39	1379.6	890.5
2005 Total	32	1540.9	1003.5
2006 Total	43	1948.2	1318
2007 Total	17	269.6	160.6
2008 Total	14	798.9	511
2009 Total	18	458.8	287.8
2010 Total	8	97.2	73
2011 Total	1	22.3	14
Total	**172**	**6515.5**	**4258.3**

Figure II-3. Lone Tree Creek @ Jack Tone Rd site subwatershed lbs diazinon applied by month (2004-2011).

PUR data available through May 2011 for San Joaquin County and through November 2011 for Stanislaus County; all PUR data after May 2011 are preliminary. Asterisk (*) denotes months with exceedances.

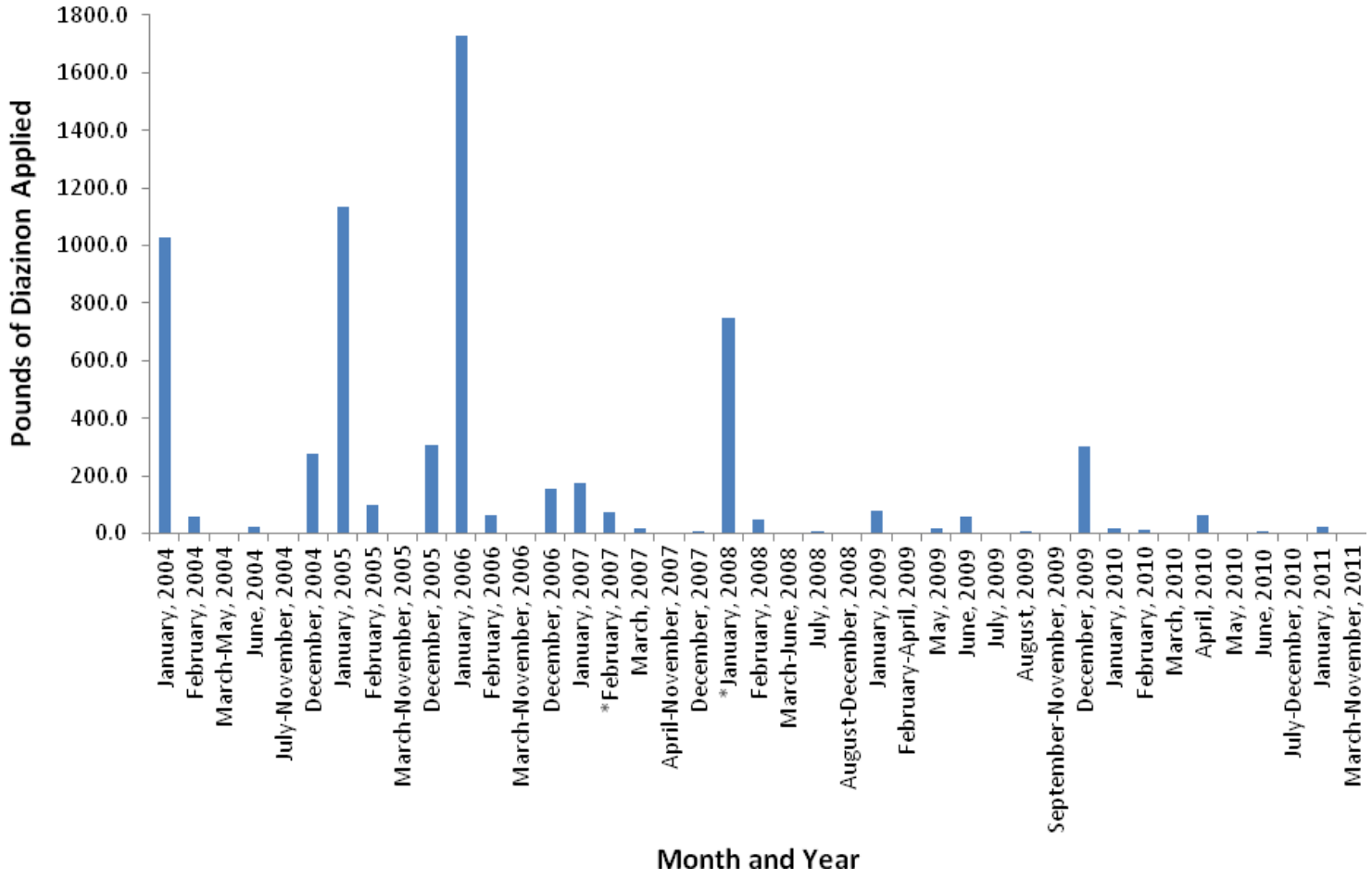


Table II-12. Lone Tree Creek @ Jack Tone Rd site subwatershed diazinon PUR data (2004-2011).

PUR data available through May 2011 for San Joaquin County and through November 2011 for Stanislaus County; all PUR data after May 2011 are preliminary.

Chemical Name	Commodity	Product Name	Lbs AI Applied
DIAZINON	ALMOND	CLEAN CROP DIAZINON AG600 WBC	153.5
		DIAZINON 50W	318.8
		DIAZINON AG 500	2209.9
		DIAZINON AG500	779.7
		DIAZINON AG500 INSECTICIDE	199.2
		DIAZOL 50 W	93.0
		DIAZOL AG 500	1248.7
		GOWAN DIAZINON 4E	525.8
		RED-TOP DIAZINON 4 SPRAY	247.1
		SMCP DIAZINON AG500	27.8
		WILBUR-ELLIS DIAZINON 4 SPRAY	144.1
	APPLE	D.Z.N. DIAZINON 50W (WITHDRAWN)	53.6
		DIAZOL 50 W	8.5
	APRICOT	DIAZINON 50W	2.0
		DIAZOL 50 W	8.8
	CHERRY	CLEAN CROP DIAZINON 50 WP	35.0
		CLEAN CROP DIAZINON AG600 WBC	39.9
		D.Z.N. DIAZINON AG600 WBC (WITHDRAWN)	44.9
		DIAZINON 50W	77.5
		DIAZOL 50 W	7.0
	NECTARINE	CLEAN CROP DIAZINON AG600 WBC	6.2
		DIAZINON 50W	1.5
		DIAZOL 50 W	5.8
		DIAZOL AG 500	19.8
	ONION (DRY, SPANISH, WHITE, YELLOW, RED, ETC.)	GOWAN DIAZINON 4E	20.0
	PEACH	CLEAN CROP DIAZINON AG600 WBC	202.1
		DIAZINON 50W	1.5
		DIAZOL 50 W	6.8
		DIAZOL AG 500	9.9
	PLUM (INCLUDES WILD PLUMS FOR HUMAN CONSUMPTION)	DIAZINON 50W	2.0
		DIAZOL 50 W	8.8
	WALNUT (ENGLISH WALNUT, PERSIAN WALNUT)	PROKIL DIAZINON 4EC	6.4

ALMOND - Total Pounds Diazinon Applied	**5947.5**
APPLE - Total Pounds Diazinon Applied	**62.1**
APRICOT - Total Pounds Diazinon Applied	**10.8**
CHERRY - Total Pounds Diazinon Applied	**204.3**
NECTARINE - Total Pounds Diazinon Applied	**33.3**
ONION - Total Pounds Diazinon Applied	**20.0**
PEACH - Total Pounds Diazinon Applied	**220.3**
PLUM - Total Pounds Diazinon Applied	**10.8**
WALNUT - Total Pounds Diazinon Applied	**6.4**
Total Pounds Diazinon Applied (2004-2011)	**6515.5**

The Coalition's strategy for addressing diazinon exceedances in the Lone Tree Creek subwatershed involved contacting specific growers with parcels that have the potential to drain to the creek. Targeted outreach that occurred within this subwatershed is described under the chlorpyrifos outreach section above and included discussions of management practices relevant to storm water retention and spray management.

Priority C Constituents

Copper and diuron are listed as priority C constituents in the Lone Tree Creek @ Jack Tone Rd subwatershed management plan.

Copper

Samples with copper exceeded the hardness based WQTL eight times in the Lone Tree Creek site subwatershed since monitoring began in 2004 (Table II-6). The Coalition began monitoring for both the total and dissolved copper fractions in October 2008 to better characterize copper contamination in the subwatershed. Starting in July 2009, MPM for copper occurred continuously in the months of January, February, July, August and September, and is scheduled in 2012 during the same months.

The PUR data were reviewed from 2004 through available 2011 data for the number of monthly copper applications, pounds of active ingredient applied, and acres treated (Table II-13, Figure II-4). Copper is one of the most heavily applied constituents in the site subwatershed. Normally, there are fewer applications from the summer through the fall, with the bulk of the applications occurring in the winter and spring. Copper applications were at their peak in 2004 (43,828 lbs AI), but decreased by roughly half with the least amount occurring in 2010 (19,434 lbs AI). Not all exceedances occur in months with the greatest use (Figure II-4).

The PUR data are also uses to assess which crops receive the most applications. Almonds (104,348 lbs AI) received the greatest pounds of copper followed by rice (60,884 lbs AI), see Table II-14.

Table II-13. Lone Tree Creek @ Jack Tone Rd site subwatershed copper applications, lbs AI applied, and acres treated by month (2004-2011).

PUR data available through May 2011 for San Joaquin County and through November 2011 for Stanislaus County; all PUR data after May 2011 are preliminary. If a month is not included in the table, no applications were made.

Month/Year	Number of Copper Applications	Pounds of AI Applied	Acres Treated
January, 2004	86	16317.5	3190
February, 2004	56	2143.7	1767.5
March, 2004	42	3035.1	1397.4
April, 2004	44	8891.9	1563.5
May, 2004	20	10759.1	997
September, 2004	1	24.6	16
October, 2004	1	39.3	16
December, 2004	18	2617.0	529.3
January, 2005	63	14649.7	2769.8
February, 2005	55	3427.1	1627.5
March, 2005	33	3232.6	918
April, 2005	53	6676.0	1282.6
May, 2005	30	6264.5	856
June, 2005	4	1489.4	208
July, 2005	1	40.5	33
December, 2005	21	4226.9	751.5
January, 2006	101	18153.2	3785.5
February, 2006	47	1142.3	1329
March, 2006	27	1090.7	907.5
April, 2006	46	4256.9	1118.1
May, 2006	36	8510.5	1217.5
June, 2006	13	2173.4	211
July, 2006	4	3.6	4
August, 2006	3	34.1	11
September, 2006	1	53.9	35
October, 2006	2	100.1	65
December, 2006	21	1407.6	301.5
January, 2007	61	10081.5	2342.5
February, 2007	27	1515.1	1167.3
March, 2007	14	1868.0	460
April, 2007	51	4699.8	1316.4
May, 2007	18	5506.0	566
June, 2007	4	3.6	4
July, 2007	6	5.3	6
August, 2007	2	1.8	2
September, 2007	4	3.6	4
October, 2007	4	3.6	4
November, 2007	8	104.0	31
December, 2007	10	268.5	49.5
January, 2008	45	7898.7	1926.3
February, 2008	25	2080.6	1141
March, 2008	12	788.3	261
April, 2008	29	2198.2	630.1
May, 2008	17	8093.9	678
June, 2008	3	348.3	37
July, 2008	4	3.6	4

Month/Year	Number of Copper Applications	Pounds of AI Applied	Acres Treated
August, 2008	4	3.6	4
September, 2008	4	3.6	4
October, 2008	4	3.6	4
November, 2008	4	3.6	4
December, 2008	5	1801.8	364
January, 2009	32	6368.8	1390
February, 2009	15	923.5	638.2
March, 2009	5	672.4	182
April, 2009	40	3080.9	950.7
May, 2009	34	10878.1	932
June, 2009	4	3.6	4
July, 2009	3	4.3	5
August, 2009	2	1.8	2
September, 2009	7	7.9	9
October, 2009	4	3.6	4
November, 2009	2	1.8	2
December, 2009	18	3018.2	586.6
January, 2010	36	5896.2	1557
February, 2010	22	878.0	794.6
March, 2010	15	1012.7	414
April, 2010	71	3421.9	1249.9
May, 2010	14	3092.4	443.2
June, 2010	15	5167.7	477
July, 2010	4	1.8	4.66
August, 2010	2	1.1	2
September, 2010	2	1.1	2
October, 2010	2	1.1	2
January, 2011	12	1600.3	365
February, 2011	14	802.8	705
March, 2011	4	114.3	123.5
April, 2011	25	1727.4	518.5
May, 2011	13	2034.7	320.2
June, 2011	1	1.1	1
July, 2011	3	3.2	3
August, 2011	2	2.2	2
Summaries by Year			
2004 Total	268	43828.3	9476.7
2005 Total	260	40006.8	8446.4
2006 Total	301	36926.1	8985.1
2007 Total	209	24060.8	5952.6
2008 Total	156	23227.6	5057.3
2009 Total	166	24964.9	4705.5
2010 Total	183	19473.8	4946.4
2011 Total	74	6286.0	2038.2
Total	**1617**	**218774.4**	**49608.0**

Figure II-4. The Lone Tree Creek @ Jack Tone Rd site subwatershed lbs copper applied by month (2004-2011).

PUR data available through May 2011 for San Joaquin County and through November 2011 for Stanislaus County; all PUR data after May 2011 are preliminary. Asterisk (*) denotes months with exceedances.

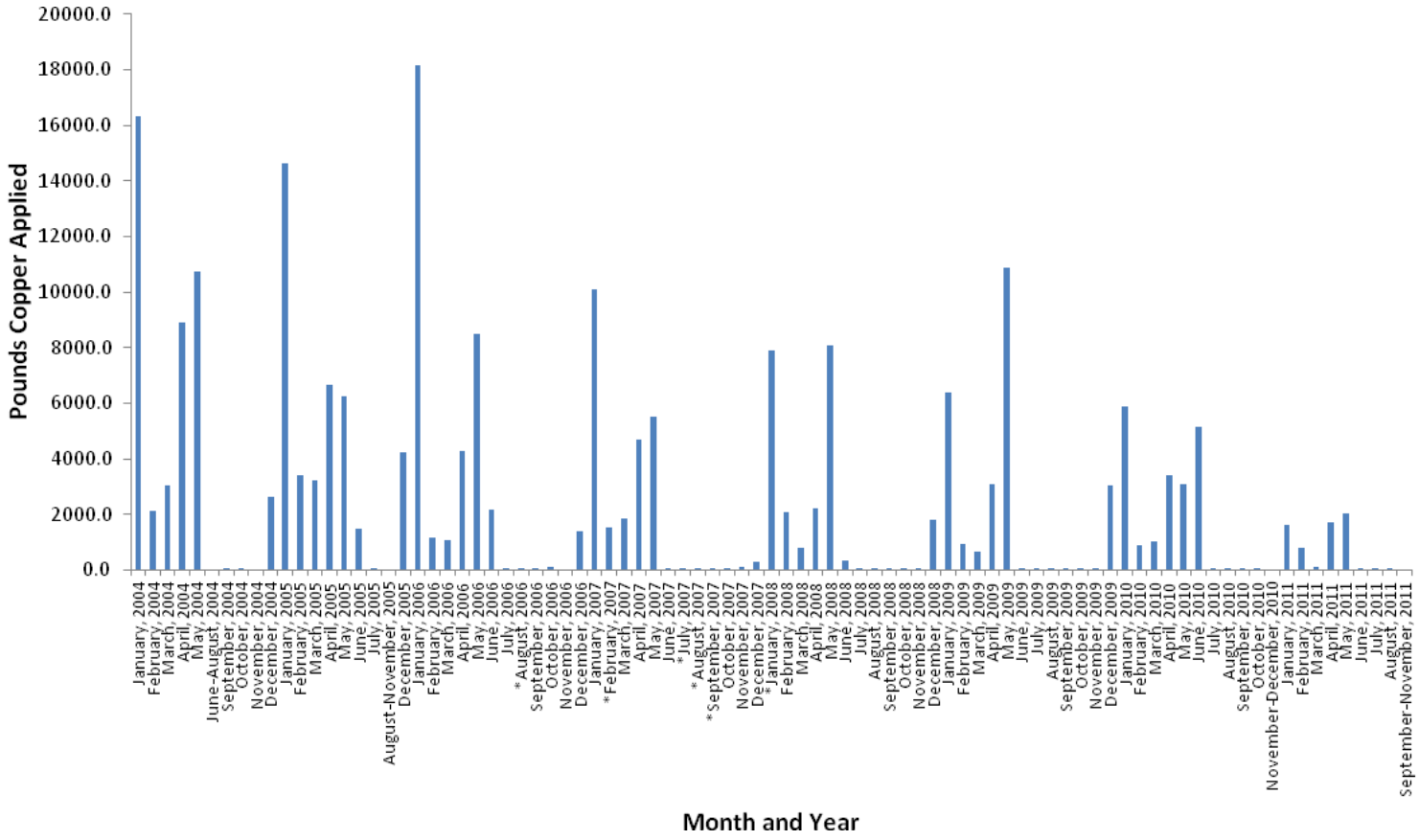


Table II-14. Lone Tree Creek @ Jack Tone Rd site subwatershed copper PUR data (2004-2011).

PUR data available through May 2011 for San Joaquin County and through November 2011 for Stanislaus County; all PUR data after May 2011 are preliminary.

Chemical Name	Commodity	Product Name	Lbs AI Applied
COPPER	ALFALFA (FORAGE - FODDER) (ALFALFA HAY)	KOCIDE DF	828.9
	ALMOND	BASIC COPPER 53	3279.3
		BASICOP	1099.8
		BLUE SHIELD DF	200.2
		CHAMP FORMULA 2 FLOWABLE	52.6
		CHAMP FORMULA II DRY FLOWABLE	367.2
		CHAMPION WETTABLE POWDER	1608.3
		CLEAN CROP C-O-C-S WETTABLE	71.2
		COPPER POWER FLOWABLE	110.3
		CUPROFIX DISPERSS	235.2
		CUPROFIX ULTRA 40 DISPERSS	4737.0
		DUPONT GX-569 FUNGICIDE/BACTERICIDE	18.4
		DUPONT KOCIDE 2000 FUNGICIDE/BACTERICIDE	12100.3
		DUPONT KOCIDE 3000 FUNGICIDE/BACTERICIDE	182.6
		DUPONT KOCIDE DF FUNGICIDE/BACTERICIDE	82.0
		HYDROX	5316.1
		KOCIDE 101	6377.1
		KOCIDE 2000	6003.4
		KOCIDE DF	17906.6
		NORDOX	956.8
		NORDOX 75 WG	23623.9
		NU-COP 50 WP	1341.3
		NU-COP 50DF	18430.7
		TRIANGLE BRAND COPPER SULFATE INSTANT POWDER	247.5
	APPLE	KOCIDE DF	12.3
	APRICOT	KOCIDE DF	6.1
		NORDOX 75 WG	26.0
	CHERRY	CHAMPION WETTABLE POWDER	81.8
		CUPROFIX DISPERSS	208.1
		DUPONT KOCIDE 2000 FUNGICIDE/BACTERICIDE	167.9
		DUPONT KOCIDE DF FUNGICIDE/BACTERICIDE	564.3
		HYDROX	81.8
		KOCIDE 101	1078.0
		KOCIDE DF	1006.3
		NORDOX	654.2
		NORDOX 75 WG	21.0
		NU-COP 50DF	209.4
	GRAPES	CHAMP FORMULA 2 FLOWABLE	115.5
		DUPONT KOCIDE 2000 FUNGICIDE/BACTERICIDE	18.3
		KENTAN DF	20.8
		KOCIDE 2000	80.7
		NU-COP 50DF	4.6
		TENN-COP 5E	145.1
		TENN-COP 5E FUNGICIDE/BACTERICIDE	75.6
	GRAPES (WINE)	CHAMP FORMULA 2 FLOWABLE	863.3
		COPPER-COUNT-N	0.4

Chemical Name	Commodity	Product Name	Lbs AI Applied
COPPER	GRAPES (WINE)	DUPONT KOCIDE 3000 FUNGICIDE/BACTERICIDE	292.1
		KENTAN DF	95.6
		KOCIDE 606 FLOWABLE AGRICULTURAL FUNGICIDE	414.0
		NU-COP 3L	361.6
		TENN-COP 5E FUNGICIDE/BACTERICIDE	2.4
	NECTARINE	BLUE SHIELD DF	38.5
		HYDROX	77.0
		KOCIDE DF	4.6
		NORDOX 75 WG	158.2
		NU-COP 50DF	19.3
	N-OUTDR GRWN TRNSPLNT/PRPGTV MTRL	CHAMP FORMULA 2 FLOWABLE	5.1
		CLEAN CROP C-O-C-S WETTABLE	89.0
		CUPRO 2005 T/N/O	9.7
	ONION (DRY, SPANISH, WHITE, YELLOW, RED, ETC.)	KOCIDE 101	215.6
	PEACH	BLUE SHIELD DF	53.9
		HYDROX	38.5
		KOCIDE DF	8.3
		NORDOX 75 WG	544.8
		NU-COP 50DF	623.7
	PLUM (INCLUDES WILD PLUMS FOR HUMAN CONSUMPTION)	KOCIDE DF	6.1
		NORDOX 75 WG	26.0
	RICE (ALL OR UNSPEC)	CHIPCO COPPER SULFATE CRYSTALS	59438.8
		COPPER SULFATE CRYSTAL	1445.4
	SOIL APPLICATION, PREPLANT-OUTDOOR (SEEDBEDS,ETC.)	KOCIDE 101	24.6
	TOMATOES, FOR PROCESSING/CANNING	KOCIDE 101	84.7
		KOCIDE DF	39.3
		NU-COP 3L	2.4
		NU-COP 50DF	154.0
	WALNUT (ENGLISH WALNUT, PERSIAN WALNUT)	BLUE SHIELD	479.7
		BLUE SHIELD DF	46.2
		CHAMPION WETTABLE POWDER	234.1
		CUPROFIX ULTRA 40 DISPERSS	42.7
		DUPONT GX-569 FUNGICIDE/BACTERICIDE	73.8
		DUPONT KOCIDE 2000 FUNGICIDE/BACTERICIDE	7288.3
		DUPONT KOCIDE 3000 FUNGICIDE/BACTERICIDE	860.6
		DUPONT KOCIDE DF FUNGICIDE/BACTERICIDE	469.5
		HYDROX	2420.1
		HYDROX DF	61.6
		KENTAN DF	887.6
		KOCIDE 101	5045.0
		KOCIDE 20/20	64.5
		KOCIDE 2000	2479.3
		KOCIDE DF	9763.5
		NORDOX	408.9
		NORDOX 75 WG	715.8
		NU-COP 50 WP	528.2
		NU-COP 50DF	11623.7
		NU-COP 50WP	69.3
		NUCOP DF	70.0
		NU-COP HB	250.3

Chemical Name	Commodity	Product Name	Lbs AI Applied
		ALFALFA - Total Pounds Copper Applied	828.9
		ALMOND - Total Pounds Copper Applied	104347.9
		APPLE - Total Pounds Copper Applied	12.3
		APRICOT - Total Pounds Copper Applied	32.1
		CHERRY - Total Pounds Copper Applied	4072.9
		GRAPES - Total Pounds Copper Applied	2490.2
		NECTARINE - Total Pounds Copper Applied	297.6
		N-OUTDR GRWN TRNSPLNT - Total Pounds Copper Applied	103.7
		ONION -Total Pounds Copper Applied	215.6
		PEACH - Total Pounds Copper Applied	1269.2
		PLUM - Total Pounds Copper Applied	32.1
		RICE - Total Pounds Copper Applied	60884.2
		SOIL APPLICATION - Total Pounds Copper Applied	24.6
		TOMATOES - Total Pounds Copper Applied	280.4
		WALNUT - Total Pounds Copper Applied	43882.5
		Total Pounds Copper Applied (2004-2011)	218774.4

The Coalition determined that discharge from a few parcels was responsible for the copper exceedances, and, consequently, management of copper was focused on parcels with the potential to discharge directly to the creek. Orchard and vineyard operators were encouraged to review their operations and determine if storm water runoff and irrigation return flows are managed properly. Growers were advised to consider tailwater management and practices to prevent copper from entering the waterway with runoff. This is consistent with the strategy used to address priority A/B constituent exceedances.

Diuron

Two exceedances of the diuron WQTL occurred in the Lone Tree Creek site subwatershed during 2007 storm monitoring and one occurred during 2008 storm monitoring (Table II-6). The Coalition did not monitor for diuron at Lone Tree Creek as a part of 2009 MPM; however starting in 2010, MPM for diuron occur in January and February.

All PUR data are reviewed for the number of monthly diuron applications, pounds of active ingredient applied, and acres treated (Table II-15, Figure II-5). Applications of diuron occurred in every month of the year except August and October, although the majority of past applications occurred in the period between November and February. Diuron applications drastically decreased in the years since 2004; in 2010 only 209 lbs AI were applied versus 866 lbs AI in 2004 (Table II-15 and Figure II-5). Exceedances of the diuron WQTL occurred in winter months following months with high amounts of diuron applied (Figure II-5).

The largest amount of diuron applied from 2004 through 2011 is associated with walnuts (1,959 lbs AI) and alfalfa (316 lbs AI) (Table II-16).

Table II-15. Lone Tree Creek @ Jack Tone Rd site subwatershed diuron applications, lbs AI applied, and acres treated by month (2004-2011).

PUR data available through May 2011 for San Joaquin County and through November 2011 for Stanislaus County; all PUR data after May 2011 are preliminary. If a month is not included in the table, no applications were made.

Month/Year	Number of Diuron Applications	Pounds of AI Applied	Acres Treated
January, 2004	2	28.2	47.5
February, 2004	10	308.6	197.6
March, 2004	6	96.9	156
April, 2004	3	62.3	92
May, 2004	4	31.7	45
June, 2004	2	39.1	41
November, 2004	2	24.4	39.1
December, 2004	9	274.8	286.3
January, 2005	2	24.2	50
February, 2005	3	29.3	73
March, 2005	1	23.4	33
April, 2005	1	19.6	7
May, 2005	1	2.9	6
January, 2006	4	92.3	141
February, 2006	4	28.9	22.5
March, 2006	1	8.2	8.3
April, 2006	2	42.9	80
May, 2006	3	37.1	47.4
June, 2006	2	23.1	47.5
July, 2006	2	31.2	49.7
November, 2006	3	120.9	124
December, 2006	2	87.7	60
January, 2007	1	13.0	13
February, 2007	2	18.8	19.3
March, 2007	8	102.2	171.7
April, 2007	1	33.2	17
May, 2007	7	50.2	67.7
June, 2007	1	17.6	33
November, 2007	3	34.1	190
December, 2007	4	197.8	122.3
February, 2008	3	42.8	22.3
March, 2008	2	19.2	15.8
May, 2008	4	35.7	62.2
November, 2008	3	17.9	19.8
January, 2009	5	29.9	51.5
February, 2009	1	23.6	33
March, 2009	2	13.1	18.3
April, 2009	3	53.9	37.8
May, 2009	2	15.1	96
July, 2009	2	11.9	25
November, 2009	1	4.8	6
December, 2009	2	17.5	123
January, 2010	2	27.0	63
February, 2010	3	53.2	42
March, 2010	3	53.4	88
May, 2010	4	50.4	36.5

Month/Year	Number of Diuron Applications	Pounds of AI Applied	Acres Treated
June, 2010	1	8.6	15
November, 2010	1	16.0	27
January, 2011	1	20.7	65
February, 2011	1	21.1	7.2
April, 2011	1	12.2	12.3
September, 2011	1	1.5	5
Summaries by Year			
2004 Total	38	865.9	904.5
2005 Total	8	99.4	169
2006 Total	23	472.4	580.4
2007 Total	27	467.0	634.1
2008 Total	12	115.6	120.0
2009 Total	18	169.8	390.7
2010 Total	14	208.5	271.5
2011 Total	4	55.5	89.5
Total	**144**	**2454.1**	**3159.6**

Figure II-5. Lone Tree Creek @ Jack Tone Rd site subwatershed lbs diuron applied by month (2004-2011).

PUR data available through May 2011 for San Joaquin County and through November 2011 for Stanislaus County; all PUR data after May 2011 are preliminary. Asterisk (*) denotes months with exceedances.

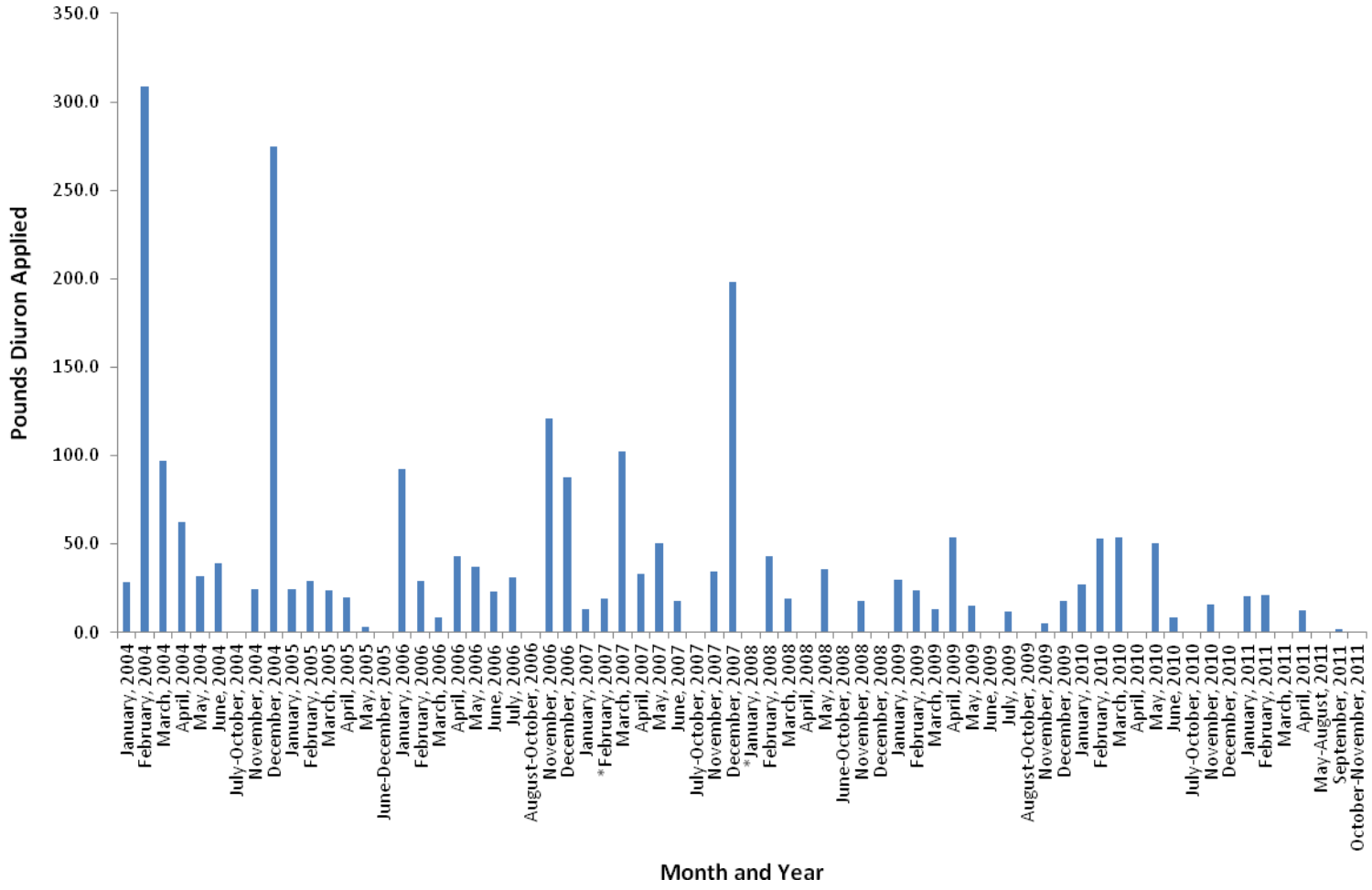


Table II-16. Lone Tree Creek @ Jack Tone Rd site subwatershed diuron PUR data (2004-2011).
PUR data available through May 2011 for San Joaquin County and through November 2011 for Stanislaus County.

Chemical Name	Commodity	Product Name	Lbs AI Applied
DIURON	ALFALFA (FORAGE - FODDER) (ALFALFA HAY)	DIREX 4L	274.6
		DUPONT DIREX 4L HERBICIDE	41.1
	GRAPES	DIREX 4L	88.9
		DU PONT KARMEX DF HERBICIDE	0.4
	GRAPES (WINE)	DIREX 4L	24.6
		DREXEL DIURON 4L HERBICIDE	13.0
		DUPONT DIREX 4L HERBICIDE	20.7
	OLIVE (ALL OR UNSPEC)	DUPONT DIREX 4L HERBICIDE	28.0
	PASTURES (ALL OR UNSPEC)	DIREX 4L	4.1
	WALNUT (ENGLISH WALNUT, PERSIAN WALNUT)	DIREX 4L	1533.9
		DIREX 80DF	27.2
		DIURON 400 HERBICIDE	123.2
		DIURON 4L HERBICIDE	153.3
		DREXEL DIURON 4L HERBICIDE	70.7
		DUPONT DIREX 4L HERBICIDE	50.6

ALFALFA - Total Pounds Diuron Applied	**315.7**
GRAPES - Total Pounds Diuron Applied	**147.6**
OLIVE - Total Pounds Diuron Applied	**28.0**
PASTURES - Total Pounds Diuron Applied	**4.1**
WALNUT - Total Pounds Diuron Applied	**1958.8**
Total Pounds Diuron Applied (2004-2011)	**2454.1**

The Coalition's strategy for addressing diuron exceedances in the Lone Tree Creek subwatershed during outreach is described above under the chlorpyrifos section. In 2012, MPM for diuron is scheduled for January and February 2011 to further assess the implementation and effectiveness of management practices.

Priority D Constituents

C. dubia, P. promelas and *S. capricornutum* water column toxicity and *H. azteca* sediment toxicity are listed as priority D constituents for Lone Tree Creek.

C. dubia toxicity

Water column toxicity to *C. dubia* occurred in the Lone Tree Creek subwatershed upstream location, Lone Tree Creek @ Brennan Rd in February 2006 and at Lone Tree Creek @ Jack Tone Rd in January 2008 (Table II-6). Both toxicities coincided with the presence of chlorpyrifos in the water at concentrations above the WQTL. However, samples collected from the downstream site at Jack Tone Rd were not toxic during the February 2006 monitoring event and therefore MPM for *C. dubia* toxicity was not initiated.

The Coalition's strategy for eliminating *C. dubia* toxicity involves focusing on chlorpyrifos. If chlorpyrifos can be prevented from entering storm water during the winter, the Coalition believes that *C. dubia* toxicity will be reduced or eliminated. Therefore, the Coalition will continue with outreach as explained above under the chlorpyrifos section to address toxicity.

P. promelas toxicity

P. promelas toxicity occurred in February 2005, February 2006 (at an upstream location) and in January 2008 (Table II-6). The January 2008 toxicity was associated with an exceedance of the ammonia WQTL. Toxicity to *P. promelas* was not monitored during 2009 MPM because the Coalition believes the ammonia exceedances that occurred were a result of dairy discharges in the Lone Tree Creek subwatershed. Because dairies are not members of the SJCDWQC, the Coalition believes it will be difficult to affect ammonia exceedances as non-members are often reluctant to cooperate with the Coalition and implement management practices.

S. capricornutum toxicity

Since monitoring began at Lone Tree Creek, there were ten instances of *S. capricornutum* toxicity, including three toxicities that occurred in samples collected from an upstream location (Table II-6). Most recently, *S. capricornutum* toxicity occurred in January, April and May of 2008. The January exceedance was associated with an exceedance of the diuron WQTL. No exceedances of herbicides occurred during April or May, but applications of copper were common prior to sampling in both months. April and May MPM in 2009 resulted in no toxicity, as did January through May MPM in 2010 and 2011.

The Coalition's strategy for eliminating *S. capricornutum* toxicity involved focusing on copper and diuron. The Coalition believes that *S. capricornutum* toxicity was eliminated as a result of the elimination of exceedances of the diuron and copper WQTLs.

H. azteca toxicity

H. azteca toxicity occurred in May 2005 and April 2006 (Table II-6). As of 2009, the Coalition began testing for total organic carbon and grain size in all sediments and analyzing for pyrethroids and chlorpyrifos in sediment that exhibits toxicity. There was no MPM for *H. azteca* toxicity scheduled during 2010. However, additional samples were collected to test for sediment toxicity in September 2010 as part of DPR grant monitoring. The DPR samples did not result in sediment toxicity. In 2012, MPM took place for *H. azteca* toxicity during the storm and irrigation collection months (March and October), and did not result in sediment toxicity.

Priority E Constituents

DO, pH, SC, TDS, *E. coli*, and ammonia are listed as priority E constituents for Lone Tree Creek. Although these constituents remain low priority, the Coalition continues to collect monitoring data for DO, pH and SC during each monitoring event. TDS, *E. coli* and ammonia will be monitored when Assessment Monitoring resumes at this site in 2026. The priority E constituents are discussed during targeted outreach and will continue to be discussed at annual grower meetings. To address *E. coli* exceedances, the Coalition plans to participate in the focus group along with other Coalitions and Regional Board staff to develop a joint Work Plan to characterize the potential agricultural sources of *E. coli* and identify management practices to prevent discharges to surface waters.

Evaluation

Lone Tree Creek is a first priority subwatershed within the SJCDWQC and has technically completed its focused outreach (2008-2010).

Individual surveys to document current management practices and follow up contacts to assess future planned implementations were completed by 100% of targeted growers. The First Priority Summary of Management Practices section of this report summarizes the results of these contacts. However, due to continued exceedances in 2010 of the chlorpyrifos WQTL, the Coalition is expanding its outreach efforts to growers with recently reported use of chlorpyrifos. Additional focused outreach is scheduled to begin in 2012. General outreach includes grower notification, management practice education, tracking of management practice implementation, and providing information to growers on special studies of management practice efficacy. In the case of additional focused outreach, individual meetings are scheduled with growers to review their operation and to discuss management practices and pesticides currently in use.

While the acres treated and pounds of chlorpyrifos applied decreased significantly since 2005, chlorpyrifos exceeded the WQTL again in January and July 2010. Usage is historically low in January, suggesting that management practices to improve storm runoff could be implemented. Lone Tree Creek is scheduled for MPM in 2012 in order to continue to assess water quality in regards to chlorpyrifos and other high priority constituents. If any additional exceedances of priority A-D constituents occur, the Coalition will discuss necessary actions with the Regional Board. The Coalition will continue to conduct outreach on a general and focused level throughout 2012.

Although chlorpyrifos remains a high priority constituent in the Lone Tree Creek management plan, there were no exceedances of the WQTLs for diazinon, copper, diuron, and SC over two or more consecutive years of monitoring in months of past exceedances. Additionally, there were no instances of toxicity to either *S. capricornutum* or *H. azteca* 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 these constituents from the Lone Tree Creek management plan.

III. UNNAMED DRAIN TO LONE TREE CREEK @ JACK TONE RD

Management Plan Constituents

Priority A/B

- Chlorpyrifos

Priority C

- Copper
- Diuron
- Simazine

Priority D

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

Priority E

- Dissolved Oxygen
- *E. coli*
- Lead
- Specific Conductivity
- Total Dissolved Solids

Description of Unnamed Drain to Lone Tree Creek @ Jack Tone Rd Site Subwatershed

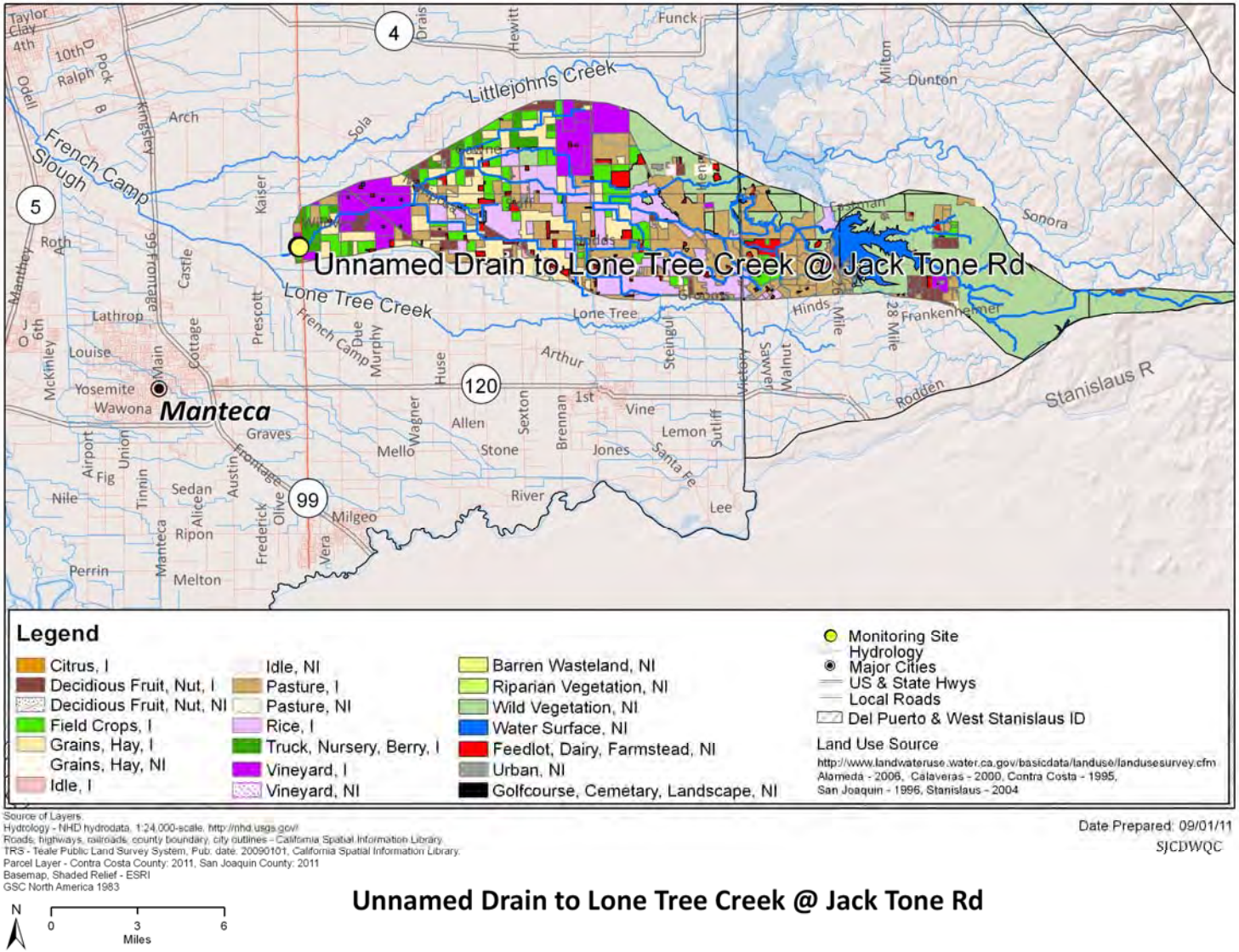
Unnamed Drain to Lone Tree Creek @ Jack Tone Rd (28,673 irrigated acres) – This site subwatershed is located to the north of the Lone Tree Creek site subwatershed and south of Littlejohns Creek. The drain forms in the eastern portion of San Joaquin County, flows west, and eventually confluences with Lone Tree Creek just west of Jack Tone Road. This site subwatershed includes an upstream location (Unnamed Drain to Lone Tee Creek @ Wagner Rd) which was sampled in 2008. The sampling location target coordinates for sites within this subwatershed are listed in Table III-1. Unlike most of the SJCDWQC area, rice is a major crop in the site subwatershed. Agriculture in the site subwatershed also consists of deciduous orchards, field crops, grains, and vineyards (Figure III-1).

Table III-1. Unnamed Drain to Lone Tree Creek site subwatershed sampling locations coordinates.

Site Name	Station Code	Target Latitude	Target Longitude
Unnamed Drain to Lone Tree Creek @ Wagner Rd[U]	531UDLTWR	37.8709	-121.0911
Unnamed Drain to Lone Tree Creek @ Jack Tone Rd*	531UDLTAJ	37.8536	-121.1457

[U]Upstream site
*Original SJCDWQC sampling site

Figure III-1. Unnamed Drain to Lone Tree Creek @ Jack Tone Rd site subwatershed land use map.



Unnamed Drain to Lone Tree Creek @ Jack Tone Rd

Subwatershed Monitoring History

Monitoring was initiated at Unnamed Drain to Lone Tree Creek (Temple Creek) during the irrigation season of 2006 and continued through December 2011 (Table III-2). Table III-3 lists specific information on the analyses conducted across each of the monitoring seasons.

The Unnamed Drain to Lone Tree Creek @ Jack Tone Rd site subwatershed is one of the rotating Assessment Monitoring locations within the SJCDWQC French Camp Slough @ Airport Way Zone (Zone 2). Normal Monitoring occurred in 2008 under the 2006 MRPP. The first Assessment Monitoring rotation under the current 2008 MRPP will occur in 2030. In 2012, MPM will be conducted during months of past exceedances.

Additional MPM for chlorpyrifos was initiated at Unnamed Drain to Lone Tree Creek @ Jack Tone Rd in 2007 (July and September). One year of upstream MPM monitoring occurred at Unnamed Drain to Lone Tree Creek @ Wagner Rd for chlorpyrifos in 2008 (July and September). In 2009, MPM for copper (May and July-September), toxicity to *S. capricornutum* (May) and chlorpyrifos (May-July, and September) occurred.

From July 2010 through February 2011 additional DPR grant monitoring for chlorpyrifos and diazinon was conducted at Unnamed Drain to Lone Tree Creek @ Jack Tone Rd. In addition to DPR grant monitoring in 2010, MPM was scheduled for copper (April-May and July-September), chlorpyrifos (January-February, May-July and September), diuron and simazine (January-February), *C. dubia* toxicity (January-February and September), *S. capricornutum* toxicity (February-March and May), and *H. azteca* sediment toxicity (September). In 2011, MPM continued for copper (April-May and July-September), chlorpyrifos (every month except March, April, and October), diuron and simazine (January and February), *C. dubia* toxicity (January, February, and September), *S. capricornutum* toxicity (February, March, and May), and *H. azteca* sediment toxicity (March and October). Table III-4 lists all MPM dates and constituents for the Unnamed Drain to Lone Tree Creek @ Jack Tone Rd. site subwatershed from 2007 through 2011.

The Unnamed Drain to Lone Tree Creek (Temple Creek) is currently on California's 2008-2010 303d List of Impaired Waterbodies for ammonia and electrical conductivity.

Table III-2. Unnamed Drain to Lone Tree Creek @ Jack Tone Rd site subwatershed sampling events per season and year (including MPM).

Year	Season	Events Sampled	Events Not Sampled[1]	Total
2006	Storm	NA	NA	**NA**
	Irrigation	4	1	**5**
2007	Storm	2	0	**2**
	Irrigation	8	0	**8**
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	2	0	**2**
	Storm	1	0	**1**
	Irrigation	6	0	**6**
	Fall	3	0	**3**
2011	Winter	3	0	**3**
	Storm	NA	NA	**NA**
	Irrigation	6	0	**6**
	Fall	1	1	**2**

[1] 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. Unnamed Drain to Lone Tree Creek @ Jack Tone 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	2006	2007		2008			2009				2010				2011			
		Irrigation	Storm	Irrigation	Storm	Irrigation	Fall*	Winter*	Storm*	Irrigation	Fall*	Winter	Storm	Irrigation	Fall	Winter	Storm*	Irrigation	Fall
Field and Physical Parameters																			
NA	pH	4	4	9	2	10				6		2	1	6	3	3		7	1
NA	Specific Conductivity	4	4	9	2	10				6		2	1	6	3	3		7	1
NA	Dissolved Oxygen	3	4	9	2	10				6		2	1	6	3	3		7	1
EPA 160.1	Dissolved Solids	4	2	6	1	6													
EPA 160.2	Suspended Solids																		
EPA 180.1	Turbidity	4	2	6	1	6													
SM 9223 B	*E. coli*	4	2	6	1	6													
EPA 110.2	Color	4	2	6	1	6													
EPA 415.1	Total Organic Carbon	4	2	6	1	6													
Walkley-Black	Total Organic Carbon (sediment)													1		1		1	
ASTM D422 or ASTM D4464	Grain size (sediment)													1		1		1	
EPA 405.1	BOD	1	2	2															
Carbamates																			
EPA 8321A	Aldicarb	4	2	6	1	6													
EPA 8321A	Carbaryl	4	2	6	1	6													
EPA 8321A	Carbofuran	4	2	6	1	6													
EPA 8321A	Methiocarb	4	2	6	1	6													
EPA 8321A	Methomyl	4	2	6	1	6													
EPA 8321A	Oxamyl	4	2	6	1	6													
Organochlorines																			
EPA 8081A	DDD	4	2	6	1	6													
EPA 8081A	DDE	4	2	6	1	6													
EPA 8081A	DDT	4	2	6	1	6													
EPA 8081A	Dicofol	4	2	6	1	6													
EPA 8081A	Dieldrin	4	2	6	1	6													
EPA 8081A	Endrin	4	2	6	1	6													
EPA 8081A	Methoxychlor	4	2	6	1	6													
Organophosphates																			
EPA 8141A	Azinphos methyl	4	2	6	1	6													

Method	Analyte	2006	2007		2008			2009				2010				2011			
		Irrigation	Storm	Irrigation	Storm	Irrigation	Fall*	Winter*	Storm*	Irrigation	Fall*	Winter	Storm	Irrigation	Fall	Winter	Storm*	Irrigation	Fall
EPA 8141A	Chlorpyrifos	4	2	8	1	6				4		1	1	5	3	2		5	1
EPA 8141A	Diazinon	4	2	6	1	6								4	3	2			
EPA 8141A	Dimethoate	4	2	6	1	6													
EPA 8141A	Disulfoton	4	2	6	1	6													
EPA 8141A	Malathion	4	2	6	1	6													
EPA 8321A	Methamidophos	4	2	6	1	6													
EPA 8141A	Methidathion	4	2	6	1	6													
EPA 8141A	Parathion, Methyl	4	2	6	1	6													
EPA 8141A	Phorate	4	2	6	1	6													
EPA 8141A	Phosmet	4	2	6	1	6													
Pyrethroids																			
EPA 8081A	Bifenthrin	4	2	6	1	6													
EPA 8081A	Cypermethrin	4	2	6	1	6													
EPA 8081A	Cyhalothrin, lambda	4	2	6	1	6													
EPA 8081A	Permethrin	4	2	6	1	6													
EPA 8081A	Cyfluthrin	4	2	6	1	6													
EPA 8081A	Esfenvalerate/ Fenvalerate	4	2	6	1	6													
Triazines																			
EPA 619	Atrazine	4	2	6	1	6													
EPA 619	Cyanazine	4	2	6	1	6													
EPA 8321A	Diuron	4	2	6	1	6						1	1			2			
EPA 574M	Glyphosate	4	2	6	1	6													
EPA 8321A	Linuron	4	2	6	1	6													
EPA 8141A	Molinate	4	2	6	1	6													
EPA 549.2M	Paraquat dichloride	4	2	6	1	6													
EPA 619	Simazine	4	2	6	1	6						1	1			2			
EPA 8141A	Thiobencarb	4	2	6	1	6													
Metals (Total)																			
EPA 200.8	Arsenic					6													
EPA 200.8	Boron					6													
EPA 200.8	Cadmium					6													
EPA 200.8	Copper					6				5				5				5	

Method	Analyte	2006	2007		2008			2009				2010				2011			
		Irrigation	Storm	Irrigation	Storm	Irrigation	Fall*	Winter*	Storm*	Irrigation	Fall*	Winter	Storm	Irrigation	Fall	Winter	Storm*	Irrigation	Fall
EPA 200.8	Lead					6													
EPA 200.8	Molybdenum																		
EPA 200.8	Nickel					6													
EPA 200.8	Selenium					6													
EPA 200.8	Zinc					6													
Metals (Dissolved)																			
EPA 200.8	Cadmium																		
EPA 200.8	Copper									5				5				5	
EPA 200.8	Lead																		
EPA 200.8	Nickel																		
EPA 200.8	Zinc																		
Nutrients																			
EPA 350.2	Ammonia as N					6													
SM 2340 C	Hardness as CaCO3					6				5				5		5		5	
EPA 300.0	Nitrate as N					6													
EPA 353.2	Nitrate + Nitrite as N																		
EPA 354.1	Nitrite as N					6													
EPA 351.3	Nitrogen, Total Kjeldahl					6													
EPA 365.2	OrthoPhosphate as P					6													
EPA 365.2	Phosphate as P					6													
Sediment Pesticides																			
EPA 8270M_NCI	Bifenthrin													1		1		1	
EPA 8270M_NCI	Chlorpyrifos													1		1		1	
EPA 8270M_NCI	Cyfluthrin													1		1		1	
EPA 8270M_NCI	Cyhalothrin, lambda													1		1		1	
EPA 8270M_NCI	Cypermethrin													1		1		1	
EPA 8270M_NCI	Deltamethrin: Tralomethrin													1		1		1	
EPA 8270M_NCI	Esfenvalerate/ Fenvalerate													1		1		1	
EPA 8270M_NCI	Fenpropathrin													1		1		1	
EPA 8270M_NCI	Permethrin													1		1		1	
Toxicity																			
EPA 821-02-012	*Ceriodaphnia dubia*	4	3	6	2	7				1		1	1	1		2		1	

Method	Analyte	2006	2007		2008			2009				2010				2011			
		Irrigation	Storm	Irrigation	Storm	Irrigation	Fall*	Winter*	Storm*	Irrigation	Fall*	Winter	Storm	Irrigation	Fall	Winter	Storm*	Irrigation	Fall
EPA 821-02-012	*Pimephales promelas*	4	2	6	1	6													
EPA 821-02-013	*Selenastrum capricornutum*	4	4	6	1	7				1		2		1		2		1	
EPA 600/R-99-064	*Hyalella azteca*	1	1	2	2	2								1		1		1	

*Site not sampled in the 2008 fall, 2009 winter, storm and fall seasons, and 2011 storm season.

Table III-4. Unnamed Drain to Lone Tree Creek site subwatershed Management Plan Monitoring schedule (2007-2011).

Site Name	Sample Date	Monitoring Type	Copper	Chlorpyrifos	Diazinon	Diuron	Simazine	*C. dubia*	*S. capricornutum*	*H. azteca*
Unnamed Drain to Lone Tree Creek @ Jack Tone Rd	30-Jul-07	A		X						
Unnamed Drain to Lone Tree Creek @ Jack Tone Rd	25-Sep-07	A		X						
Unnamed Drain to Lone Tree Creek @ Wagner Rd	15-Jul-08	U		X						
Unnamed Drain to Lone Tree Creek @ Wagner Rd	16-Sep-08	U		X						
Unnamed Drain to Lone Tree Creek @ Jack Tone Rd	14-Apr-09	MPM	X							
Unnamed Drain to Lone Tree Creek @ Jack Tone Rd	12-May-09	MPM	X	X					X	
Unnamed Drain to Lone Tree Creek @ Jack Tone Rd	09-Jun-09	MPM		X						
Unnamed Drain to Lone Tree Creek @ Jack Tone Rd	14-Jul-09	MPM	X	X						
Unnamed Drain to Lone Tree Creek @ Jack Tone Rd	11-Aug-09	MPM	X							
Unnamed Drain to Lone Tree Creek @ Jack Tone Rd	15-Sep-09	MPM	X	X				X		
Unnamed Drain to Lone Tree Creek @ Jack Tone Rd	13-Jan-10	MPM		X		X	X	X		
Unnamed Drain to Lone Tree Creek @ Jack Tone Rd	9-Feb-10	MPM		X		X	X	X	X	
Unnamed Drain to Lone Tree Creek @ Jack Tone Rd	16-Mar-10	MPM							X	
Unnamed Drain to Lone Tree Creek @ Jack Tone Rd	13-Apr-10	MPM	X							
Unnamed Drain to Lone Tree Creek @ Jack Tone Rd	11-May-10	MPM	X	X					X	
Unnamed Drain to Lone Tree Creek @ Jack Tone Rd	8-Jun-10	MPM		X[1]	X[2]					
Unnamed Drain to Lone Tree Creek @ Jack Tone Rd	13-Jul-10	MPM	X	X[1]	X[2]					
Unnamed Drain to Lone Tree Creek @ Jack Tone Rd	10-Aug-10	MPM	X	X[2]	X[2]					
Unnamed Drain to Lone Tree Creek @ Jack Tone Rd	7-Sep-10	MPM	X	X[1]	X[2]			X		X[1]
Unnamed Drain to Lone Tree Creek @ Jack Tone Rd	12-Oct-10	MPM		X[2]	X[2]					
Unnamed Drain to Lone Tree Creek @ Jack Tone Rd	9-Nov-10	MPM		X[2]	X[2]					
Unnamed Drain to Lone Tree Creek @ Jack Tone Rd	7-Dec-10	MPM		X[2]	X[2]					
Unnamed Drain to Lone Tree Creek @ Jack Tone Rd	11-Jan-11	MPM		X[1]	X[2]	X	X	X		
Unnamed Drain to Lone Tree Creek @ Jack Tone Rd	8-Feb-11	MPM		X[1]	X[2]	X	X	X	X	
Unnamed Drain to Lone Tree Creek @ Jack Tone Rd	8-Mar-11	MPM							X	X
Unnamed Drain to Lone Tree Creek @ Jack Tone Rd	12-Apr-11	MPM	X							
Unnamed Drain to Lone Tree Creek @ Jack Tone Rd	24-May-11	MPM	X	X					X	
Unnamed Drain to Lone Tree Creek @ Jack Tone Rd	28-Jun-11	MPM		X						
Unnamed Drain to Lone Tree Creek @ Jack Tone Rd	26-Jul-11	MPM	X	X						
Unnamed Drain to Lone Tree Creek @ Jack Tone Rd	23-Aug-11	MPM	X	X						
Unnamed Drain to Lone Tree Creek @ Jack Tone Rd	20-Sep-11	MPM	X	X				X		
Unnamed Drain to Lone Tree Creek @ Jack Tone Rd	14-Oct-11	MPM								X
Unnamed Drain to Lone Tree Creek @ Jack Tone Rd	15-Nov-11	MPM		X						
Unnamed Drain to Lone Tree Creek @ Jack Tone Rd	13-Dec-11	MPM		X						

[1]MPM and Department of Pesticide Regulation (DPR) grant monitoring.
[2]DPR grant monitoring only.
A – Additional sampling.
U – Upstream sampling.
X – Constituent sampled for Management Plan Monitoring (MPM).

Exceedance History

Samples collected during monitoring from 2006 through 2011 at the Unnamed Drain to Lone Tree Creek location (Unnamed Drain to Lone Tree Creek @ Jack Tone Rd, and Unnamed Drain to Lone Tree Creek @ Wagner Rd) experienced exceedances of WQTLs for DO (7), pH (1), SC (3), TDS (1), *E. coli* (10), DDE (1), total copper (5), dissolved copper (2), lead (2), carbofuran (1), chlorpyrifos (19), diuron (3), methidathion (1), simazine (2), and thiobencarb (3). Toxicity to *C. dubia* (5), *S. capricornutum* (5) and *H. azteca* sediment (7) occurred.

The 2011 irrigation season resulted in SC (1), dissolved copper (1), and chlorpyrifos (2) exceedances, and two instances of sediment toxicity to *H. azteca.*

The priority level (A-E) assigned to each constituent is listed in the bottom row of Tables III-5 and III-6. The highest priority constituents for the Unnamed Drain to Lone Tree Creek subwatershed are chlorpyrifos (A/B), copper, diuron and simazine (C) and toxicities to *C. dubia, S. capricornutum* and *H. azteca* (D). There was no change to constituent priority following 2011 exceedances.

Table III-5. Unnamed Drain to Lone Tree Creek site subwatershed low priority exceedances (2006-2011).

The WQTLs are listed in the header after the analyte. Data sorted by season and date. 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	Lead, Total[1], > 15 µg/L	DDE (p,p')[1], >0.00059 µg/L
Unnamed Drain to Lone Tree Creek @ Jack Tone Rd	Irrigation	6/20/2006	4.8						0.004
Unnamed Drain to Lone Tree Creek @ Jack Tone Rd	Irrigation	7/18/2006	6				2400		
Unnamed Drain to Lone Tree Creek @ Jack Tone Rd	Storm	2/11/2007					2400		
Unnamed Drain to Lone Tree Creek @ Jack Tone Rd	Storm	2/28/2007					2400		
Unnamed Drain to Lone Tree Creek @ Jack Tone Rd	Storm	3/6/2007			841				
Unnamed Drain to Lone Tree Creek @ Jack Tone Rd	Irrigation	5/22/2007			905	620			
Unnamed Drain to Lone Tree Creek @ Jack Tone Rd	Irrigation	7/10/2007					2400		
Unnamed Drain to Lone Tree Creek @ Jack Tone Rd	Irrigation	8/7/2007					250		
Unnamed Drain to Lone Tree Creek @ Jack Tone Rd	Storm	1/23/2008					>2400		
Unnamed Drain to Lone Tree Creek @ Jack Tone Rd	Irrigation	4/15/2008					250	6.1 (2.7)	
Unnamed Drain to Lone Tree Creek @ Jack Tone Rd	Irrigation	5/13/2008	5.61	6.17			460		
Unnamed Drain to Lone Tree Creek @ Jack Tone Rd	Irrigation	7/15/2008					690		
Unnamed Drain to Lone Tree Creek @ Jack Tone Rd	Irrigation	8/12/2008					260		
Unnamed Drain to Lone Tree Creek @ Jack Tone Rd	Irrigation	9/16/2008	6.7					1.3 (1.0)	
Unnamed Drain to Lone Tree Creek @ Wagner Rd	*Irrigation*	*9/16/2008*	*6.6*						
Unnamed Drain to Lone Tree Creek @ Jack Tone Rd	Irrigation	8/11/2009	6.28						
Unnamed Drain to Lone Tree Creek @ Jack Tone Rd	Storm	1/13/2010	2.36						
Unnamed Drain to Lone Tree Creek @ Jack Tone Rd	Winter	3/8/2011			718				
		Constituent Priority	**E**	**NP**	**E**	**E**	**E**	**E**	**NP**

[1]Total metal WQTL variable based on hardness.

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

Table III-6. Unnamed Drain to Lone Tree Creek site subwatershed high priority exceedances (2006-2011).

The WQTLs are listed in the header after the analyte. Data sorted by season and date. Upstream site is italicized.

Site Name	Season	Sample Date	Copper, Dissolved[1], µg/L	Copper, Total[2], > 1,300 µg/L	Carbofuran, >0 µg/L	Chlorpyrifos, >0.015 µg/L	Diuron, >2 µg/L	Methidathion[1], >0.7 µg/L	Simazine, >4 µg/L	Thiobencarb[1], >0 µg/L	*C. dubia*, (% Control)	*S. capricornutum*, (% Control)	*H. azteca*, (% Control)
Unnamed Drain to Lone Tree Creek @ Jack Tone Rd	Irrigation	6/20/2006								0.12			
Unnamed Drain to Lone Tree Creek @ Jack Tone Rd	Irrigation	7/18/2006				0.031							
Unnamed Drain to Lone Tree Creek @ Jack Tone Rd	Irrigation	9/19/2006				0.045							
Unnamed Drain to Lone Tree Creek @ Jack Tone Rd	Storm	2/11/2007				0.048	19	1.1	7		0	53	
Unnamed Drain to Lone Tree Creek @ Jack Tone Rd	Storm	2/21/2007										83	
Unnamed Drain to Lone Tree Creek @ Jack Tone Rd	Storm	2/28/2007					29					5	
Unnamed Drain to Lone Tree Creek @ Jack Tone Rd	Storm	3/7/2007										57	
Unnamed Drain to Lone Tree Creek @ Jack Tone Rd	Irrigation	6/12/2007								0.57			
Unnamed Drain to Lone Tree Creek @ Jack Tone Rd	Irrigation	7/10/2007				0.034							
Unnamed Drain to Lone Tree Creek @ Jack Tone Rd	Irrigation	8/9/2007											61
Unnamed Drain to Lone Tree Creek @ Jack Tone Rd	Irrigation	9/25/2007				0.017							
Unnamed Drain to Lone Tree Creek @ Jack Tone Rd	Storm	1/23/2008				0.045	7.7		6.4		0		
Unnamed Drain to Lone Tree Creek @ Jack Tone Rd	Sediment	3/18/2008											54
Unnamed Drain to Lone Tree Creek @ Jack Tone Rd	Sediment	4/9/2008											21
Unnamed Drain to Lone Tree Creek @ Jack Tone Rd	Irrigation	4/15/2008		23 (8.4)									
Unnamed Drain to Lone Tree Creek @ Jack Tone Rd	Irrigation	5/13/2008		7.8 (6.5)	0.64	0.41						34	
Unnamed Drain to Lone Tree Creek @ Jack Tone Rd	Irrigation	6/10/2008				0.12				0.12			
Unnamed Drain to Lone Tree Creek @ Jack Tone Rd	Irrigation	7/15/2008		6.9 (5.7)		0.028							
Unnamed Drain to Lone Tree Creek @ Jack Tone Rd	Irrigation	8/12/2008		6.8 (5.9)									
Unnamed Drain to Lone Tree Creek @ Jack Tone Rd	Sediment	8/13/2008											87

Site Name	Season	Sample Date	Copper, Dissolved[1], µg/L	Copper, Total[2], > 1,300 µg/L	Carbofuran, >0 µg/L	Chlorpyrifos, >0.015 µg/L	Diuron, >2 µg/L	Methidathion[1], >0.7 µg/L	Simazine, >4 µg/L	Thiobencarb[1], >0 µg/L	*C. dubia*, (% Control)	*S. capricornutum*, (% Control)	*H. azteca*, (% Control)
Unnamed Drain to Lone Tree Creek @ Jack Tone Rd	Irrigation	9/16/2008		6.5 (4.3)		0.12					0		
Unnamed Drain to Lone Tree Creek @ Wagner Rd	*Irrigation*	*9/16/2008*				*0.14*							
Unnamed Drain to Lone Tree Creek @ Jack Tone Rd	Irrigation	9/23/2008									65		
Unnamed Drain to Lone Tree Creek @ Jack Tone Rd	Irrigation	5/12/2009				0.032							
Unnamed Drain to Lone Tree Creek @ Jack Tone Rd	Irrigation	7/14/2009				0.66							
Unnamed Drain to Lone Tree Creek @ Jack Tone Rd	Irrigation	9/15/2009				0.086					30		
Unnamed Drain to Lone Tree Creek @ Jack Tone Rd	Irrigation	4/13/2010	5.5(4.70)										
Unnamed Drain to Lone Tree Creek @ Jack Tone Rd	Irrigation	8/10/2010				0.039							
Unnamed Drain to Lone Tree Creek @ Jack Tone Rd	Irrigation	9/7/2010											76
Unnamed Drain to Lone Tree Creek @ Jack Tone Rd	Fall	11/9/2010				0.052							
Unnamed Drain to Lone Tree Creek @ Jack Tone Rd	Fall	12/7/2010				0.068							
Unnamed Drain to Lone Tree Creek @ Jack Tone Rd	Winter	1/11/2011				0.020							
Unnamed Drain to Lone Tree Creek @ Jack Tone Rd	Winter	3/8/2011											33
Unnamed Drain to Lone Tree Creek @ Jack Tone Rd	Irrigation	5/24/2011	11 (5.95)										
Unnamed Drain to Lone Tree Creek @ Jack Tone Rd	Irrigation	7/26/2011				0.028							
Unnamed Drain to Lone Tree Creek @ Jack Tone Rd	Irrigation	10/14/2011											46
		Constituent Priority	**C**	**C**	**NP**	**A/B**	**C**	**NP**	**C**	**NP[R]**	**D**	**D**	**D**

[1]Dissolved metals not analyzed until October 2008; WQTL variable based on hardness.
[2]Total metal WQTL variable based on hardness.
NP – Not Prioritized; less than two exceedances within three consecutive monitoring years and currently no TMDL.
NP[R] – Not Prioritized; thiobencarb is only applied to rice and therefore will be managed under the Rice Coalition.

2007 - 2011 Management Plan Monitoring Results

All monitoring results for high priority management plan constituents in the Unnamed Drain to Lone Tree Creek subwatershed are listed in Table III-7. These constituents include chlorpyrifos, diazinon, diuron, simazine, copper, water column toxicities to *C. dubia* and *S. capricornutum*, and sediment toxicity to *H. azteca.*

Chlorpyrifos MPM was initiated in 2007 at the Unnamed Drain to Lone Tree Creek for chlorpyrifos after exceedances in 2006 (July and September). In 2007, MPM for chlorpyrifos occurred in July and September in addition to Normal Monitoring. Water samples exceeded the chlorpyrifos WQTL during July Normal Monitoring and September additional MPM. During 2008, chlorpyrifos was monitored during Normal Monitoring (April-September) and exceedances of the chlorpyrifos WQTL occurred during every event except for April and August. Another exceedances of chlorpyrifos occurred during 2008 September upstream MPM (July and September) at Unnamed Drain to Lone Tree Creek @ Wagner Rd. In 2009, MPM (May-July and September) occurred, and exceedances of chlorpyrifos occurred in three of the four months (May, June, and September). In 2010, MPM for chlorpyrifos (January, February, May, June, July, and September) resulted in no exceedances. Monitoring for the DPR grant resulted in exceedances (August, November, and December). In 2011, MPM (January, February, May-September, November and December) occurred for chlorpyrifos resulting in exceedances in January and July. In 2012, chlorpyrifos will continue to be monitored at Unnamed Drain to Lone Tree Creek @ Jack Tone Rd during months of past exceedances (every month except March and April).

Copper was added to the Unnamed Drain to Lone Tree Creek @ Jack Tone Rd MPM schedule in 2009 after five exceedances of the WQTL during Normal Monitoring in 2008 (April, May, July, August, and September). Management Plan Monitoring occurred from 2009 through 2011. There were no exceedances in 2009, one in April 2010, and one in May 2011. In 2012 copper is scheduled for MPM (April, May, July, and August).

Management Plan Monitoring was initiated for toxicity to *C. dubia* after samples collected during storm events in 2007 (February) and 2008 (January) were toxic. The toxicities coincided with exceedances of the WQTL for chlorpyrifos, diuron, and simazine. In addition to the storm exceedance, there was an exceedance of the WQTL for toxicity to *C. dubia* in September 2008. In 2009, samples were again toxic to *C. dubia* in September. In 2010 and 2011, MPM (January, February, and September) for *C. dubia* occurred and no toxicity occurred in either year. In 2012, MPM for *C. dubia* is scheduled to continue.

In 2007, there were two exceedances of the WQTL for *S. capricornutum* during both Normal Monitoring storm events in February. Because the second exceedance was so close to the beginning of March and toxicity was persistent during the March resample, the Coalition decided to add March to the MPM schedule to best represent the water quality of Unnamed Drain to Lone Tree Creek @ Jack Tone Rd. In 2008, Normal Monitoring occurred and *S. capricornutum* toxicity was added to the MPM schedule. During 2009, MPM for *S. capricornutum* only occurred in the month of May and resulted in no exceedance. In 2010, past results for *S. capricornutum* toxicity were reexamined, and February and

March were added to the MPM schedule. In 2011, MPM (February, March, and May) was scheduled and again there was no toxicity to *S. capricornutum* occurred. In 2012, MPM is scheduled to occur (February, March, and May).

As part of DPR grant monitoring, diazinon was monitored from June 2010 through February 2011. There were no detections of diazinon in water samples collected during these events. Because there were no detections of diazinon, it will not be a monitoring constituent during 2012 MPM sampling.

Diuron first exceeded the WQTL in samples collected during both 2007 (February) storm events, and again during Normal Monitoring in 2008 (January). Diuron was not sampled again until 2010, when it was added to the Unnamed Drain to Lone Tree Creek @ Jack Tone Rd MPM schedule (January, February). In 2011, MPM (January and February) for diuron occurred. There has not been an exceedance of the diuron WQTL since the January 2008. In 2012, MPM is scheduled for diuron.

Simazine was added to the MPM schedule after exceedances during 2007 (February) and 2008 (January) Normal Monitoring storm events. Water samples were not analyzed for simazine in 2009. During 2010 and 2011, MPM (January and February) occurred and resulted in no exceedances. Simazine will resume MPM in 2012.

Sediment toxicity to *H. azteca* was added to the MPM schedule due to 2007 irrigation season toxicity, and following the 2008 storm and irrigation seasons. In 2009, there were no MPM samples collected for toxicity to *H. azteca*. In 2010, DPR grant monitoring for sediment toxicity occurred in September and, in 2011, MPM occurred in March and September. All three sediment samples from 2010 and 2011 were toxic to *H. azteca*. In 2012, toxicity testing of sediment will remain on the MPM schedule for March and September.

Table III-7. Unnamed Drain to Lone Tree 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 (@ Jack Tone Rd)	Date	NA	NA	NA	4/10/07	5/22/07	6/12/07	7/10/07	8/07/07	9/04/07	NA	NA	NA
	Chlorpyrifos (µg/L)	NA	NA	NA	<0.003	<0.003	<0.003	**0.034**	<0.003	<0.003	NA	NA	NA
2007 MPM A (@ Jack Tone Rd)	Date	NA	NA	NA	NA	NA	NA	7/30/07	NA	9/25/07	NA	NA	NA
	Chlorpyrifos (µg/L)	NA	NA	NA	NA	NA	NA	0.014	NA	**0.017**	NA	NA	NA
2008 NM (@ Jack Tone Rd)	Date	NA	NA	NA	4/15/08	5/13/08	6/10/08	7/15/08	8/12/08	9/16/08	NA	NA	NA
	Chlorpyrifos (µg/L)	NA	NA	NA	<0.003	**0.410**	**0.120**	**0.028**	0.014	**0.120**	NA	NA	NA
2008 MPM US (@ Wagner Rd)	Date	NA	NA	NA	NA	NA	NA	7/15/08	NA	9/16/08	NA	NA	NA
	Chlorpyrifos (µg/L)	NA	NA	NA	NA	NA	NA	<0.003	NA	**0.140**	NA	NA	NA
2009 MPM (@ Jack Tone Rd)	Date	NA	NA	NA	4/14/09	5/12/09	6/09/09	7/14/09	8/11/09	9/15/09	NA	NA	NA
	Copper, dissolved (µg/L)	NA	NA	NA	4.3	5.0	NA	1.5	1.5	2.5	NA	NA	NA
	Copper, total (µg/L)	NA	NA	NA	8.5	7.3	NA	4.6	3.8	5.0	NA	NA	NA
	Chlorpyrifos (µg/L)	NA	NA	NA	NA	**0.032**	<0.003	**0.660**	NA	**0.086**	NA	NA	NA
	C. dubia toxicity (% Control)	NA	NA	NA	NA	NA	NA	NA	NA	**30**	NA	NA	NA
	S. capricornutum toxicity (% Control)	NA	NA	NA	NA	500	NA	NA	NA	NA	NA	NA	NA
2010 MPM (@ Jack Tone Rd)	Date	1/13/10	2/9/10	3/16/10	4/13/10	5/11/10	6/8/10	7/13/10	8/10/10	9/7/10	10/12/10	11/9/10	12/7/10
	Copper, dissolved (µg/L)	NA	NA	NA	**5.5**	2.1	NA	0.81	2.3	1.9	NA	NA	NA
	Copper, total (µg/L)	NA	NA	NA	11	4.3	NA	5	4.7	4.9	NA	NA	NA
	Chlorpyrifos (µg/L)	<0.003	<0.003	NA	NA	<0.003	<0.003	0.008	**0.039***	0.013	<0.003*	**0.052***	**0.068***
	Diazinon (µg/L)	NA	NA	NA	NA	NA	<0.004*	<0.004*	<0.004*	<0.004*	<0.004*	<0.004*	<0.004*
	Diuron (µg/L)	0.62	0.26	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Simazine (µg/L)	0.69	0.66	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	C. dubia toxicity (% Survival)	100	100	NA	NA	NA	NA	NA	NA	95	NA	NA	NA
	S. capricornutum toxicity (% Control)	NA	807	1394	NA	1107	NA	NA	NA	NA	NA	NA	NA
	H. azteca toxicity (% Control)	NA	NA	NA	NA	NA	NA	NA	NA	**76**	NA	NA	NA

	Month:	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	Date	1/11/11	2/8/11	3/8/11	4/12/11	5/24/11	6/28/11	7/26/11	8/23/11	9/20/11	10/14/11	11/15/11	12/13/11
2011 MPM (@ Jack Tone Rd)	Copper, dissolved (µg/L)	NA	NA	NA	3.2	**11**	NA	2.1	1.7	2.7	NA	NA	NA
	Copper, total (µg/L)	NA	NA	NA	7.6	26	NA	5.7	4.7	5.2	NA	NA	NA
	Chlorpyrifos (µg/L)	**0.020**	<0.003	NA	NA	<0.003	<0.003	**0.028**	<0.003	<0.003	NA	<0.003	Dry
	Diazinon (µg/L)	<0.004*	<0.004*	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Diuron (µg/L)	<0.2	0.25	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Simazine (µg/L)	<0.08	0.37	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	C. dubia toxicity (% Survival)	100	100	NA	NA	NA	NA	NA	NA	100	NA	NA	NA
	S. capricornutum toxicity (% Control)	NA	1101	484	NA	1341	NA	NA	NA	NA	NA	NA	NA
	H. azteca toxicity (% Control)	NA	NA	**33**	NA	NA	NA	NA	NA	NA	**46**	NA	NA

A – Additional Monitoring, 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 Monitoring, conducted in 2008 only.
*Additional Department of Pesticide Regulation (DPR) grant monitoring.

Load Calculations

Loads have been calculated for chlorpyrifos, copper, diuron and simazine detections (Table III-8) in the site subwatershed based on the following formula:

Load = Discharge (cfs) X 28.317L/ft^3 X Concentration (mg/L X 1000 or µg/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-8. Unnamed Drain to Lone Tree Creek site subwatershed instantaneous load calculations for chlorpyrifos, copper, diuron and simazine.

Sorted by analyte and date. Upstream site is italicized.

Site Name	Analyte Name	Sample Date	Discharge cfs	Concentration µg/L	Loading Rate µg/sec
Unnamed Drain to Lone Tree Creek @ Jack Tone Rd	Chlorpyrifos	07/18/06	40.64	0.031	35.67
Unnamed Drain to Lone Tree Creek @ Jack Tone Rd	Chlorpyrifos	08/15/06	17.86	0.011	5.56
Unnamed Drain to Lone Tree Creek @ Jack Tone Rd	Chlorpyrifos	09/19/06	10.41	0.045	13.27
Unnamed Drain to Lone Tree Creek @ Jack Tone Rd	Chlorpyrifos	02/11/07	27.09	0.048	36.82
Unnamed Drain to Lone Tree Creek @ Jack Tone Rd	Chlorpyrifos	07/10/07	21.51	0.034	20.71
Unnamed Drain to Lone Tree Creek @ Jack Tone Rd	Chlorpyrifos	07/30/07	32.45	0.014	12.86
Unnamed Drain to Lone Tree Creek @ Jack Tone Rd	Chlorpyrifos	09/25/07	15.92	0.017	7.66
Unnamed Drain to Lone Tree Creek @ Jack Tone Rd	Chlorpyrifos	01/23/08	12.18	0.045	15.52
Unnamed Drain to Lone Tree Creek @ Jack Tone Rd*	Chlorpyrifos	01/23/08	12.18	0.079	27.25
Unnamed Drain to Lone Tree Creek @ Jack Tone Rd	Chlorpyrifos	05/13/08	21.52	0.41	249.85
Unnamed Drain to Lone Tree Creek @ Jack Tone Rd	Chlorpyrifos	06/10/08	15.85	0.12	53.86
Unnamed Drain to Lone Tree Creek @ Jack Tone Rd	Chlorpyrifos	07/15/08	17.55	0.028	13.91
Unnamed Drain to Lone Tree Creek @ Jack Tone Rd	Chlorpyrifos	08/12/08	11.11	0.014	4.40
Unnamed Drain to Lone Tree Creek @ Jack Tone Rd	Chlorpyrifos	09/16/08	18.38	0.12	62.46
Unnamed Drain to Lone Tree Creek @ Jack Tone Rd*	Chlorpyrifos	09/16/08	18.38	0.12	62.46
Unnamed Drain to Lone Tree Creek @ Wagner Rd	*Chlorpyrifos*	*09/16/08*	*30.9*	*0.14*	*122.50*
Unnamed Drain to Lone Tree Creek @ Jack Tone Rd	Chlorpyrifos	05/12/09	2.48	0.032	2.25
Unnamed Drain to Lone Tree Creek @ Jack Tone Rd	Chlorpyrifos	07/14/09	2.12	0.66	39.62
Unnamed Drain to Lone Tree Creek @ Jack Tone Rd	Chlorpyrifos	09/15/09	15.82	0.086	38.53
Unnamed Drain to Lone Tree Creek @ Jack Tone Rd	Chlorpyrifos	07/13/10	13.84	0.008	3.14
Unnamed Drain to Lone Tree Creek @ Jack Tone Rd	Chlorpyrifos	08/10/10	11.19	0.039	12.36
Unnamed Drain to Lone Tree Creek @ Jack Tone Rd	Chlorpyrifos	09/07/10	27.32	0.013	10.06
Unnamed Drain to Lone Tree Creek @ Jack Tone Rd	Chlorpyrifos	11/09/10	0.28	0.052	0.41
Unnamed Drain to Lone Tree Creek @ Jack Tone Rd	Chlorpyrifos	12/07/10	3.3	0.068	6.35
Unnamed Drain to Lone Tree Creek @ Jack Tone Rd	Chlorpyrifos	01/11/11	0.93	0.02	0.53
Unnamed Drain to Lone Tree Creek @ Jack Tone Rd	Chlorpyrifos	07/26/11	5.18	0.028	4.11
Unnamed Drain to Lone Tree Creek @ Jack Tone Rd	Copper	04/15/08	4.67	23	3041.53
Unnamed Drain to Lone Tree Creek @ Jack Tone Rd	Copper	05/13/08	21.52	7.8	4753.18
Unnamed Drain to Lone Tree Creek @ Jack Tone Rd	Copper	06/10/08	15.85	4.8	2154.36
Unnamed Drain to Lone Tree Creek @ Jack Tone Rd	Copper	07/15/08	17.55	6.9	3429.05
Unnamed Drain to Lone Tree Creek @ Jack Tone Rd	Copper	08/12/08	11.11	6.8	2139.29
Unnamed Drain to Lone Tree Creek @ Jack Tone Rd*	Copper	09/16/08	18.38	6.2	3226.89
Unnamed Drain to Lone Tree Creek @ Jack Tone Rd	Copper	09/16/08	18.38	6.5	3383.03
Unnamed Drain to Lone Tree Creek @ Jack Tone Rd	Copper	04/14/09	2.74	4.3	333.63
Unnamed Drain to Lone Tree Creek @ Jack Tone Rd	Copper	04/14/09	2.74	8.5	659.50
Unnamed Drain to Lone Tree Creek @ Jack Tone Rd	Copper	05/12/09	2.48	5	351.13
Unnamed Drain to Lone Tree Creek @ Jack Tone Rd	Copper	05/12/09	2.48	7.3	512.65

Site Name	Analyte Name	Sample Date	Discharge cfs	Concentration µg/L	Loading Rate µg/sec
Unnamed Drain to Lone Tree Creek @ Jack Tone Rd	Copper	07/14/09	2.12	1.5	90.05
Unnamed Drain to Lone Tree Creek @ Jack Tone Rd	Copper	07/14/09	2.12	4.6	276.15
Unnamed Drain to Lone Tree Creek @ Jack Tone Rd	Copper	08/11/09	10.5	1.5	445.99
Unnamed Drain to Lone Tree Creek @ Jack Tone Rd	Copper	08/11/09	10.5	3.8	1129.85
Unnamed Drain to Lone Tree Creek @ Jack Tone Rd	Copper	09/15/09	15.82	2.5	1119.94
Unnamed Drain to Lone Tree Creek @ Jack Tone Rd	Copper	09/15/09	15.82	5	2239.87
Unnamed Drain to Lone Tree Creek @ Jack Tone Rd	Copper	04/13/10	5.88	11	1831.54
Unnamed Drain to Lone Tree Creek @ Jack Tone Rd	Copper	05/11/10	4.11	4.3	500.45
Unnamed Drain to Lone Tree Creek @ Jack Tone Rd	Copper	07/13/10	13.84	5	1959.54
Unnamed Drain to Lone Tree Creek @ Jack Tone Rd	Copper	08/10/10	11.19	4.7	1489.28
Unnamed Drain to Lone Tree Creek @ Jack Tone Rd	Copper	09/07/10	27.32	4.9	3790.74
Unnamed Drain to Lone Tree Creek @ Jack Tone Rd	Copper	04/12/11	9.26	7.6	1992.84
Unnamed Drain to Lone Tree Creek @ Jack Tone Rd	Copper	05/24/11	16.75	26	12332.05
Unnamed Drain to Lone Tree Creek @ Jack Tone Rd	Copper	07/26/11	5.18	5.7	836.09
Unnamed Drain to Lone Tree Creek @ Jack Tone Rd	Copper	08/23/11	14.77	4.7	1965.74
Unnamed Drain to Lone Tree Creek @ Jack Tone Rd	Copper	09/20/11	18.52	5.2	2727.04
Unnamed Drain to Lone Tree Creek @ Jack Tone Rd	Copper (D)	04/13/10	5.88	5.5	915.77
Unnamed Drain to Lone Tree Creek @ Jack Tone Rd	Copper (D)	05/11/10	4.11	2.1	244.40
Unnamed Drain to Lone Tree Creek @ Jack Tone Rd	Copper (D)	07/13/10	13.84	0.81	317.44
Unnamed Drain to Lone Tree Creek @ Jack Tone Rd	Copper (D)	08/10/10	11.19	2.3	728.79
Unnamed Drain to Lone Tree Creek @ Jack Tone Rd	Copper (D)	09/07/10	27.32	1.9	1469.88
Unnamed Drain to Lone Tree Creek @ Jack Tone Rd	Copper (D)	04/12/11	9.26	3.2	839.09
Unnamed Drain to Lone Tree Creek @ Jack Tone Rd	Copper (D)	05/24/11	16.75	11	5217.41
Unnamed Drain to Lone Tree Creek @ Jack Tone Rd	Copper (D)	07/26/11	5.18	2.1	308.03
Unnamed Drain to Lone Tree Creek @ Jack Tone Rd	Copper (D)	08/23/11	14.77	1.7	711.01
Unnamed Drain to Lone Tree Creek @ Jack Tone Rd	Copper (D)	09/20/11	18.52	2.7	1415.96
Unnamed Drain to Lone Tree Creek @ Jack Tone Rd	Diuron	02/11/07	27.09	19	14575.04
Unnamed Drain to Lone Tree Creek @ Jack Tone Rd	Diuron	02/28/07	7.49	29	6150.74
Unnamed Drain to Lone Tree Creek @ Jack Tone Rd	Diuron	04/10/07	3.56	1.6	161.29
Unnamed Drain to Lone Tree Creek @ Jack Tone Rd	Diuron	05/22/07	0	1.5	0.00
Unnamed Drain to Lone Tree Creek @ Jack Tone Rd	Diuron	01/23/08	12.18	7.7	2655.74
Unnamed Drain to Lone Tree Creek @ Jack Tone Rd*	Diuron	01/23/08	12.18	7.8	2690.23
Unnamed Drain to Lone Tree Creek @ Jack Tone Rd	Diuron	04/15/08	4.67	0.72	95.21
Unnamed Drain to Lone Tree Creek @ Jack Tone Rd	Diuron	05/13/08	21.52	0.54	329.07
Unnamed Drain to Lone Tree Creek @ Jack Tone Rd	Diuron	06/10/08	15.85	0.29	130.16
Unnamed Drain to Lone Tree Creek @ Jack Tone Rd	Diuron	01/13/10	1.59	0.62	27.91
Unnamed Drain to Lone Tree Creek @ Jack Tone Rd	Diuron	02/09/10	7.44	0.26	54.78
Unnamed Drain to Lone Tree Creek @ Jack Tone Rd	Simazine	02/11/07	27.09	7	5369.75
Unnamed Drain to Lone Tree Creek @ Jack Tone Rd	Simazine	02/28/07	7.49	2.4	509.03
Unnamed Drain to Lone Tree Creek @ Jack Tone Rd	Simazine	04/10/07	3.56	0.08	8.06
Unnamed Drain to Lone Tree Creek @ Jack Tone Rd	Simazine	05/22/07	0	3.4	0.00
Unnamed Drain to Lone Tree Creek @ Jack Tone Rd	Simazine	01/23/08	12.18	6.4	2207.37
Unnamed Drain to Lone Tree Creek @ Jack Tone Rd*	Simazine	01/23/08	12.18	8.4	2897.17
Unnamed Drain to Lone Tree Creek @ Jack Tone Rd	Simazine	04/15/08	4.67	1	132.24
Unnamed Drain to Lone Tree Creek @ Jack Tone Rd	Simazine	01/13/10	1.59	0.69	31.07
Unnamed Drain to Lone Tree Creek @ Jack Tone Rd	Simazine	02/09/10	7.44	0.66	139.05

Copper (D) – Dissolved Copper
*Field duplicate

Source Identification and Outreach

The Coalition addressed source identification for the Unnamed Drain to Lone Tree Creek @ Jack Tone Rd subwatershed in the 2011 MPUR and, in the following sections, considers 2011 monitoring results and PUR data as it expands upon that discussion. The PUR data were available for review through May 2011 for San Joaquin County and November 2011 for Stanislaus County. Given that any data included after May 2011 is preliminary, yearly evaluations are only considered complete through 2010.

In 2008 the Coalition conducted additional and upstream MPM to better characterize water quality in the subwatershed during the months when exceedances historically occurred. Management Plan Monitoring continued in 2011 at the Unnamed Drain to Lone Tree Creek @ Jack Tone Rd site during months when exceedances historically occurred to continue to assess water quality in the subwatershed as outreach in the area progressed.

Since the Unnamed Drain to Lone Tree Creek subwatershed became high priority in 2008, the Coalition actively engaged in grower outreach and education to address 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 and follow up meetings with targeted members have informed growers about management practices as well as assessed current and newly implemented management practices.

While focused outreach is effective for most priority constituents, water quality data from 2011 indicates that it would be beneficial for additional growers to implement management practices to eliminate the discharge of chlorpyrifos. The Coalition developed a strategy for additional outreach to growers in the Unnamed Drain to Lone Tree Creek subwatershed for 2012, similar to the strategy outlined in the Duck Creek subwatershed; topics will be discussed with targeted growers in the Unnamed Drain to Lone Tree Creek subwatershed as described in the Duck Creek subwatershed Source ID and Outreach section.

Priority A/B Constituents

Chlorpyrifos is the only priority A/B constituent included in the Unnamed Drain to Lone Tree Creek subwatershed management plan.

Chlorpyrifos

Nineteen exceedances of the chlorpyrifos WQTL (0.015 µg/L) occurred in samples collected for Normal Monitoring and MPM between 2006 and 2011, including one exceedance at the upstream sampling location (Table III-6). Exceedances of chlorpyrifos occurred in every month except March, April, and October.

The PUR data were reviewed from 2004 through available 2011 data for the number of applications, amount of the chlorpyrifos applied (pounds applied), and acres treated (Table III-9, Figure III-2). The greatest amount of chlorpyrifos applied was in 2009 (6,386 lbs AI) with the lowest amount in 2008

(2,193 lbs AI). Overall, the number of applications and acres treated with chlorpyrifos in this subwatershed has decreased annually since 2006; however the pounds of chlorpyrifos used in 2009 increased compared to 2008 usage and then decreased again in 2010 (Table III-9, Figure III-2). Preliminary PUR data through May 2011 indicate that use of chlorpyrifos in the spring has dropped significantly, however partial data from August 2011 indicate an increase of chlorpyrifos use compared to past use in the month of August. Although chlorpyrifos use increased, the two exceedances that occurred in 2011 in the months of January and July were prior to the August applications (Figure III-2).

The Coalition also uses PUR data from 2006 to 2011 to assess which crops received the most applications of chlorpyrifos (Table III-10). Corn (7,249 lbs AI) received the highest applications of chlorpyrifos followed by grapes (6,665 lbs AI). The Coalition focused its outreach to target growers farming these crops. The most common product used within this subwatershed containing chlorpyrifos was Lorsban (Table III-10).

Table III-9. Unnamed Drain to Lone Tree Creek @ Jack Tone Rd site subwatershed chlorpyrifos applications, lbs AI applied, and acres treated by month (2006-2011).

PUR data available through May 2011 for San Joaquin County and through November 2011 for Stanislaus County; all PUR data after May 2011 are preliminary. If a month is not included in the table, no applications were made.

Month/Year	Number of Chlorpyrifos Applications	Pounds of AI Applied	Acres Treated
April, 2006	6	168.4	382
May, 2006	22	1275.8	963.3
June, 2006	20	2235.9	1558
July, 2006	19	1144.4	762.5
August, 2006	6	385.5	198
September, 2006	9	269.5	230
November, 2006	1	185.8	100
March, 2007	3	54.3	137
April, 2007	8	298.3	342
May, 2007	29	2428.4	1741
June, 2007	23	1801.7	1537
July, 2007	9	702.7	378
August, 2007	10	440.8	313.5
September, 2007	2	75.9	112
October, 2007	1	199.4	100
March, 2008	5	154.0	310
May, 2008	10	1014.7	638.5
June, 2008	5	129.6	183
July, 2008	17	895.1	557
March, 2009	9	683.7	769
April, 2009	1	40.0	57.3
May, 2009	4	604.7	322
June, 2009	2	308.1	154
July, 2009	13	1084.5	692
August, 2009	6	210.4	175
September, 2009	9	332.5	295
October, 2009	3	2537.2	1351
November, 2009	2	585.0	311.5

Month/Year	Number of Chlorpyrifos Applications	Pounds of AI Applied	Acres Treated
March, 2010	3	72.1	133
April, 2010	2	220.4	152
June, 2010	5	356.0	177
July, 2010	10	567.2	399
August, 2010	9	385.3	284
September, 2010	2	93.9	50
October, 2010	3	1633.9	870
November, 2010	2	1489.3	793
December, 2010	1	44.0	25
March, 2011	1	31.8	63
April, 2011	1	58.0	57
May, 2011	1	121.2	60
June, 2011	2	187.8	325
July, 2011	2	87.4	65
August, 2011	6	809.5	513.5
September, 2011	1	35.7	19
Summaries by Year			
2006 Total	83	5665.4	4193.8
2007 Total	85	6001.6	4660.5
2008 Total	37	2193.4	1688.5
2009 Total	49	6386.1	4126.8
2010 Total	37	4862.0	2883
2011 Total	14	1331.3	1102.5
Total	**305**	**26439.8**	**18655.1**

Figure III-2. Unnamed Drain to Lone Tree Creek @ Jack Tone Rd site subwatershed lbs chlorpyrifos applied by month (2006-2011).

PUR data available through May 2011 for San Joaquin County and through November 2011 for Stanislaus County; all PUR data after May 2011 are preliminary. Asterisk (*) denotes months with exceedances.

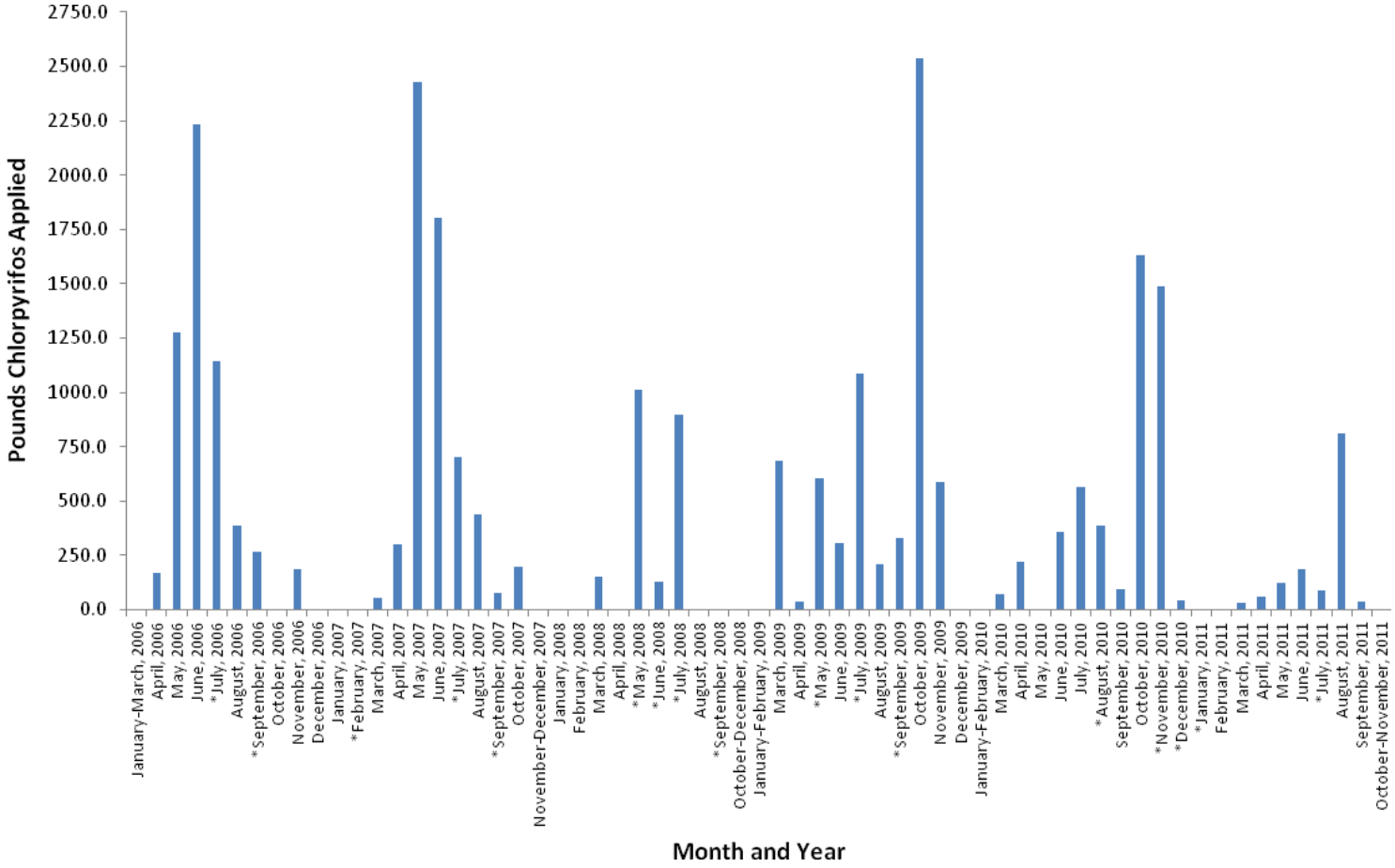


Table III-10. Unnamed Drain to Lone Tree Creek @ Jack Tone Rd site subwatershed chlorpyrifos PUR data (2006-2011).

PUR data available through May 2011 for San Joaquin County and through November 2011 for Stanislaus County; all PUR data after May 2011 are preliminary.

Chemical Name	Commodity	Product Name	Lbs AI Applied
CHLORPYRIFOS	ALFALFA (FORAGE - FODDER) (ALFALFA HAY)	GOVERN 4E INSECTICIDE	62.1
		LOCK-ON INSECTICIDE	277.7
		LORSBAN 4E-HF	962.2
		LORSBAN ADVANCED	133.3
		LORSBAN-4E	58.5
	ALMOND	GOVERN 4E INSECTICIDE	161.6
		LORSBAN 4E-HF	494.5
		LORSBAN ADVANCED	1416.0
		LORSBAN-4E	2309.4
		NUFOS 4E	61.0
		WARHAWK	254.5
	CORN (FORAGE - FODDER)	GOVERN 4E INSECTICIDE	292.9
		LORSBAN 15G GRANULAR INSECTICIDE	4643.1
		LORSBAN 4E-HF	414.0
		LORSBAN ADVANCED	45.1
		LORSBAN-4E	397.8
		NUFOS 15G	1292.1
		NUFOS 4E	163.7
	GRAPES	LORSBAN 4E-HF	16.0
		LORSBAN ADVANCED	18.8
	GRAPES (WINE)	LORSBAN 4E-HF	199.4
		LORSBAN ADVANCED	6245.3
		LORSBAN-4E	185.8
	N-OUTDR GRWN TRNSPLNT/PRPGTV MTRL	LORSBAN ADVANCED	44.0
		LORSBAN-4E	240.1
		WARHAWK	3.0
	WALNUT (ENGLISH WALNUT, PERSIAN WALNUT)	GOVERN 4E INSECTICIDE	1319.1
		LORSBAN 4E INSECTICIDE	1047.5
		LORSBAN 4E-HF	1300.0
		LORSBAN ADVANCED	665.9
		LORSBAN-4E	1657.2
		NUFOS 4E	58.0

ALFALFA - Total Pounds Chlorpyrifos Applied	**1494.0**
ALMOND - Total Pounds Chlorpyrifos Applied	**4697.1**
CORN - Total Pounds Chlorpyrifos Applied	**7248.7**
GRAPES - Total Pounds Chlorpyrifos Applied	**6665.2**
N-OUTDR GRWN TRNSPLNT - Total Pounds Chlorpyrifos Applied	**287.1**
WALNUT - Total Pounds Chlorpyrifos Applied	**6047.7**
Total Pounds Chlorpyrifos Applied (2006-2011)	**26439.8**

Previous analyses conducted by the Coalition and reported in the 2009 MPUR indicate a few parcels are responsible for the chlorpyrifos exceedances and management should focus on growers located adjacent to the drain. Growers with corn, grapes, almonds, and walnuts were targeted for outreach, and management practices aimed at preventing discharge during the irrigation season were discussed.

The Coalition noted that growers currently employ recirculation and/or tailwater return systems, allow grass to grow down orchard row centers, and maintain vegetative filter strips around field edges and/or waterways to reduce runoff. Growers with row crop are advised of methods to better manage their irrigation tailwater and storm water runoff, whereas outreach efforts to orchard growers focus on encouraging management practices to reduce spray drift and improve orchard water management.

Since 2007, Coalition outreach includes grower meetings and the mailing/distribution of information. A complete list of Coalition outreach that occurred in high priority subwatersheds during 2011 is provided in the Performance Goals and Schedules section of this report. The Coalition focused outreach to growers who had used chlorpyrifos within the last two years and contacted permittees associated with the targeted growers. Beginning in the fall of 2008, the Coalition made several individual contacts with permittees and/or growers to discuss the Unnamed Drain management plan strategy and relevant management practices. The Coalition also hosted a subwatershed grower meeting in November 2008, invited members to a Mid Valley Agricultural Services hosted grower meeting in March 2009, invited growers to Spray Safe hosted grower meetings in February 2010 and 2011, and hosted a meeting alongside MVP Safety Consulting in December 2011 to further expand their grower audience and highlight chlorpyrifos management practices. Although meetings focused mainly on chlorpyrifos exceedances, all water quality results were reviewed and discussed including copper, diuron, simazine, lead, DO, SC, TDS and *E. coli* exceedances; toxicity to *C. dubia, S. capricornutum* and *H. azteca* were also discussed. Grower surveys for the 34 targeted member s (accounting for 6,463 acres within the subwatershed) were completed at the meetings, documenting members' current practices and indicating which recommended practices growers anticipate implementing in the upcoming year, have been compiled and assessed by the Coalition.

The Coalition began following up with growers in 2010 to determine which additional management practices were implemented in 2009 and if additional practices were planned for 2010. Of the initial 34 targeted growers, 18 members were required to complete a follow up survey. To date, 100% of the follow up meetings with the first priority subwatersheds were completed and all members with recommended management practices implemented those practices. Of the 18 growers who implemented management practices, 37% of acres with recorded practices installed sprinkler or micro irrigation, 31% of acres with recorded practices reduced use of pesticides found in exceedances, 24% of acres with recorded practices reduced runoff water volumes using irrigation management, 4% of acres with recorded practices are using center grass rows, grass waterways/grass filter strips, and 4% of acres with recorded practices installed retention pond/holding basin/return systems. The growers who implemented new management practices represent 61% (3,934 acres) of the 6,463 targeted acres.

Chlorpyrifos was scheduled for 2011 MPM in the months of January, February, May through September, November and December; DPR grant monitoring for chlorpyrifos coincided with MPM in January and February 2011. There were two chlorpyrifos exceedances in January and July 2011, and the Coalition will continue MPM in 2012 to assess the water quality in Unnamed Drain to Lone Tree Creek. Unnamed Drain to Lone Tree Creek is scheduled for MPM of chlorpyrifos in January, February, May through

September, November and December. Furthermore, five additional growers representing 1,666 acres are targeted for outreach in 2012 due to their continued use of chlorpyrifos in 2010 or 2011. Outreach will focus mainly on discontinuing the use of chlorpyrifos; however, improved management practices such as recycling runoff water and being mindful of buffer zones will be discussed for all pesticides in use.

Priority C Constituents

Copper, diuron and simazine are listed as priority C constituent in the Unnamed Drain to Lone Tree Creek @ Jack Tone Rd subwatershed management plan.

Copper

Copper exceeded the hardness based WQTL seven times in the Unnamed Drain to Lone Tree Creek site subwatershed since monitoring began in 2006 (Table III-6). The Coalition began monitoring for both the total and dissolved copper fractions in October 2008 to better characterize copper contamination in the subwatershed. Starting in April 2009, MPM for copper has continued continuously in the months of April, May, July, August and September, and is scheduled to continue in 2012 during the same months.

The PUR data from 2004 through available 2011 were reviewed for the number of monthly copper applications, pounds of active ingredient applied, and acres treated (Table III-11, Figure III-3). Copper is one of the most heavily applied pesticides in the site subwatershed. Overall, the number of copper applications, amount of copper applied (pounds AI), and the number of acres treated has decreased since 2006. The largest amount applied was in 2007 (21,850 lbs AI) and the smallest amount was applied in 2010 (14,043 lbs AI). The greatest use has consistently occurred in May. Not all exceedances occurred during months of the greatest use (Figure III-3).

The largest amount of copper applied from 2006 through 2010 was to rice (53,644 lbs AI) followed by walnuts (29,832 lbs AI) (Table III-12). Several different products containing copper are used throughout the Coalition area, including Chipco (on rice crops only) and Kocide (Table III-12).

Table III-11. Unnamed Drain to Lone Tree Creek @ Jack Tone Rd site subwatershed copper applications, lbs AI applied, and acres treated by month (2006-2011).

PUR data available through May 2011 for San Joaquin County and through November 2011 for Stanislaus County; all PUR data after May 2011 are preliminary. If a month is not included in the table, no applications were made.

Month/Year	Number of Copper Applications	Pounds of AI Applied	Acres Treated
January, 2006	13	3152.2	570
February, 2006	8	333.3	362.5
March, 2006	23	861.0	786.5
April, 2006	27	3818.2	1197.9
May, 2006	33	10057.2	1400
June, 2006	8	2379.0	287
August, 2006	2	101.6	65
September, 2006	5	301.1	194.5
October, 2006	5	338.8	217
November, 2006	2	116.2	40
December, 2006	1	61.6	10

Month/Year	Number of Copper Applications	Pounds of AI Applied	Acres Treated
January, 2007	7	2044.1	513
February, 2007	5	197.6	195.5
March, 2007	13	1730.0	490.6
April, 2007	30	4892.7	1155.1
May, 2007	25	11936.1	1313.2
June, 2007	5	870.5	177
July, 2007	5	133.5	170
September, 2007	1	27.7	80
December, 2007	1	17.4	6
January, 2008	4	734.8	151
February, 2008	6	837.0	304.3
March, 2008	11	1062.2	331.6
April, 2008	18	2813.0	541
May, 2008	16	9730.7	809
June, 2008	1	86.0	70
December, 2008	1	234.6	44
January, 2009	4	498.2	104
February, 2009	3	309.6	261
March, 2009	3	630.2	118.8
April, 2009	22	3518.1	2087.4
May, 2009	26	14462.7	1230.0
July, 2009	1	2.5	3
September, 2009	1	2.5	3
November, 2009	1	234.6	44
December, 2009	4	541.6	65
February, 2010	7	386.4	476
March, 2010	8	921.4	324.3
April, 2010	31	3525.4	2302.5
May, 2010	11	2587.0	399.9
June, 2010	10	6468.7	533
September, 2010	1	15.4	10
December, 2010	3	138.8	41
January, 2011	2	479.6	160
February, 2011	5	358.1	529
March, 2011	3	356.8	440
April, 2011	30	3016.8	1014.4
May, 2011	21	2991.8	803.5
June, 2011	2	126.5	50
July, 2011	1	46.1	25
Summaries by Year			
2006 Total	127	21520.2	5130.4
2007 Total	92	21849.5	4100.4
2008 Total	57	15498.3	2250.8
2009 Total	65	20200.1	3916.2
2010 Total	71	14043.0	4086.7
2011 Total	64	7375.7	3021.9
Total	**476**	**100486.8**	**22506.5**

Figure III-3. Unnamed Drain to Lone Tree Creek @ Jack Tone Rd site subwatershed lbs copper applied by month (2006-2011).

PUR data available through May 2011 for San Joaquin County and through November 2011 for Stanislaus County; all PUR data after May 2011 are preliminary. Asterisk (*) denotes months with exceedances.

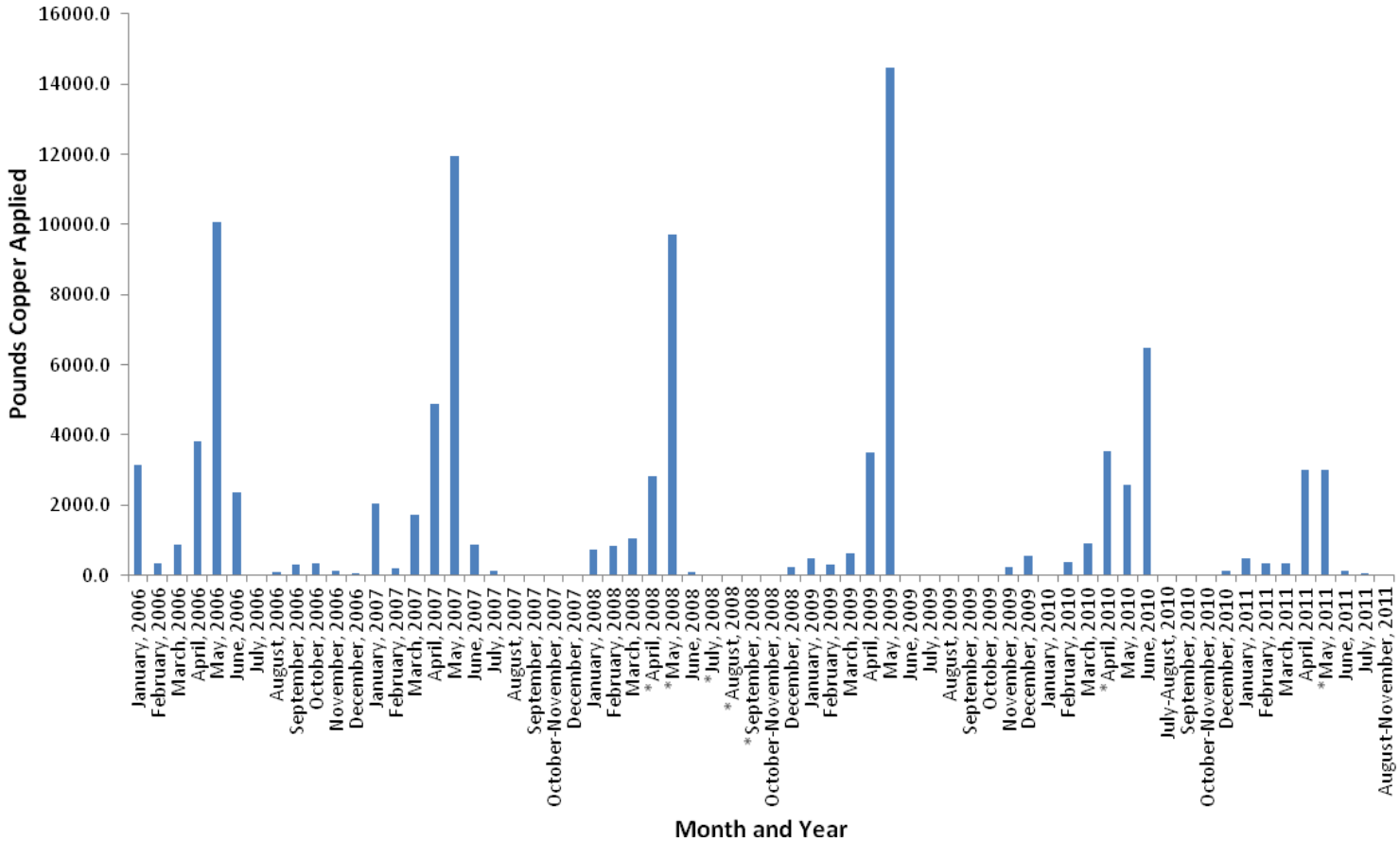


Table III-12. Unnamed Drain to Lone Tree Creek @ Jack Tone Rd site subwatershed copper PUR data (2006-2011).

PUR data available through May 2011 for San Joaquin County and through November 2011 for Stanislaus County; all PUR data after May 2011 are preliminary.

Chemical Name	Commodity	Product Name	Lbs AI Applied
COPPER	ALFALFA (FORAGE - FODDER) (ALFALFA HAY)	KOCIDE DF	329.1
	ALMOND	BLUE SHIELD DF	20.0
		CHAMP FORMULA 2 FLOWABLE	21.9
		CHAMPION WETTABLE POWDER	192.4
		DUPONT GX-569 FUNGICIDE/BACTERICIDE	5.3
		DUPONT KOCIDE 2000 FUNGICIDE/BACTERICIDE	990.2
		DUPONT KOCIDE 3000 FUNGICIDE/BACTERICIDE	37.1
		HYDROX	61.6
		KOCIDE 101	1897.8
		KOCIDE 2000	1772.6
		KOCIDE DF	2200.0
		NORDOX	76.1
		NORDOX 75 WG	1486.3
		NU-COP 50 WP	231.0
		NU-COP 50DF	808.5
	CHERRY	CUPROFIX ULTRA 40 DISPERSS	696.8
		DUPONT KOCIDE 3000 FUNGICIDE/BACTERICIDE	92.2
		KOCIDE 101	55.4
		NU-COP 50DF	773.9
	GRAPES	CHAMP FORMULA 2 FLOWABLE	398.2
		HYDROX	92.4
		KENTAN DF	98.0
		NU-COP 50DF	92.2
		TENN-COP 5E	73.1
		TENN-COP 5E FUNGICIDE/BACTERICIDE	509.9
	GRAPES (WINE)	CHAMP FORMULA 2 FLOWABLE	156.1
		DUPONT GX-569 FUNGICIDE/BACTERICIDE	809.7
		DUPONT KOCIDE 3000 FUNGICIDE/BACTERICIDE	889.7
		KOCIDE 606 FLOWABLE AGRICULTURAL FUNGICIDE	185.2
		NU-COP 3L	284.7
		STRETCH FUNGICIDE	3.5
	NECTARINE	NORDOX 75 WG	136.9
	N-OUTDR GRWN TRNSPLNT/PRPGTV MTRL	CHAMP FORMULA 2 FLOWABLE	198.3
	ONION (DRY, SPANISH, WHITE, YELLOW, RED, ETC.)	DUPONT KOCIDE 3000 FUNGICIDE/BACTERICIDE	10.4
		DUPONT KOCIDE DF FUNGICIDE/BACTERICIDE	86.0
		KOCIDE 2000	169.5
	PEACH	NORDOX 75 WG	124.8
	PEAR	KOCIDE 101	16.2
	PEPPERS (FRUITING VEGETABLE), (BELL,CHILI, ETC.)	DUPONT KOCIDE 3000 FUNGICIDE/BACTERICIDE	27.7
	RICE (ALL OR UNSPEC)	BLUE VIKING COPPER SULFATE STAR SHINE CRYSTAL	2128.5
		CHIPCO COPPER SULFATE CRYSTALS	49931.5
		COPPER SULFATE CRYSTAL	1584.0
	TOMATOES, FOR PROCESSING/CANNING	CHAMP 30 DP	10.7
		CHAMP FORMULA 2 FLOWABLE	0.8
		HYDROX	101.6

Chemical Name	Commodity	Product Name	Lbs AI Applied
COPPER	TOMATOES, FOR PROCESSING/CANNING	KOCIDE 4.5 LF	7.1
		KOCIDE DF	136.1
		NU-COP 3L	3.6
		NU-COP 50DF	639.9
	WALNUT (ENGLISH WALNUT, PERSIAN WALNUT)	BADGE X2	152.0
		BLUE SHIELD DF	92.4
		CHAMP FORMULA 2 FLOWABLE	126.5
		COPPER SULFATE CRYSTALS	222.8
		CUPROFIX ULTRA 40 DISPERSS	140.8
		DUPONT GX-569 FUNGICIDE/BACTERICIDE	166.0
		DUPONT KOCIDE 2000 FUNGICIDE/BACTERICIDE	2325.5
		DUPONT KOCIDE 3000 FUNGICIDE/BACTERICIDE	1900.4
		DUPONT KOCIDE DF FUNGICIDE/BACTERICIDE	378.2
		HYDROX	1124.2
		KENTAN DF	2056.0
		KOCIDE 101	1359.0
		KOCIDE 2000	865.1
		KOCIDE DF	5069.6
		NORDOX 75 WG	298.2
		NU-COP 50 WP	997.2
		NU-COP 50DF	12089.2
		NUCOP DF	100.0
		NU-COP HB	369.6

ALFALFA - Total Pounds Copper Applied	**329.1**
ALMOND - Total Pounds Copper Applied	**9800.9**
CHERRY - Total Pounds Copper Applied	**1618.3**
GRAPES - Total Pounds Copper Applied	**3592.6**
NECTARINE - Total Pounds Copper Applied	**136.9**
N-OUTDR GRWN TRNSPLNT - Total Pounds Copper Applied	**198.3**
ONION - Total Pounds Copper Applied	**265.8**
PEACH - Total Pounds Copper Applied	**124.8**
PEAR - Total Pounds Copper Applied	**16.2**
PEPPERS - Total Pounds Copper Applied	**27.7**
RICE - Total Pounds Copper Applied	**53644.0**
TOMATOES - Total Pounds Copper Applied	**899.8**
WALNUT - Total Pounds Copper Applied	**29832.4**
Total Pounds Copper Applied (2006-2011)	**100486.8**

The Coalition will continue with its Management Plan strategy for copper as outlined above. Previous analyses discussed the 2011 Management Plan Update suggested that management of copper in this watershed should focus on growers making applications late in the summer. Orchard and vineyard operators are advised to consider irrigation tailwater retention to prevent copper from entering the waterway with runoff. Storm runoff management was recommended to prevent the winter exceedances. Individual contacts that occurred within this subwatershed for copper are described under the chlorpyrifos outreach section.

Diuron

Concentrations of diuron exceeded the WQTL (2 µg/L) three times in the Unnamed Drain to Lone Tree Creek @ Jack Tone Rd subwatershed, in February 2007 (two separate storm events), and January 2008 (Table III-6). The February 11, 2007 exceedance was associated with *C. dubia* and *S. capricornutum* toxicities; the February 28, 2007 exceedance was associated with *S. capricornutum* toxicity. Diuron has had continuous MPM in the months of January and February since 2010; no exceedances occurred. While the sum of applications, pounds applied, and acres treated in 2010 appear to have increased, the PUR data indicate that heavier applications took place during 2010 in all the months with historically high usage (January, February, November and December); the yearly summaries are skewed as the vast majority of applications occur in two years, and should rather be viewed on a seasonal basis (Table III-13). Applications of diuron dropped drastically in the winter season of 2007/2008 and remained at comparable levels through the winter of 2010/2011 (Figure III-4). Alfalfa and grapes received the most applications of diuron (Table III-14).

Table III-13. Unnamed Drain to Lone Tree Creek @ Jack Tone Rd site subwatershed diuron applications, lbs AI applied, and acres treated by month (2006-2011).

PUR data available through May 2011 for San Joaquin County and through November 2011 for Stanislaus County; all PUR data after May 2011 are preliminary. If a month is not included in the table, no applications were made.

Month/Year	Number of Diuron Applications	Pounds of AI Applied	Acres Treated
January, 2006	3	17.5	60
February, 2006	18	946.6	1146.4
April, 2006	1	15.0	9.4
May, 2006	2	24.8	46
July, 2006	1	8.9	20
October, 2006	6	126.8	171.3
November, 2006	4	320.7	92.3
December, 2006	12	722.8	483
February, 2007	8	665.5	1306
March, 2007	1	3.4	5.5
April, 2007	2	48.4	77.5
May, 2007	1	3.4	5.5
June, 2007	1	18.5	26
October, 2007	1	17.1	5
November, 2007	1	7.4	5
December, 2007	3	245.1	162
January, 2008	2	193.7	291
March, 2008	3	41.5	54.5
April, 2008	1	12.5	6.4
July, 2008	1	12.0	7.5
November, 2008	1	8.2	5.7
December, 2008	2	213.9	146
January, 2009	5	72.3	109
March, 2009	1	150.0	75
May, 2009	2	32.9	46
November, 2009	1	9.2	6
December, 2009	3	149.1	95
January, 2010	2	199.4	142.1

Month/Year	Number of Diuron Applications	Pounds of AI Applied	Acres Treated
February, 2010	7	328.7	275.6
May, 2010	2	6.6	35.3
July, 2010	1	12.0	7.5
November, 2010	5	132.5	289.5
December, 2010	3	165.0	96
January, 2011	7	331.3	334.4
February, 2011	3	106.3	55.0
Summaries by Year			
2006 Total	47	2183.0	2028.4
2007 Total	18	1008.9	1592.5
2008 Total	10	481.8	511.1
2009 Total	12	413.5	331
2010 Total	20	844.2	846.0
2011 Total	10	437.6	389.4
Total	**117**	**5369.0**	**5698.4**

Figure III-4. Unnamed Drain to Lone Tree Creek @ Jack Tone Rd site subwatershed lbs diuron applied by month (2006-2011).

PUR data available through May 2011 for San Joaquin County and through November 2011 for Stanislaus County; all PUR data after May 2011 are preliminary. Asterisk (*) denotes months with exceedances.

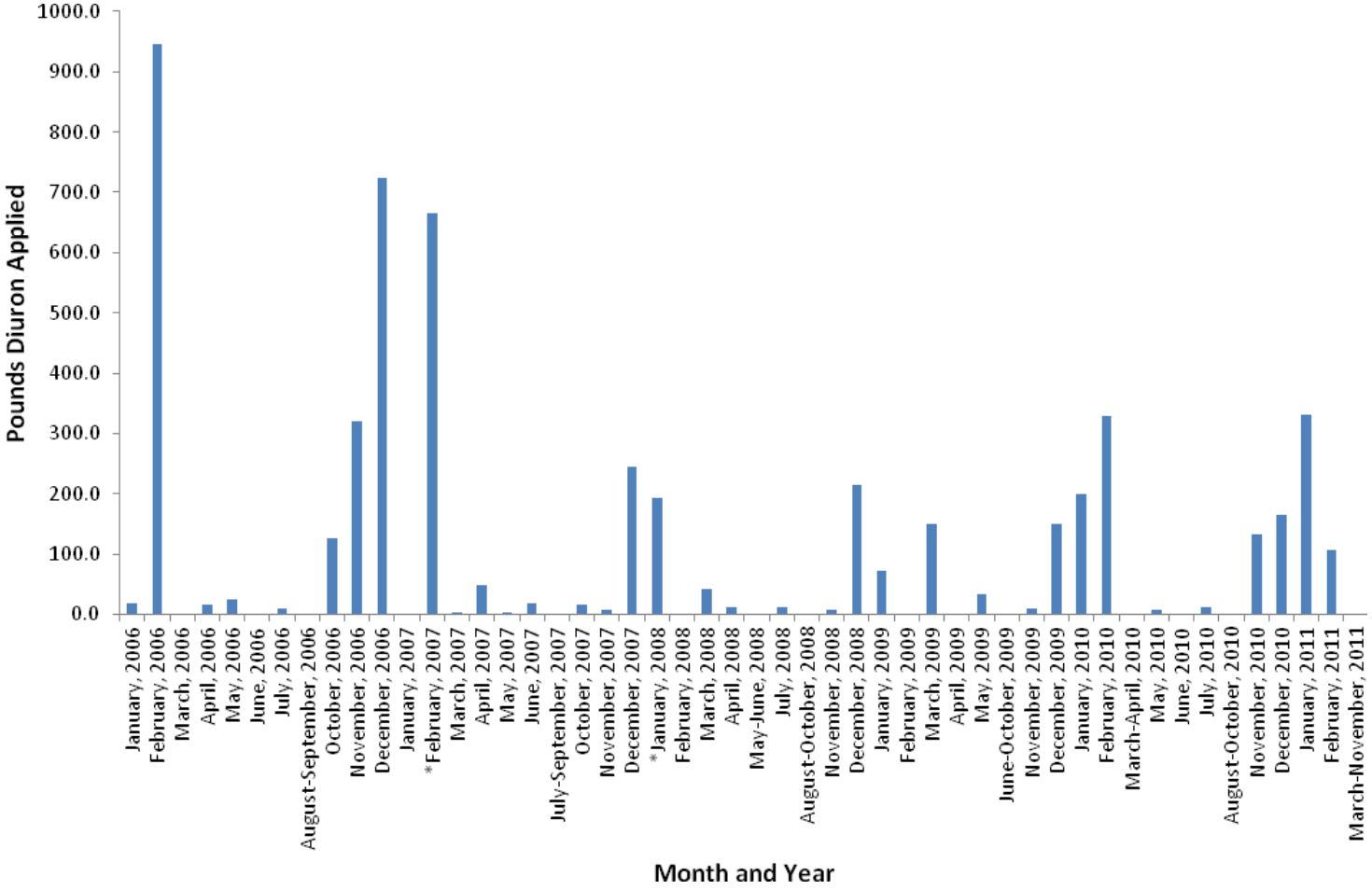


Table III-14. Unnamed Drain to Lone Tree Creek @ Jack Tone Rd site subwatershed diuron PUR data (2006-2011). PUR data available through May 2011 for San Joaquin County and through November 2011 for Stanislaus County; all PUR data after May 2011 are preliminary.

Chemical Name	Commodity	Product Name	Lbs AI Applied
DIURON	ALFALFA (FORAGE - FODDER) (ALFALFA HAY)	DIREX 4L	1466.4
		DUPONT DIREX 4L HERBICIDE	199.8
	GRAPES	KARMEX XP HERBICIDE	662.9
	GRAPES (WINE)	DIURON 4L HERBICIDE	475.8
		DREXEL DIURON 4L HERBICIDE	302.1
		DUPONT DIREX 4L HERBICIDE	169.7
		KARMEX DF HERBICIDE	665.5
	PASTURES (ALL OR UNSPEC)	DIREX 4L	17.1
	PEAR	DIREX 4L	25.0
	SOIL APPLICATION, PREPLANT-OUTDOOR (SEEDBEDS,ETC.)	DIREX 4L	20.5
	UNCULTIVATED NON-AG AREAS (ALL OR UNSPEC)	DIREX 4L	625.4
		DU PONT KROVAR I DF HERBICIDE	150.0
		DUPONT DIREX 4L HERBICIDE	10.0
	WALNUT (ENGLISH WALNUT, PERSIAN WALNUT)	DIREX 4L	279.6
		DIREX 80DF	42.0
		DIURON 400 HERBICIDE	18.5
		DIURON 4L	9.2
		DIURON 4L HERBICIDE	41.8
		DREXEL DIURON 4L HERBICIDE	81.1
		DU PONT KARMEX DF HERBICIDE	12.0
		DUPONT DIREX 4L HERBICIDE	22.8
		DUPONT KARMEX DF HERBICIDE	26.2
		KARMEX DF HERBICIDE	45.8

ALFALFA - Total Pounds Diuron Applied	**1666.1**
GRAPES - Total Pounds Diuron Applied	**2276.0**
PASTURES - Total Pounds Diuron Applied	**17.1**
PEAR - Total Pounds Diuron Applied	**25.0**
SOIL APPLICATION - Total Pounds Diuron Applied	**20.5**
UNCULTIVATED NON-AG AREAS - Total Pounds Diuron Applied	**785.4**
WALNUT - Total Pounds Diuron Applied	**578.9**
Total Pounds Diuron Applied (2006-2011)	**5369.0**

The Coalition's strategy for addressing diuron exceedances in the Unnamed Drain to Lone Tree Creek subwatershed during outreach is described above under the chlorpyrifos section. In 2012, MPM for diuron is scheduled for January and February to further assess the implementation and effectiveness of management practices.

Simazine

Samples with simazine exceeded the WQTL (4.0 µg/L) twice, once in February 2007 and again in January 2008. From 2010 through 2011, MPM for simazine was conducted in the months of January and February and resulted in zero exceedances.

Simazine was applied in this watershed in every month except for August, but it is applied primarily during the winter months, therefore use trends are most accurately evaluated on a seasonal basis (Table III-15, Figure III-5). Applications of diuron dropped drastically in the winter season of 2010/2011 compared to the applications made during the winter of 2009/2010. Simazine was primarily applied to grapes and almonds (Table III-16).

Table III-15. Unnamed Drain to Lone Tree Creek @ Jack Tone Rd site subwatershed simazine applications, lbs AI applied, and acres treated by month (2006-2011).

PUR data available through May 2011 for San Joaquin County and through November 2011 for Stanislaus County; all PUR data after May 2011 are preliminary. If a month is not included in the table, no applications were made.

Month/Year	Number of Simazine Applications	Pounds of AI Applied	Acres Treated
January, 2006	12	473.5	581
February, 2006	9	386.5	309.8
March, 2006	3	20.2	77
April, 2006	1	16.9	9.4
May, 2006	2	25.5	46
July, 2006	1	9.0	20
October, 2006	5	106.0	101.3
November, 2006	6	443.0	428.8
December, 2006	4	1076.4	976
January, 2007	2	366.3	353
February, 2007	5	137.5	251
March, 2007	2	16.3	25.5
April, 2007	3	23.4	47.5
May, 2007	1	3.5	5.5
June, 2007	1	18.9	26
July, 2007	1	60.7	57
October, 2007	1	11.0	28
November, 2007	3	63.5	45
December, 2007	10	1660.4	1430.3
January, 2008	6	553.4	625
February, 2008	3	48.8	92
March, 2008	3	65.5	120.5
April, 2008	4	33.8	121.4
July, 2008	1	7.1	7.5
November, 2008	5	177.7	270.7
December, 2008	10	1011.2	452.4
January, 2009	3	40.9	67
February, 2009	7	370.2	415.7
March, 2009	3	50.4	125
April, 2009	12	437.3	596.0
May, 2009	8	240.0	517
June, 2009	1	68.8	57.3
November, 2009	15	2876.7	2011.4
December, 2009	3	56.2	82
January, 2010	13	561.9	655.0
February, 2010	8	587.8	381.7
March, 2010	2	91.9	92.9
April, 2010	2	107.5	273

Month/Year	Number of Simazine Applications	Pounds of AI Applied	Acres Treated
May, 2010	2	40.5	60.3
July, 2010	1	14.9	7.5
September, 2010	1	75.0	100
November, 2010	7	105.1	199.2
January, 2011	9	492.0	589
February, 2011	8	304.6	272.3
April, 2011	1	20.0	20.0
May, 2011	3	51.6	51.7
Summaries by Year			
2006 Total	43	2556.9	2549.3
2007 Total	29	2361.7	2268.8
2008 Total	32	1897.5	1689.5
2009 Total	52	4140.5	3871.4
2010 Total	36	1584.6	1769.6
2011 Total	21	868.1	932.9
Total	**213**	**13409.2**	**13081.6**

Figure III-5. Unnamed Drain to Lone Tree Creek @ Jack Tone Rd site subwatershed lbs simazine applied by month (2006-2011).

PUR data available through May 2011 for San Joaquin County and through November 2011 for Stanislaus County; all PUR data after May 2011 are preliminary. Asterisk (*) denotes months with exceedances.

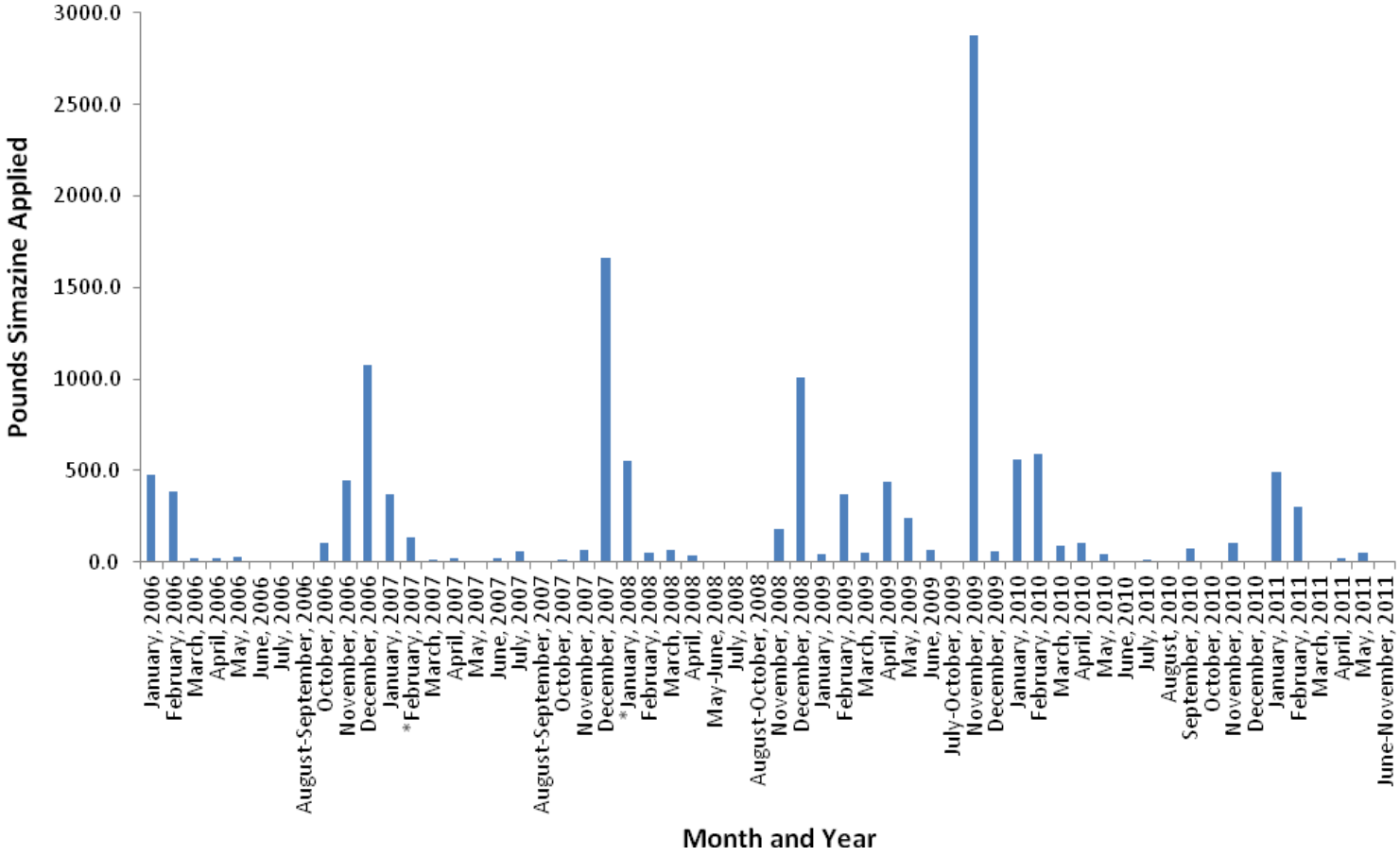


Table III-16. Unnamed Drain to Lone Tree Creek @ Jack Tone Rd site subwatershed simazine PUR data (2006-2011).

PUR data available through May 2011 for San Joaquin County and through November 2011 for Stanislaus County; all PUR data after May 2011 are preliminary.

Chemical Name	Commodity	Product Name	Lbs AI Applied
SIMAZINE	ALMOND	DREXEL SIMAZINE 4L	420.3
		PRINCEP 4L	922.9
		PRINCEP CALIBER 90 HERBICIDE	109.2
		SIM-TROL 4L	677.3
		SIM-TROL 90DF	45.1
	GRAPES	PRINCEP 4L	26.9
		PRINCEP CALIBER 90 HERBICIDE	1812.2
		SIMAZINE 90DF	106.2
	GRAPES (WINE)	PRINCEP 4L	976.3
		PRINCEP CALIBER 90 HERBICIDE	732.7
		SIMAZINE 4L HERBICIDE	1357.2
		SIMAZINE 90DF	1450.8
		SIM-TROL 4L	1219.5
		SIM-TROL 90DF	1361.2
		SIM-TROL 9DF	465.4
	NECTARINE	SIM-TROL 4L	4.4
	PEACH	SIM-TROL 4L	2.7
	UNCULTIVATED NON-AG AREAS (ALL OR UNSPEC)	DREXEL SIMAZINE 4L	130.2
		PRINCEP CALIBER 90 HERBICIDE	93.6
	WALNUT (ENGLISH WALNUT, PERSIAN WALNUT)	DREXEL SIMAZINE 4L	44.3
		PRINCEP 4L	518.9
		PRINCEP CALIBER 90 HERBICIDE	86.7
		SIMAZINE 4L FLOWABLE HERBICIDE	11.6
		SIMAZINE 90 WATER DISPERSIBLE GRANULAR HERBICIDE	13.3
		SIMAZINE 90DF	31.8
		SIM-TROL 4L	735.1
		SIM-TROL 90DF	38.7
		SIM-TROL 9DF	14.9

ALMOND - Total Pounds Simazine Applied	**2174.7**
GRAPES - Total Pounds Simazine Applied	**9508.4**
NECTARINE - Total Pounds Simazine Applied	**4.4**
PEACH - Total Pounds Simazine Applied	**2.7**
UNCULTIVATED NON-AG AREAS - Total Pounds Simazine Applied	**223.8**
WALNUT - Total Pounds Simazine Applied	**1495.2**
Total Pounds Simazine Applied (2006-2011)	**13409.2**

The Coalition's strategy for addressing simazine exceedances in the Unnamed Drain to Lone Tree Creek subwatershed during outreach is described above under the chlorpyrifos section. In 2012, MPM for simazine is scheduled for January and February to further assess the implementation and effectiveness of management practices.

Priority D Constituents

The priority D constituents listed under the Unnamed Drain to Lone Tree Creek management plan are water column toxicity to *C. dubia* and *S. capricornutum* and sediment toxicity to *H. azteca*.

***C. dubia* toxicity**

Toxicity to *C. dubia* occurred five times (including a resample event to test for toxicity persistence) since monitoring began (Table III-6). The most recent toxicity occurred during September 2009 MPM. All toxicity occurrences coincided with exceedances of the chlorpyrifos WQTL. MPM will occur for *C. dubia* toxicity in 2012 in the months of January, February, and September. The Coalition's strategy to address toxicity to *C. dubia* is to focus on chlorpyrifos exceedances. If chlorpyrifos is prevented from entering the waterway by controlling the movement of soluble pesticides (as discussed in the chlorpyrifos section) the toxicity can be eliminated.

***S. capricornutum* toxicity**

S. capricornutum toxicity occurred five times since monitoring began, including two resample events to test for persistence of toxicity (Table III-6). 2012 MPM will occur for *S. capricornutum* toxicity in February, March and May. The Coalition believes that the improved management of copper and herbicides such as diuron and simazine (as discussed in the corresponding sections) has reduced the number of samples toxic to algae.

***H. azteca* toxicity**

H. azteca toxicity occurred seven times since monitoring began, including one resample to test for persistence of toxicity (Table III-6). *H. azteca* toxicity was added to the MPM schedule (in correspondence with DPR grant monitoring) in September 2010; MPM continued in 2011 during the months of March and October. *H. azteca* will be part of MPM in 2012 in March and September. Starting in 2009, the Coalition began testing for total organic carbon and grain size in all sediments and pyrethroids and chlorpyrifos in sediment that exhibits toxicity.

Priority E Constituents

The priority E constituents listed under the Unnamed Drain to Lone Tree Creek management plan are DO, *E. coli*, SC, TDS, and lead. Although these constituents remain low priority, the Coalition continues to collect priority E constituent monitoring data for DO and SC during each monitoring event. TDS, *E. coli* and lead will be monitored when Assessment Monitoring resumes at this site in 2030. The priority E constituents are discussed during individual contacts and will continue to be discussed at annual grower meetings.

To address *E. coli* exceedances, the Coalition plans to participate in the focus group along with other Coalitions and Regional Board staff to develop a joint Work Plan to characterize the potential agricultural sources of *E. coli* and identify management practices to prevent discharges to surface waters.

Evaluation

Unnamed Drain to Lone Tree Creek is a first priority subwatershed within the SJCDWQC and has technically completed its focused outreach (2008-2010).

Individual surveys to document current management practices and follow up contacts to assess future planned implementations have been completed by 100% of targeted growers. The First Priority Summary of Management Practices section of this report summarizes the results of these contacts. However, due to continued exceedances in 2011 of chlorpyrifos, the Coalition is expanding its outreach efforts to growers with recent reported use of chlorpyrifos. Additional focused outreach is scheduled to begin in 2012. Outreach includes grower notification, management practice education, tracking of management practice implementation, and providing information to growers on special studies of management practice efficacy. In the case of additional focused outreach, individual meetings are scheduled with growers to review their operation and to discuss management practices and pesticides currently in use.

In general, the acres treated and pounds of chlorpyrifos applied have decreased since 2006, however chlorpyrifos concentrations in samples exceeded the WQTL again in January and July 2011. Usage is historically low in January, suggesting that management practices to improve storm runoff could be implemented. Unnamed Drain to Lone Tree Creek is scheduled for MPM in 2012 in order to continue monitoring the waterbody for chlorpyrifos and other high priority constituents. If any additional exceedances of priority A-D constituents occur, the Coalition will discuss necessary actions with the Regional Board. The Coalition will continue to conduct outreach on a general and focused level throughout 2012.

Although chlorpyrifos remains a high priority constituent in the Lone Tree Creek management plan, diuron and simazine experienced no exceedances for two or more consecutive years of monitoring in months of past exceedances. Additionally, there were no instances of toxicity to *S. capricornutum* or *C. dubia* 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 these constituents from the Lone Tree Creek management plan.

HIGH PRIORITY SITE SUBWATERSHEDS (2010 – 2012)

IV. GRANT LINE CANAL @ CLIFTON COURT RD

Management Plan Constituents

Priority A/B

- Chlorpyrifos

Priority C

- Copper

Priority D

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

Priority E

- Arsenic
- DDE
- Dissolved Oxygen
- *E. coli*
- Lead
- pH
- Specific Conductivity
- Total Dissolved Solids

Description of Grant Line Canal @ Clifton Court Rd Site Subwatershed

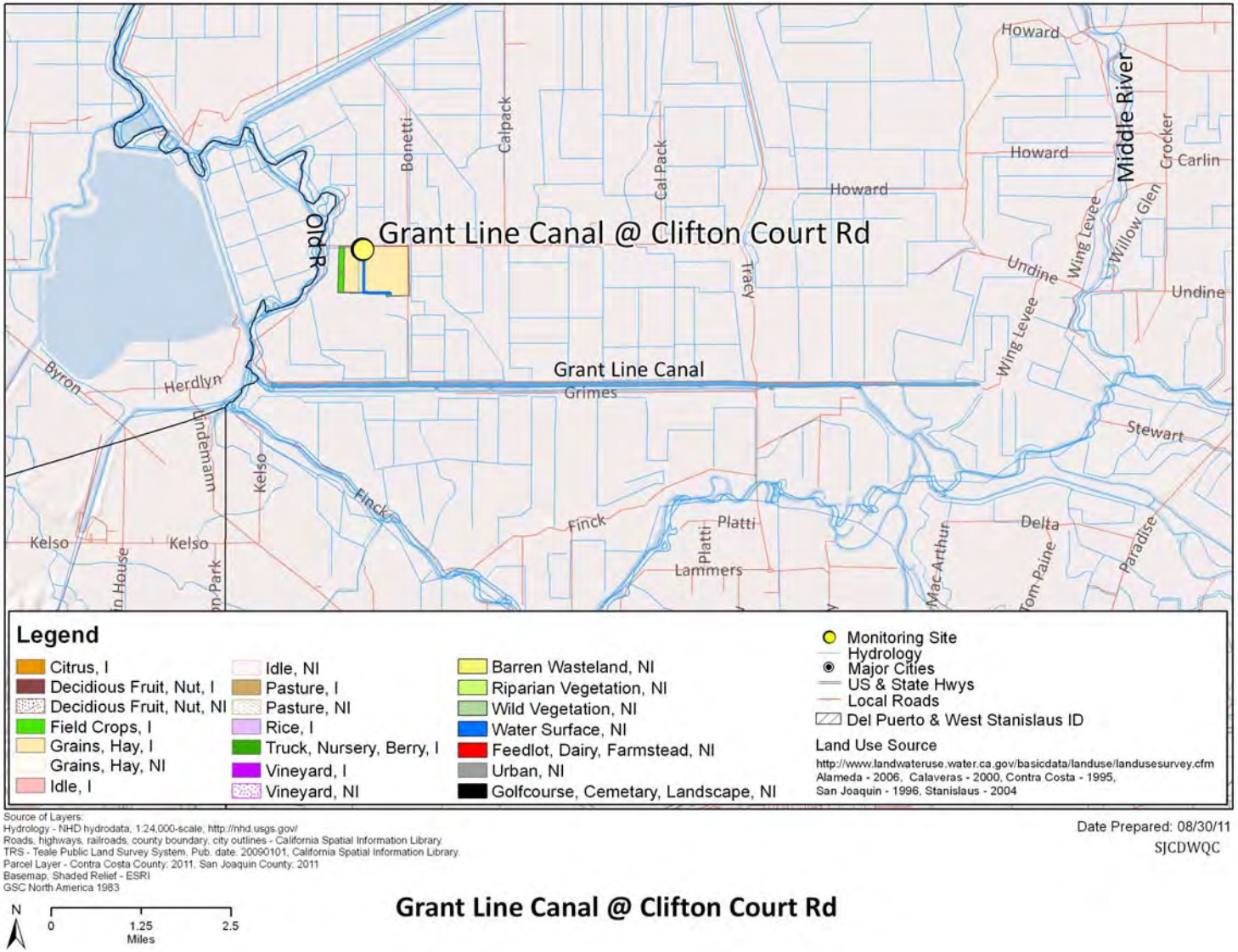
Grant Line @ Clifton Court Rd (260 irrigated acres) – This site is located on the southwest section of Union Island. Table IV-1 includes the station name (site name), station code and target latitude/longitudes for the site sampled within this subwatershed. The site is west of the Grant Line Canal @ Calpack Rd site, immediately south of Clifton Court Rd, and drains fields east and south. The crops are primarily alfalfa, field crops, and grain. Figure IV-1 illustrates the land use within this site subwatershed area.

The Grant Line Canal is located in the Bay-Delta tidal prism and receives water from east and west inputs. Source water of the GLC depends on delta tides, the natural flows of large waterbodies such as the San Joaquin River, and the operation of agriculture barriers.

Table IV-1. Grant Line Canal @ Clifton Court Rd site subwatershed sampling location coordinates.

Site Name	Station Code	Target Latitude	Target Longitude
Grant Line Canal @ Clifton Court Rd	544XGLCAA	37.8414	-121.5288

Figure IV-1. Grant Line Canal @ Clifton Court Rd site subwatershed land use map.



Subwatershed Monitoring History

Normal Monitoring began at Grant Line Canal @ Clifton Court Rd in the storm season of 2005, and continued through the storm and irrigation seasons of 2006 through 2008 (Table IV-2). Starting in October 2008, Grant Line Canal @ Clifton Court Rd was removed from the monitoring schedule and became a rotating Assessment Monitoring site under the current 2008 MRPP. The site is not scheduled for Assessment Monitoring until after 2035. Table IV-3 lists specific information on the analyses conducted across each of the monitoring seasons from 2005 through 2011.

In 2007, Normal Monitoring as well as additional MPM occurred at Grant Line Canal @ Clifton Court Rd for copper in 2007 (June, July, and September). In 2008, only Normal Monitoring occurred, and no monitoring was scheduled for 2009. In 2010, MPM took place for copper (May-September), chlorpyrifos (September), toxicity to *S. capricornutum* (May), and sediment toxicity to *H. azteca* (September). In 2011, MPM occurred for copper (May-September), chlorpyrifos (January, February, and September), and toxicity to *S. capricornutum* (January and May) and *H. azteca* (March and October). Table IV-4 lists all MPM dates and constituents for Grant Line Canal @ Clifton Court Rd from 2007 through 2011.

The Grant Line Canal is not considered impaired on California's 2008-2010 303d List of Impaired Waterbodies for, but the section of Old River from the SJR to the Delta Mendota Canal that runs parallel to Grant Line Canal is 303d listed for chlorpyrifos, low DO, TDS and electrical conductivity. The export waters of the Delta are 303d listed for chlorpyrifos, DDT, diazinon, electrical conductivity, group A pesticides, invasive species, mercury and unknown toxicity. This includes the Delta Mendota Canal and the California Aqueduct, both of which receive water from Grant Line Canal.

Table IV-2. Grant Line Canal @ Clifton Court Rd site subwatershed sampling events per season and year (including MPM).

Year	Season	Events Sampled	Events Not Sampled[1]	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	2	0	**2**
	Irrigation	6	0	**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	5	0	**5**
	Fall	NA	NA	**NA**
2011	Winter	3	0	**3**
	Storm	NA	NA	**NA**
	Irrigation	5	0	**5**
	Fall	NA	NA	**NA**

[1] 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. Grant Line Canal @ Clifton Court 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																			
NA	Dissolved Oxygen	1	5	3	5	3	9	3	8					5		3		6	
NA	Specific Conductivity	2	5	3	5	3	9	3	8					5		3		6	
NA	pH	1	5	3	5	3	9	3	8					5		3		6	
EPA 110.2	Color	2	5	2	5	2	6	1	6										
EPA 160.1	Dissolved Solids	2	5	2	5	2	6	1	6										
EPA 160.2	Suspended Solids																		
EPA 180.1	Turbidity	2	5	2	5	2	6	1	6										
SM 9223	*E. coli*	2	5	2	5	2	7	1	6										
EPA 415.1	Total Organic Carbon	2	5	2	5	2	6	1	6										
Walkley-Black	Total Organic Carbon (sediment)													1		1		1	
ASTM D422 or ASTM D4464	Grain size (sediment)													1		1		1	
EPA 405.1	BOD				1	2	2												
Carbamates																			
EPA 8321A	Aldicarb				5	2	6	1	6										
EPA 8321A	Carbaryl				5	2	6	1	6										
EPA 8321A	Carbofuran				5	2	6	1	6										
EPA 8321A	Diuron				5	2	6	1	6										
EPA 8321A	Linuron				5	2	6	1	6										
EPA 8321A	Methiocarb				5	2	6	1	6										
EPA 8321A	Methomyl				5	2	6	1	6										
EPA 8321A	Oxamyl				5	2	6	1	6										
Organochlorines																			
EPA 8081A	DDD(p,p')				5	2	6	1	6										
EPA 8081A	DDE(p,p')				5	2	6	1	6										
EPA 8081A	DDT(p,p')				5	2	6	1	6										
EPA 8081A	Dicofol				5	2	6	1	6										
EPA 8081A	Dieldrin				5	2	6	1	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 8081A	Endrin				5	2	6	1	6										
EPA 8081A	Methoxychlor				5	2	6	1	6										
Organophosphates																			
EPA 8141A	Azinphos methyl				5	2	6	1	6										
EPA 8141A	Chlorpyrifos	2	5	2	5	2	6	1	6					1		3		1	
EPA 8141A	Demeton-s																		
EPA 8141A	Diazinon	2	5	2	5	2	6	1	6										
EPA 8141A	Dichlorvos																		
EPA 8141A	Dimethoate				5	2	6	1	6										
EPA 8141A	Disulfoton				5	2	6	1	6										
EPA 8141A	Malathion				5	2	6	1	6										
EPA 8321A	Methamidophos				5	2	6	1	6										
EPA 8141A	Methidathion				5	2	6	1	6										
EPA 8141A	Molinate				5	2	6	1	6										
EPA 8141A	Parathion, Methyl				5	2	6	1	6										
EPA 8141A	Phorate				5	2	6	1	6										
EPA 8141A	Phosmet				5	2	6	1	6										
EPA 8141A	Thiobencarb				5	2	6	1	6										
Pyrethroids																			
EPA 8081A	Bifenthrin		1	2	5	2	6	1	6										
EPA 8081A	Cyfluthrin, total		1	2	5	2	6	1	6										
EPA 8081A	Cyhalothrin, lambda, total	2	5	2	5	2	6	1	6										
EPA 8081A	Cypermethrin, total	2	5	2	5	2	6	1	6										
EPA 8081A	Esfenvalerate/ Fenvalerate, total	2	5	2	5	2	6	1	6										
EPA 8081A	Permethrin, total	2	5	2	5	2	6	1	6										
Triazines																			
EPA 547M	Glyphosate				5	2	6	1	6										
EPA 549.2M	Paraquat dichloride				5	2	6	1	6										
EPA 619	Atrazine				5	2	6	1	6										
EPA 619	Cyanazine				5	2	6	1	6										
EPA 619	Simazine				5	2	6	1	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*
Metals (Total)																			
EPA 200.8	Arsenic				5	2	6	1	6										
EPA 200.8	Boron				5	2	6	1	6										
EPA 200.8	Cadmium				5	2	6	1	6										
EPA 200.8	Copper				5	2	8	1	6					5				5	
EPA 200.8	Lead				5	2	6	1	6										
EPA 200.8	Molybdenum																		
EPA 200.8	Nickel				5	2	6	1	6										
EPA 200.8	Selenium				5	2	2	1	6										
EPA 200.8	Zinc				5	2	6	1	6										
Metals (Dissolved)																			
EPA 200.8	Cadmium																		
EPA 200.8	Copper													5				5	
EPA 200.8	Lead																		
EPA 200.8	Nickel																		
EPA 200.8	Zinc																		
Nutrients																			
SM 2340 C	Hardness as CaCO3				5	2	8	1	6					5				5	
EPA 300.0	Nitrate as N				5	2	6	1	6										
EPA 350.2	Ammonia as N				5	2	6	1	6										
EPA 351.3	Nitrogen, Total Kjeldahl				5	2	6	1	6										
EPA 354.1	Nitrite as N				5	2	6	1	6										
EPA 353.2	Nitrate + Nitrite as N																		
EPA 365.2	OrthoPhosphate as P				5	2	6	1	6										
EPA 365.2	Phosphate as P				5	2	6	1	6										
Sediment Pesticides																			
EPA 8270M_NCI	Bifenthrin													1		1		1	
EPA 8270M_NCI	Chlorpyrifos													1		1		1	
EPA 8270M_NCI	Cyfluthrin													1		1		1	
EPA 8270M_NCI	Cyhalothrin, lambda													1		1		1	
EPA 8270M_NCI	Cypermethrin													1		1		1	

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 8270M_NCI	Deltamethrin: Tralomethrin													1		1		1	
EPA 8270M_NCI	Esfenvalerate/ Fenvalerate													1		1		1	
EPA 8270M_NCI	Fenpropathrin													1		1		1	
EPA 8270M_NCI	Permethrin													1		1		1	
Toxicity																			
EPA 821/R-02-012	*Ceriodaphnia dubia*	2	5	2	5	2	7	2	6										
EPA 821/R-02-012	*Pimephales promelas*	2	5	2	5	2	7	1	6										
EPA 821/R-02-013	*Selenastrum capricornutum*	2	5	2	5	2	7	2	7					1		1		1	
EPA 600/R-99-064	*Hyalella azteca*		3	1	1	2	1	1	1					1		1		1	

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

Table IV-4. Grant Line Canal @ Clifton Court Rd site subwatershed Management Plan Monitoring schedule (2007-2011).

Site Name	Sample Date	Monitoring Type	Copper	Chlorpyrifos	*S. capricornutum*	*H. azteca*
Grant Line Canal @ Clifton Court Rd	20-Jun-07	A	X			
Grant Line Canal @ Clifton Court Rd	30-Jul-07	A	X			
Grant Line Canal @ Clifton Court Rd	25-Sep-07	A	X			
Grant Line Canal @ Clifton Court Rd	11-May-10	MPM	X		X	
Grant Line Canal @ Clifton Court Rd	8-Jun-10	MPM	X			
Grant Line Canal @ Clifton Court Rd	13-Jul-10	MPM	X			
Grant Line Canal @ Clifton Court Rd	10-Aug-10	MPM	X			
Grant Line Canal @ Clifton Court Rd	7-Sep-10	MPM	X	X		X
Grant Line Canal @ Clifton Court Rd	11-Jan-11	MPM		X	X	
Grant Line Canal @ Clifton Court Rd	8-Feb-11	MPM		X		
Grant Line Canal @ Clifton Court Rd	8-Mar-11	MPM		X		X
Grant Line Canal @ Clifton Court Rd	24-May-11	MPM	X		X	
Grant Line Canal @ Clifton Court Rd	28-Jun-11	MPM	X			
Grant Line Canal @ Clifton Court Rd	26-Jul-11	MPM	X			
Grant Line Canal @ Clifton Court Rd	23-Aug-11	MPM	X			
Grant Line Canal @ Clifton Court Rd	20-Sep-11	MPM	X	X		
Grant Line Canal @ Clifton Court Rd	14-Oct-11	MPM				X

A – Additional sampling.
X – Constituent sampled for Management Plan Monitoring (MPM).

Exceedance History

During Coalition monitoring, exceedances of WQTL for field and physical parameters, *E. coli*, metals, pesticides, and sediment toxicity occurred at Grant Line Canal @ Clifton Court Rd. From 2005 through 2011, ambient water samples resulted in exceedances of the WQTLs for DO (31), pH (7), SC (28), *E. coli* (19), TDS (16), ammonia (1), arsenic (10), copper (6), lead (3), nickel (1), carbofuran (1), chlorpyrifos (6), DDE (2), DDT (1), dimethoate (1). Toxicity to *C. dubia* (1), *S. capricornutum* (3) and *H. azteca* sediment (5) occurred.

Exceedances in 2011 include DO (4), SC (6), and sediment toxicity to *H. azteca* (2).

All exceedances are listed in Table IV-5 by season and date and are based on WQTLs listed in the introduction of the SJCDWQC Management Plan. The highest priority constituents for Grant Line Canal @ Clifton Court Rd subwatershed are chlorpyrifos (A/B), copper (C) and toxicity to *S. capricornutum* and *H. azteca* (D).

Table IV-5. Grant Line Canal @ Clifton Court Rd site subwatershed exceedances (2005-2011).

The WQTLs are listed in the header after the analyte. Data sorted by season and date.

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[1], >1.5 mg/L	Arsenic, >10 µg/L	Copper, Total[2], > 1,300 µg/L	Lead, Total[2], > 15 µg/L	Nickel Total[2], > 100 µg/L	Carbofuran, >0 µg/L	Chlorpyrifos, >0.015 µg/L	DDE (p,p'), >0.00059 µg/L	DDT (p,p'), >0.00059 µg/L	Dimethoate[1], >1 µg/L	*C. dubia*, (% Control)	*S. capricornutum*, (% Control)	*H. azteca*, (% Control)
Grant Line Canal @ Clifton Court Rd	Storm	2/16/2005	5.3		1743	240	1200													
Grant Line Canal @ Clifton Court Rd	Storm	3/21/2005	3.8		1715	240	1100							0.02						
Grant Line Canal @ Clifton Court Rd	Irrigation	5/17/2005			801		550													
Grant Line Canal @ Clifton Court Rd	Irrigation	6/21/2005	5.4																	
Grant Line Canal @ Clifton Court Rd	Irrigation	7/19/2005	6.4			1600														
Grant Line Canal @ Clifton Court Rd	Irrigation	8/16/2005	4.7			1600														
Grant Line Canal @ Clifton Court Rd	Irrigation	9/20/2005	3.8																	9
Grant Line Canal @ Clifton Court Rd	Storm	2/27/2006				500														
Grant Line Canal @ Clifton Court Rd	Storm	3/15/2006				500														
Grant Line Canal @ Clifton Court Rd	Storm	4/27/2006	1.1	6.11	1214															94
Grant Line Canal @ Clifton Court Rd	Irrigation	5/16/2006		6.48		2400														
Grant Line Canal @ Clifton Court Rd	Irrigation	6/20/2006	6.36			550	530		12	52 (9)	15 (3.02)	70 (50.4)								
Grant Line Canal @ Clifton Court Rd	Irrigation	7/18/2006	3.6			1600		1.8		31 (10.9)	7.2 (4.01)						11			
Grant Line Canal @ Clifton Court Rd	Irrigation	8/15/2006	2.5	6.42		920														
Grant Line Canal @ Clifton Court Rd	Irrigation	9/19/2006	2.1	5.99	814	360	600		35	100 (27.9)	35 (16.25)				0.014					
Grant Line Canal @ Clifton Court Rd	Storm	2/11/2007			1204	240	740							0.08						
Grant Line Canal @ Clifton Court Rd	Storm	2/28/2007		6.37	1099		700							0.018	0.008	0.01				
Grant Line Canal @ Clifton Court Rd	Storm	3/7/2007	4.21	6.3																
Grant Line Canal @ Clifton Court Rd	Irrigation	4/11/2007	3.56				480						0.09							

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[1], >1.5 mg/L	Arsenic, >10 µg/L	Copper, Total[2], > 1,300 µg/L	Lead, Total[2], > 15 µg/L	Nickel Total[2], > 100 µg/L	Carbofuran, >0 µg/L	Chlorpyrifos, >0.015 µg/L	DDE (p,p'), >0.00059 µg/L	DDT (p,p'), >0.00059 µg/L	Dimethoate[1], >1 µg/L	*C. dubia*, (% Control)	*S. capricornutum*, (% Control)	*H. azteca*, (% Control)
Grant Line Canal @ Clifton Court Rd	Irrigation	5/22/2007	5.77						20	24 (19)										
Grant Line Canal @ Clifton Court Rd	Irrigation	6/12/2007	4.09			2400														
Grant Line Canal @ Clifton Court Rd	Irrigation	6/20/2007	4		1011															
Grant Line Canal @ Clifton Court Rd	Irrigation	7/10/2007	0.14			2400			11	17 (14.7)										
Grant Line Canal @ Clifton Court Rd	Irrigation	8/7/2007			997	2400	590		14											
Grant Line Canal @ Clifton Court Rd	Irrigation	8/9/2007			810															
Grant Line Canal @ Clifton Court Rd	Irrigation	9/4/2007			838	1700	550		14					0.13						
Grant Line Canal @ Clifton Court Rd	Storm	1/23/2008	4.33		1483		1100							0.14				0	19	
Grant Line Canal @ Clifton Court Rd	Storm	1/30/2008	3.2		1625															
Grant Line Canal @ Clifton Court Rd	Storm	3/18/2008	5.97		1759															
Grant Line Canal @ Clifton Court Rd	Irrigation	4/15/2008	4.82		763	2000	490													
Grant Line Canal @ Clifton Court Rd	Irrigation	5/13/2008			821	260	880		17										3	
Grant Line Canal @ Clifton Court Rd	Irrigation	5/21/2008	1.15																	
Grant Line Canal @ Clifton Court Rd	Irrigation	6/10/2008	4.24		892	440	650													
Grant Line Canal @ Clifton Court Rd	Irrigation	7/15/2008			879		590		28											
Grant Line Canal @ Clifton Court Rd	Irrigation	8/12/2008							12	28 (18)										
Grant Line Canal @ Clifton Court Rd	Irrigation	9/16/2008		8.61	1099		620		14											
Grant Line Canal @ Clifton Court Rd	Irrigation	5/11/2010	6.23																11	
Grant Line Canal @ Clifton Court Rd	Irrigation	6/8/2010			1523															
Grant Line Canal @ Clifton Court Rd	Irrigation	7/13/2010	6.71																	
Grant Line Canal @ Clifton Court Rd	Irrigation	8/10/2010	6.37		1172															

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[1], >1.5 mg/L	Arsenic, >10 µg/L	Copper, Total[2], > 1,300 µg/L	Lead, Total[2], > 15 µg/L	Nickel Total[2], > 100 µg/L	Carbofuran, >0 µg/L	Chlorpyrifos, >0.015 µg/L	DDE (p,p'), >0.00059 µg/L	DDT (p,p'), >0.00059 µg/L	Dimethoate[1], >1 µg/L	*C. dubia*, (% Control)	*S. capricornutum*, (% Control)	*H. azteca*, (% Control)
Grant Line Canal @ Clifton Court Rd	Irrigation	9/7/2010	6.28		798									0.044						30
Grant Line Canal @ Clifton Court Rd	Winter	1/11/2011			844															
Grant Line Canal @ Clifton Court Rd	Winter	2/8/2011			1975															
Grant Line Canal @ Clifton Court Rd	Winter	3/8/2011			1972															80
Grant Line Canal @ Clifton Court Rd	Irrigation	5/24/2011			1932															
Grant Line Canal @ Clifton Court Rd	Irrigation	6/28/2011	1.26																	
Grant Line Canal @ Clifton Court Rd	Irrigation	7/26/2011	3.5		940															
Grant Line Canal @ Clifton Court Rd	Irrigation	8/23/2011	0.34																	
Grant Line Canal @ Clifton Court Rd	Irrigation	10/14/2011	3.72		1031															79
		Constituent Priority	**E**	**E**	**E**	**E**	**E**	**NP**	**E**	**C**	**E**	**NP**	**NP**	**A/B**	**E**	**NP**	**NP**	**NP**	**D**	**D**

[1]Ammonia WQTL variable based on pH and temperature.
[2]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

All monitoring results for high priority management plan constituents in the Grant Line Canal @ Clifton Court Rd subwatershed are listed in Table IV-6. These constituents include copper, chlorpyrifos, water column toxicity to *S. capricornutum*, and sediment toxicity to *H. azteca.*

Copper MPM was initiated at Grant Line Canal @ Clifton Court Rd after exceedances of the WQTL in 2006 (June, July, and August). In 2007, Normal Monitoring and additional MPM (June, July, and September) occurred and two of the Normal Monitoring samples exceeded the WQTL (May and July). During 2008, Normal Monitoring continued and there was one exceedance in August. Grant Line Canal @ Clifton Court Rd was not on the monitoring schedule in 2009. In 2010 and 2011, MPM samples were collected from May through September without a single copper exceedance. In 2012, MPM for copper is scheduled for May through September.

Chlorpyrifos was added to the MPM schedule after exceedances during Normal Monitoring in 2005 (March) and 2007 storm events (February and September). During 2008 Normal Monitoring, there was one chlorpyrifos exceedance (January). In 2009, no sampling occurred at the site. In 2010, the single MPM sample collected in September exceeded the chlorpyrifos WQTL. In 2011, MPM (January, February, and September) resulted in zero exceedances of chlorpyrifos.

Toxicity to *S. capricornutum* was included in the Grant Line Canal @ Clifton Court Rd management plan after samples collected during 2008 (January and May) storm and irrigation events were toxic. In 2009, monitoring did not take place at the site. In 2010, September MPM samples were toxic to *S. capricornutum*. In 2011, MPM occurred (January and May) and neither sample was toxic. In 2012, MPM (January and May) for toxicity to *S. capricornutum* will remain on the schedule.

Sediment toxicity to *H. azteca* was added to the Grant Line Canal @ Clifton Court Rd management plan as a result of toxicity in September 2005 and in April 2006. Sediment toxicity to *H. azteca* did not occur in samples collected during 2007 and 2008 (March and August) Normal Monitoring. In 2009, the site was not monitored. In 2010, MPM (September only) resulted in toxicity to *H. azteca*. In 2011, MPM (March and September) for *H. azteca* occurred and toxicity continued, however during the analysis of the September sediment samples, there was a lab failure and the results were discarded. Sediment samples were recollected in October and resulted in toxicity to *H. azteca*. During 2012, sediment toxicity to *H. azteca* remains on the MPM schedule for March and September.

Table IV-6. Grant Line Canal @ Clifton Court 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
2007 NM (@ Clifton Court Rd)	Date	NA	NA	NA	4/11/07	5/22/07	6/12/07	7/10/07	8/07/07	9/04/07	NA
	Copper (µg/L)	NA	NA	NA	5.5	**24**	10	**17**	10	8.5	NA
2007 MPM A (@ Clifton Court Rd)	Date	NA	NA	NA	NA	NA	6/20/07	7/30/07	NA	9/25/07	NA
	Copper (µg/L)	NA	NA	NA	NA	NA	8.5	<0.01	NA	3.7	NA
2008 NM (@ Clifton Court Rd)	Date	4/15/08	4/15/08	4/15/08	4/15/08	5/13/08	6/10/08	7/15/08	8/12/08	9/16/08	NA
	Copper (µg/L)	NA	NA	NA	6.5	7.9	5.9	6.2	**28**	5.9	NA
2010 MPM (@Clifton Court Rd)	Date	NA	NA	NA	NA	5/11/10	6/8/10	7/13/10	8/10/10	9/7/10	NA
	Copper, dissolved (µg/L)	NA	NA	NA	NA	6	1.6	2.7	2.1	2.3	NA
	Copper, total (µg/L)	NA	NA	NA	NA	15	3.4	65	40	32	NA
	Chlorpyrifos (µg/L)	NA	NA	NA	NA	NA	NA	NA	NA	**0.044**	NA
	S. capricornutum toxicity (% Control)	NA	NA	NA	NA	**11**	NA	NA	NA	NA	NA
	H. azteca toxicity (% Control)	NA	NA	NA	NA	NA	NA	NA	NA	**30**	NA
2011 MPM (@Clifton Court Rd)	Date	1/11/11	2/8/11	3/8/11	NA	5/24/11	6/28/11	7/26/11	8/23/11	9/20/11	10/14/11
	Copper, dissolved (µg/L)	NA	NA	NA	NA	0.79	4.8	1.9	4.7	2.1	NA
	Copper, total (µg/L)	NA	NA	NA	NA	2	10	9.8	7.8	66	NA
	Chlorpyrifos (µg/L)	<0.003	<0.003	<0.003	NA	NA	NA	NA	NA	<0.003	NA
	S. capricornutum toxicity(% Control)	286	NA	NA	NA	556	NA	NA	NA	NA	NA
	H. azteca toxicity (% Control)	NA	NA	**80**	NA	NA	NA	NA	NA	NA	**79**

A – Additional Monitoring, 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.

Load Calculations

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

Load = Discharge (cfs) X 28.317L/ft^3 X Concentration (mg/L X 1000 or µg/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 that samples were collected.

Table IV-7. Grant Line Canal @ Clifton Court site subwatershed instantaneous load calculations for chlorpyrifos and copper.

Sorted by analyte and date.

Site Name	Analyte Name	Sample Date	Discharge cfs	Concentration µg/L	Loading Rate µg/sec
Grant Line Canal @ Clifton Court Rd	Chlorpyrifos	03/21/05	0	0.02	0
Grant Line Canal @ Clifton Court Rd	Chlorpyrifos	02/11/07	0	0.08	0
Grant Line Canal @ Clifton Court Rd	Chlorpyrifos	02/28/07	0	0.018	0
Grant Line Canal @ Clifton Court Rd	Chlorpyrifos	01/23/08	0	0.14	0
Grant Line Canal @ Clifton Court Rd	Chlorpyrifos	09/07/10	4.61	0.044	5.74
Grant Line Canal @ Clifton Court Rd	Copper	05/16/06	1.47	9	374.63
Grant Line Canal @ Clifton Court Rd	Copper	06/20/06	3.58	52	5271.49
Grant Line Canal @ Clifton Court Rd	Copper	07/18/06	0	31	0
Grant Line Canal @ Clifton Court Rd	Copper	08/15/06	0	11	0
Grant Line Canal @ Clifton Court Rd	Copper	09/19/06	0	100	0
Grant Line Canal @ Clifton Court Rd	Copper	02/11/07	0	4.7	0
Grant Line Canal @ Clifton Court Rd	Copper	02/28/07	0	6.7	0
Grant Line Canal @ Clifton Court Rd	Copper	05/22/07	0	24	0
Grant Line Canal @ Clifton Court Rd*	Copper	05/22/07	0	26	0
Grant Line Canal @ Clifton Court Rd	Copper	06/12/07	0	10	0
Grant Line Canal @ Clifton Court Rd	Copper	06/20/07	0	8.5	0
Grant Line Canal @ Clifton Court Rd	Copper	08/07/07	0	10	0
Grant Line Canal @ Clifton Court Rd	Copper	09/25/07	0	3.7	0
Grant Line Canal @ Clifton Court Rd	Copper	01/23/08	0	7.3	0
Grant Line Canal @ Clifton Court Rd	Copper	04/15/08	0	6.5	0
Grant Line Canal @ Clifton Court Rd	Copper	05/13/08	0	7.9	0
Grant Line Canal @ Clifton Court Rd	Copper	06/10/08	0	5.9	0
Grant Line Canal @ Clifton Court Rd	Copper	07/15/08	0	6.2	0
Grant Line Canal @ Clifton Court Rd	Copper	08/12/08	0	28	0
Grant Line Canal @ Clifton Court Rd	Copper	09/16/08	0	5.9	0
Grant Line Canal @ Clifton Court Rd	Copper	05/11/10	7.55	15	3206.90
Grant Line Canal @ Clifton Court Rd	Copper	06/08/10	0	3.4	0
Grant Line Canal @ Clifton Court Rd	Copper	07/13/10	0	65	0
Grant Line Canal @ Clifton Court Rd	Copper	08/10/10	7.68	40	8698.98
Grant Line Canal @ Clifton Court Rd	Copper	09/07/10	4.61	32	4177.32
Grant Line Canal @ Clifton Court Rd	Copper	05/24/11	1.17	2	66.26
Grant Line Canal @ Clifton Court Rd	Copper	06/28/11	3.77	10	1067.55
Grant Line Canal @ Clifton Court Rd	Copper	07/26/11	0	9.8	0
Grant Line Canal @ Clifton Court Rd	Copper	08/23/11	0	7.8	0
Grant Line Canal @ Clifton Court Rd	Copper	09/20/11	5.01	66	9363.30
Grant Line Canal @ Clifton Court Rd	Copper (D)	05/11/10	7.55	6	1282.76
Grant Line Canal @ Clifton Court Rd	Copper (D)	06/08/10	0	1.6	0
Grant Line Canal @ Clifton Court Rd	Copper (D)	07/13/10	0	2.7	0
Grant Line Canal @ Clifton Court Rd	Copper (D)	08/10/10	7.68	2.1	456.70
Grant Line Canal @ Clifton Court Rd	Copper (D)	09/07/10	4.61	2.3	300.25
Grant Line Canal @ Clifton Court Rd	Copper (D)	05/24/11	1.17	0.79	26.17
Grant Line Canal @ Clifton Court Rd	Copper (D)	06/28/11	3.77	4.8	512.42
Grant Line Canal @ Clifton Court Rd	Copper (D)	07/26/11	0	1.9	0
Grant Line Canal @ Clifton Court Rd	Copper (D)	08/23/11	0	4.7	0
Grant Line Canal @ Clifton Court Rd	Copper (D)	09/20/11	5.01	2.1	297.92

Copper (D) – Dissolved Copper

*Field Duplicate

Source Identification and Outreach

The Coalition addressed source identification for the Grant Line Canal @ Clifton Court Rd subwatershed in the 2011 MPUR and, in the following sections, considers 2011 monitoring results and PUR data as it expands upon that discussion. The PUR data were available for review through May 2011 for San Joaquin County. Given that any data included after May 2011 is preliminary, yearly evaluations are only considered complete through 2010.

Since the Grant Line Canal @ Clifton Court Rd subwatershed became high priority in 2010, the Coalition actively engaged in grower outreach education to address Grant Line Canal @ Clifton Court 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. Individual grower meetings and follow up meetings with targeted members informed growers about management practices as well as assessed current and newly implemented management practices.

Additional MPM was initiated in this subwatershed in 2007; MPM of high priority constituents began in 2010 and has continued through 2012.

Priority A/B Constituents

Chlorpyrifos is the only priority A/B constituent listed under the Grant Line Canal @ Clifton Court Rd site subwatershed management plan.

Chlorpyrifos

Six exceedances of the chlorpyrifos WQTL (0.015 µg/L) occurred in samples collected from 2005 through 2011 although the most recent exceedance of chlorpyrifos occurred during September 2010 MPM (Table IV-5). Grant Line Canal @ Clifton Court Rd was not monitored during 2009. Samples collected for chlorpyrifos MPM from January through March and September 2011 resulted in no exceedances of chlorpyrifos.

The PUR data were reviewed from 2004 through available 2011 data for the number of applications, amount of the chlorpyrifos applied (pounds applied), and acres treated (Table IV-8, Figure IV-2). The greatest chlorpyrifos use occurred in 2007 (564 lbs AI) while no applications were reported in 2008 and 2009 (Table IV-8). A single application of chlorpyrifos was reported in both 2010 and 2011. Overall, the amount of chlorpyrifos applied within this subwatershed decreased since 2005. Chlorpyrifos is applied the most frequently in this subwatershed during the months of March and July through October. Not all exceedances occurred during months of the greatest amount of use, and some exceedances occurred after several months with no reported use (Figure IV-2).

The Coalition also uses PUR data to assess which crops receive the most applications of chlorpyrifos. Grant Line Canal @ Clifton Court Rd is a small subwatershed, and the only applications of chlorpyrifos

since 2005 were to alfalfa and asparagus (Table IV-9). The most common product containing chlorpyrifos used within this watershed was Lorsban (Table IV-9).

Table IV-8. Grant Line Canal @ Clifton Court Rd site subwatershed chlorpyrifos applications, lbs AI applied, and acres treated by month (2005-2011).

PUR data available through May 2011 for San Joaquin County. If a month is not included in the table, no applications were made.

Month/Year	Number of Chlorpyrifos Applications	Pounds of AI Applied	Acres Treated
March, 2005	9	162.7	406.2
July, 2005	2	138.2	308
August, 2005	1	47.6	95
September, 2005	1	47.6	95
March, 2006	1	88.7	178
April, 2006	5	50.3	202
August, 2006	6	130.4	347.9
October, 2006	6	282.0	282
July, 2007	6	283.2	283.2
September, 2007	6	281.1	282
March, 2010	1	25.8	55
March, 2011	1	23.2	55
Summaries by Year			
2005 Total	13	396.1	904.2
2006 Total	18	551.5	1009.9
2007 Total	12	564.4	565.2
2010 Total	1	25.8	55
2011 Total	1	23.2	55
Total	**45**	**1561.0**	**2589.3**

Figure IV-2. Grant Line Canal @ Clifton Court Rd site subwatershed lbs chlorpyrifos applied by month (2005-2011).

Asterisk (*) denotes months with exceedances. PUR data available through May 2011 for San Joaquin County. No chlorpyrifos PUR data reported for 2008-2009.

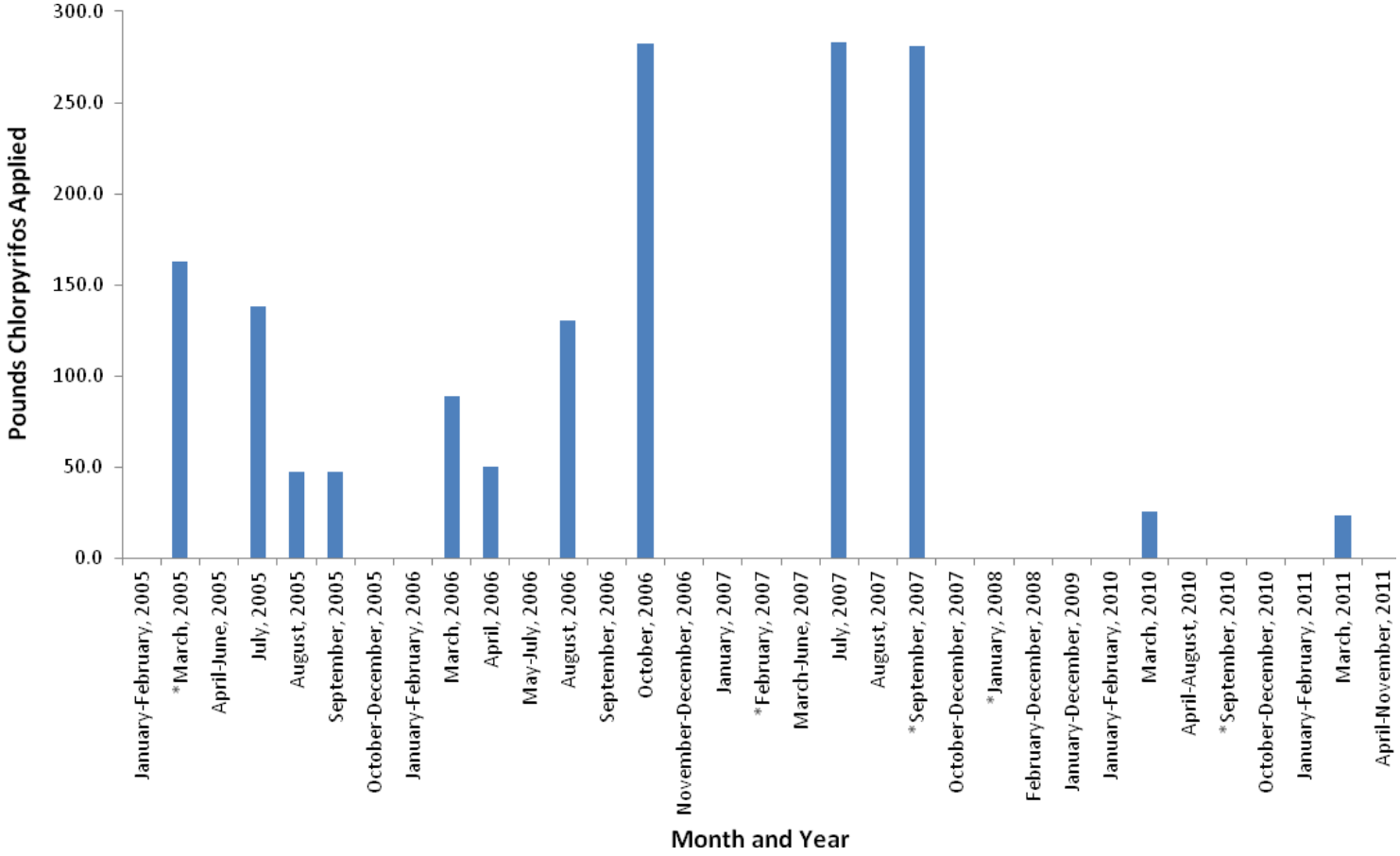


Table IV-9. Grant Line Canal @ Clifton Court Rd site subwatershed chlorpyrifos PUR data (2005-2011).
PUR data available through May 2011 for San Joaquin County. No chlorpyrifos PUR data were reported for 2008-2009.

Chemical Name	Commodity	Product Name	Lbs AI Applied
CHLORPYRIFOS	ALFALFA (FORAGE - FODDER) (ALFALFA HAY)	LOCK-ON INSECTICIDE	159.0
		LORSBAN 4E-HF	506.5
		LORSBAN ADVANCED	49.1
	ASPARAGUS (SPEARS, FERNS, ETC.)	LORSBAN 4E INSECTICIDE	565.3
		LORSBAN 4E-HF	281.1
		ALFALFA - Total Pounds Chlorpyrifos Applied	**714.6**
		ASPARAGUS - Total Pounds Chlorpyrifos Applied	**846.4**
		Total Pounds Chlorpyrifos Applied (2005-2011)	**1561.0**

Exceedances of the WQTL for chlorpyrifos continued to occur in September 2010; however, the most recent application prior to this was March 2010. The Coalition focused on management of chlorpyrifos in this watershed by providing information to growers to determine if irrigation return flows are managed properly, specifically to growers whose parcels have the potential to drain to the waterway. Representatives of the Coalition also discussed spray drift management to growers that farm adjacent to the creek. Grower meetings with members to discuss these practices took place in 2010.

Since 2007, Coalition outreach includes grower meetings and the mailing/distribution of information. A complete list of Coalition outreach that occurred in high priority subwatersheds during 2011 is provided in the Performance Goals and Schedules section of this report. The Coalition focused outreach to growers who used chlorpyrifos within the last two years and contacted permittees associated with the targeted growers. In early January 2010, the Coalition sent out mailings to invite targeted growers and their associated permittees to a meeting on January 28, 2010 to discuss the Grant Line Canal Management Plan strategy and relevant management practices. The attendees at the meeting grow primarily alfalfa or asparagus. Therefore, the Coalition discussed alfalfa pest management as well as switching to products other than those containing chlorpyrifos as another option for reducing/eliminating the presence of chlorpyrifos in water pumped directly into Grant Line Canal. The Coalition also focused on spray drift, including minimizing the potential for drift by spraying in favorable conditions, using appropriate nozzle sizes and spray pressure, and maintaining low speeds when applying by ground (6 mph). Although the meeting focused mainly on chlorpyrifos exceedances, all water quality results were reviewed and discussed including copper, *S. capricornutum* and *H. azteca* toxicity, *E. coli*, pH, DO, SC, TDS, DDE, arsenic, and lead. Grower surveys completed at the meeting documenting the members' current practices and indicating which recommended practices growers anticipate implementing in the upcoming years, have been compiled and assessed by the Coalition.

Because of the relatively small number of members in the Grant Line Canal @ Clifton Court Rd site subwatershed and its similarity in impairments and crop type to the Grant Line Canal near Calpack Rd site subwatershed (see next section), these subwatersheds were targeted together. The Coalition contacted two growers within the Grant Line Canal at Clifton Court Rd subwatershed and two growers within the Grant Line Canal near Calpack subwatershed and all members completed and returned

surveys. This accounts for 259 acres in the Grant Line Canal @ Clifton Court subwatershed. The Coalition received surveys from all targeted members and thus has achieved 100% targeted grower contact.

The Coalition began contacting members in the winter of 2011 to determine if additional management practices were implemented in 2010 and if additional practices are planned for 2011. To obtain information on practices implemented since the meeting, the Coalition sent out a brief letter that included a survey for the grower to complete. Two targeted growers were required to complete a follow up survey. To date, 100% of the follow up meetings with growers in the Grant Line Canal @ Clifton Court Rd subwatershed have been completed and all members who were recommended management practices have implemented new practices. Of the two growers who implemented management practices, 42% of acres with recorded practices reduced use of pesticides found in exceedances, 42% of acres with recorded practices reduced runoff water volume, and 16% of acres with recorded practices treat runoff waters with PAM or other materials. The growers who implemented new management practices represent 100% (259 acres) of targeted acres.

The Coalition will continue MPM for chlorpyrifos at Grant Line Canal @ Clifton Court Rd during 2012 in the months of January through March and September.

Priority C Constituents

The only priority C constituent listed for the Grant Line Canal @ Clifton Court Rd is copper.

Copper

Six exceedances of the copper hardness-based WQTL occurred in the Grant Line Canal @ Clifton Court subwatershed in June, July and September 2006, May and July 2007 and August 2008 (Table IV-5). The Coalition began monitoring for both the total and dissolved copper fractions in October 2008 to better characterize copper contamination in the subwatershed. Copper has not been applied within the subwatershed since March 2008 (Table IV-10, Figure IV-3). Copper applications occurred only in March in this subwatershed, yet exceedances occurred during irrigation months, often in mid-late summer (Table IV-10, Figure IV-3). In 2011, MPM for copper took place during months of past exceedances and no exceedances of the copper WQTL occurred.

The Coalition also uses PUR data to assess which crops received the most applications of copper. Copper has been applied only to alfalfa in this subwatershed (Table IV-11). The only product containing copper used in this subwatershed was Kocide (Table IV-11).

Table IV-10. Grant Line Canal @ Clifton Court Rd site subwatershed copper applications, lbs AI applied, and acres treated by month (2005-2011).

No copper PUR data were reported for 2005 and 2009-2011. If a month is not included in the table, no applications were made.

Month/Year	Number of Copper Applications	Pounds of AI Applied	Acres Treated
March, 2006	2	474.3	308
March, 2007	2	378.2	308
March, 2008	1	104.9	130
Summaries by Year			
2006 Total	2	474.3	308
2007 Total	2	378.2	308
2008 Total	1	104.9	130
Total	**5**	**957.5**	**746**

Figure IV-3. Grant Line Canal @ Clifton Court Rd site subwatershed lbs copper applied by month (2005-2011).

Asterisk (*) denotes months with exceedances. No copper PUR data reported for 2005 or 2009-2011.

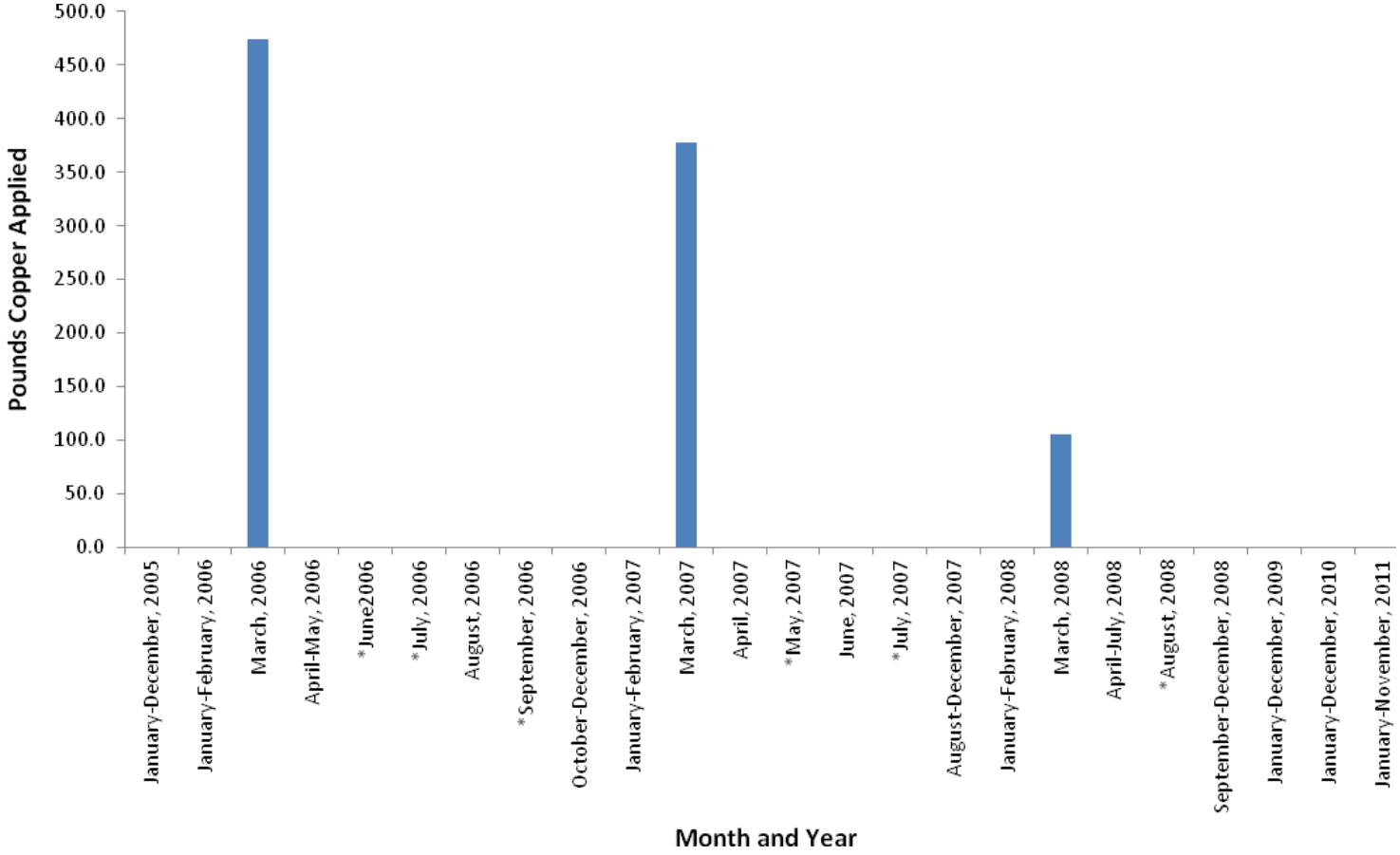


Table IV-11. Grant Line Canal @ Clifton Court Rd site subwatershed copper PUR data (2005-2011).
No copper PUR data were reported for 2005 and 2009-2011.

Chemical Name	Commodity	Product Name	Lbs AI Applied
COPPER	ALFALFA (FORAGE - FODDER) (ALFALFA HAY)	KOCIDE 101	474.3
		KOCIDE 2000	104.9
		KOCIDE DF	378.2
		ALFALFA - Total Pounds Copper Applied	**957.5**
		Total Pounds Copper Applied (2005-2011)	**957.5**

The Coalition will continue with its Management Plan strategy when conducting targeted outreach regarding copper. Alfalfa operators were encouraged to consider irrigation tailwater retention to prevent copper from entering the water with runoff. Storm water runoff management was also discussed to prevent against winter exceedances. Targeted outreach within this subwatershed is described under the chlorpyrifos outreach section above and included discussions of copper exceedances and appropriate management practices.

Priority D Constituents

Priority D constituents under the Grant Line Canal @ Clifton Court Rd management plan include water column toxicity for *S. capricornutum* and sediment toxicity *H. azteca.*

S. capricornutum toxicity

S. capricornutum toxicity occurred twice during 2008 in January and May and once during MPM monitoring in May 2010 (Table IV-5). *S. capricornutum* toxicity did not occur during 2009 or 2011 MPM. Monitoring for toxicity to *S. capricornutum* will continue in January and May 2012. The Coalition believes that management of copper and herbicides will eliminate the toxicity to algae.

H. azteca toxicity

H. azteca toxicity occurred five times since sediment monitoring began in this subwatershed (Table IV-5). The Coalition initiated sediment MPM in September 2010 and continued in March and October 2011; all MPM samples were toxic to *H. azteca.* As of 2009, the Coalition tests for total organic carbon and grain size in all sediments and pyrethroids and chlorpyrifos in sediment that exhibits toxicity. Sediment toxicity to *H. azteca* is scheduled for MPM in March and September 2012.

Priority E Constituents

Priority E constituents under the Grant Line Canal @ Clifton Court Rd management plan include DO, pH, SC, TDS, *E. coli,* DDE, arsenic and lead. Although these constituents will remain low priority, the Coalition will continue to collect priority E constituent monitoring data for DO, pH and SC during each monitoring event. TDS, *E. coli,* DDE, arsenic and lead will be monitored when Assessment Monitoring resumes at this site after 2035. The priority E constituents are discussed during targeted outreach and will continue to be discussed at annual grower meetings. To address *E. coli* exceedances, the Coalition plans to participate in the focus group along with other Coalitions and Regional Board staff to develop a

joint Work Plan to characterize the potential agricultural sources of *E. coli* and identify management practices to prevent discharges to surface waters.

There were 10 exceedances of the arsenic WQTL (10 µg/L) from 2006 through 2011, all occurring during irrigation months. Available PUR records indicate no product containing arsenic were applied in this subwatershed during the past 10 years.

Evaluation

Grant Line Canal @ Clifton Court Rd is one of the second priority site subwatersheds within the SJCDWQC and has completed its second year of focused outreach (2010-2012).

The Coalition's strategy for the Grant Line Canal @ Clifton Court Rd subwatershed is to target growers who applied chlorpyrifos in the past. The Coalition's outreach focus was on tailwater management and minimizing spray drift. Outreach included grower notification, management practice education, tracking of management practices implementation, and providing information on special studies of management practice efficacy.

Individual grower surveys documenting current management practices and planned implementation of management practices were completed and returned for 100% of targeted growers. The Second Priority Summary of Management Practices section of this report summarizes the results of these contacts. The final stages of outreach include following up with growers to identify newly implemented practices and future monitoring to evaluate water quality improvement. As growers indicated that they implemented all intended practices in 2010 (and did not plan to implement additional practices in 2011), additional outreach to determine 2011 practices was not initiated.

While there was no reported use of chlorpyrifos in 2008 or 2009, and only one application in both 2010 and 2011, another exceedance of chlorpyrifos occurred in 2010. The Coalition continues MPM of chlorpyrifos and other high priority constituents in months of past exceedances in 2012.

Although chlorpyrifos remains a high priority constituent in the Grant Line Canal @ Clifton Court Rd management plan, monitoring for copper and lead resulted in no exceedances 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 these constituents from the Lone Tree Creek management plan.

V. GRANT LINE CANAL NEAR CALPACK RD

Management Plan Constituents

Priority A/B

- Chlorpyrifos

Priority D

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

Priority E

- Arsenic
- Dissolved Oxygen
- *E. coli*
- Specific Conductivity
- Total Dissolved Solids

Description of Grant Line Canal near Calpack Rd Site Subwatershed

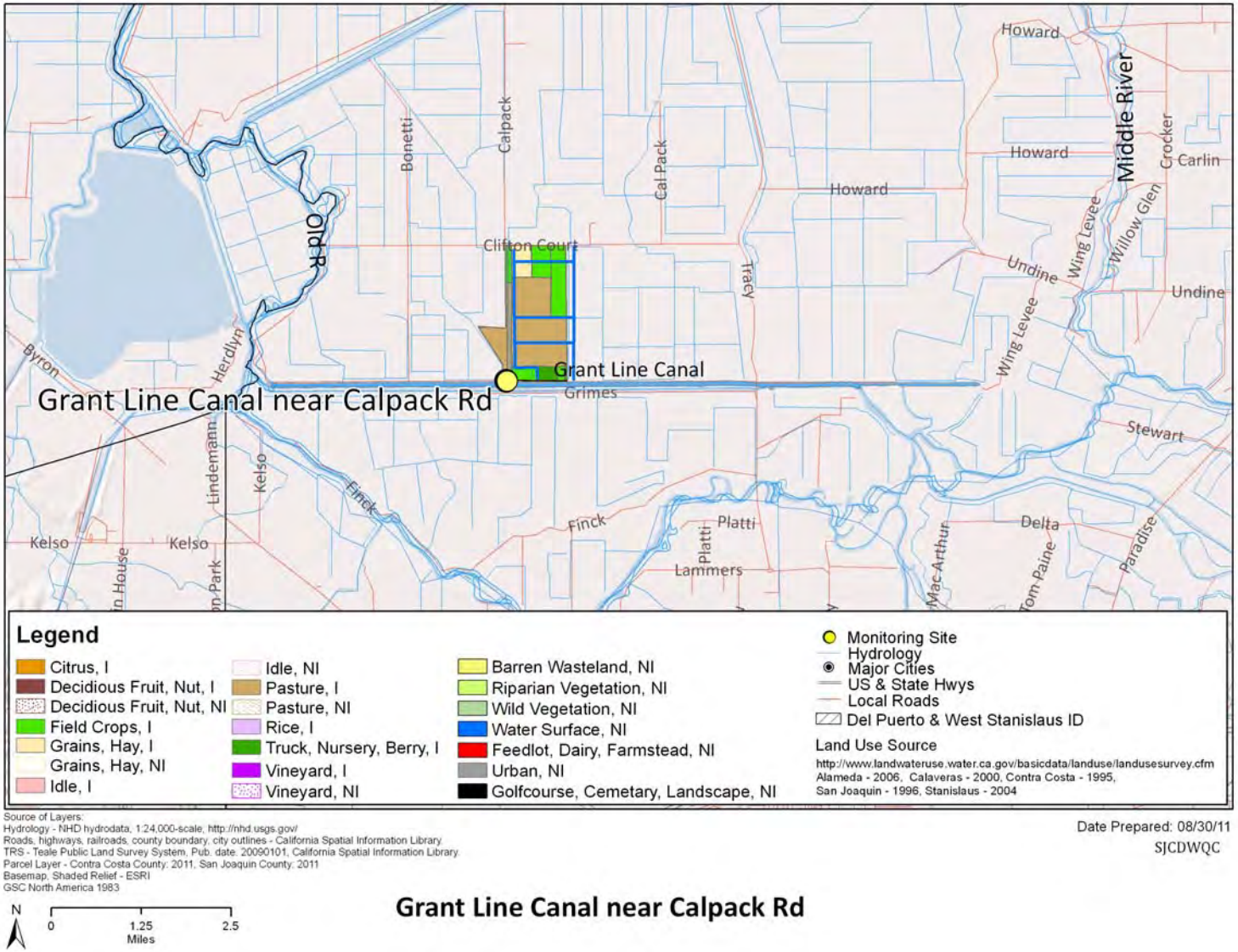
Grant Line Canal near Calpack Rd (682 irrigated acres) is located on the southwest section of Union Island. Table V-1 includes the station name (site name), station code and target latitude/longitudes for the site sampled within this subwatershed. The site is adjacent to the Grant Line Canal at a pumping station and drains fields immediately to the north and east of the drain pump. The crops grown are primarily alfalfa, field crops (e.g. corn and safflower), grain and hay (Figure V-1).

The Grant Line Canal is located in the Bay-Delta tidal prism and receives water from east and west inputs. The source of water in the Grant Line Canal depends on delta tides, natural flows of large waterbodies such as the San Joaquin River, the operation of agriculture barriers, and the operation of the pumping plants at Clifton Court Forebay.

Table V-1. Grant Line Canal near Calpack Rd site subwatershed sampling location coordinates.

Site Name	Station Code	Target Latitude	Target Longitude
Grant Line Canal near Calpack Rd	544XGLCCR	37.8205	-121.4999

Figure V-1. Grant Line Canal near Calpack Rd site subwatershed land use map.



Subwatershed Monitoring History

Normal Monitoring began at Grant Line Canal near Calpack Rd in the storm season of 2005, and continued through the storm and irrigation seasons of 2006 through 2008 (Table V-2). Starting in October 2008, Grant Line Canal near Calpack Rd was removed from the monitoring schedule and became a rotating Assessment Monitoring site under the current 2008 MRPP. The site is not scheduled for Assessment Monitoring until after 2035. Table V-3 lists specific information on the analyses conducted across each of the monitoring seasons from 2005 through 2011.

In 2007, Normal Monitoring as well as additional MPM occurred at Grant Line Canal near Calpack Rd for chlorpyrifos (July and August) and toxicity to *C. dubia* (July). In 2008, only Normal Monitoring occurred and in 2009 the site was not scheduled for monitoring. In 2010, MPM for chlorpyrifos (May, July, and August), toxicity to *S. capricornutum* (April, June, and July), and sediment toxicity to *H. azteca* (September) took place. In 2011, MPM occurred for chlorpyrifos (March, May, July, and August), toxicity to *C. dubia* (March, May and August), toxicity to *S. capricornutum* (January, February, April, May, and July), and *H. azteca* (March and October). Table V-4 lists all MPM dates and constituents for Grant Line Canal near Calpack Rd from 2007 through 2011.

The Grant Line Canal is not considered impaired on California's 2008-2010 303d List of Impaired Waterbodies for, but the section of Old River from the SJR to the Delta Mendota Canal that runs parallel to Grant Line Canal is 303d listed for chlorpyrifos, low DO, TDS and electrical conductivity. The export waters of the Delta are 303d listed for chlorpyrifos, DDT, diazinon, electrical conductivity, group A pesticides, invasive species, mercury and unknown toxicity. This includes the Delta Mendota Canal and the California Aqueduct, both of which receive water from Grant Line Canal.

Table V-2. Grant Line Canal near Calpack Rd site subwatershed sampling events per season and year (including MPM).

Year	Season	Events Sampled	Events Not Sampled[1]	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	8	0	**8**
2008	Storm	2	0	**2**
	Irrigation	6	0	**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	5	0	**5**
	Fall	NA	NA	**NA**
2011	Winter	3	0	**3**
	Storm	NA	NA	**NA**
	Irrigation	5	0	**5**
	Fall	NA	NA	**NA**

[1] 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. Grant Line Canal near Calpack 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																			
NA	Dissolved Oxygen	4	6	3	6	4	10	3	9					5		3		6	
NA	Specific Conductivity	4	6	3	6	4	10	3	9					5		3		6	
NA	pH	3	6	3	6	4	10	3	9					5		3		6	
EPA 110.2	Color	2	5	2	5	2	6	1	6										
EPA 160.1	Dissolved Solids	2	5	2	5	2	6	1	6										
EPA 160.2	Suspended Solids																		
EPA 180.1	Turbidity	2	5	2	5	2	6	1	6										
EPA 415.1	Total Organic Carbon	2	5	2	5	2	6	1	6										
SM 9223	*E. coli*	2	5	2	6	2	7	1	6										
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	1	6										
EPA 8321A	Carbaryl				5	2	6	1	6										
EPA 8321A	Carbofuran				5	2	6	1	6										
EPA 8321A	Diuron				5	2	6	1	6										
EPA 8321A	Linuron				5	2	6	1	6										
EPA 8321A	Methiocarb				5	2	6	1	6										
EPA 8321A	Methomyl				5	2	6	1	6										
EPA 8321A	Oxamyl				5	2	6	1	6										
Organochlorines																			
EPA 8081A	DDD(p,p')				5	2	6	1	6										
EPA 8081A	DDE(p,p')				5	2	6	1	6										
EPA 8081A	DDT(p,p')				5	2	6	1	6										
EPA 8081A	Dicofol				5	2	6	1	6										
EPA 8081A	Dieldrin				5	2	6	1	6										
EPA 8081A	Endrin				5	2	6	1	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 8081A	Methoxychlor				5	2	6	1	6										
Organophosphates																			
EPA 8141A	Azinphos methyl				5	2	6	1	6										
EPA 8141A	Chlorpyrifos	2	5	2	5	2	8	1	6					3		1		3	
EPA 8141A	Demeton-s																		
EPA 8141A	Diazinon	2	5	2	5	2	6	1	6										
EPA 8141A	Dichlorvos																		
EPA 8141A	Dimethoate				5	2	6	1	6										
EPA 8141A	Disulfoton				5	2	6	1	6										
EPA 8141A	Malathion				5	2	6	1	6										
EPA 8321A	Methamidophos				5	2	6	1	6										
EPA 8141A	Methidathion				5	2	6	1	6										
EPA 8141A	Molinate				5	2	6	1	6										
EPA 8141A	Parathion, Methyl				5	2	6	1	6										
EPA 8141A	Phorate				5	2	6	1	6										
EPA 8141A	Phosmet				5	2	6	1	6										
EPA 8141A	Thiobencarb				5	2	6	1	6										
Pyrethroids																			
EPA 8081A	Bifenthrin		1	2	5	2	6	1	6										
EPA 8081A	Cyfluthrin, total		1	2	5	2	6	1	6										
EPA 8081A	Cyhalothrin, lambda, total	2	5	2	5	2	6	1	6										
EPA 8081A	Cypermethrin, total	2	5	2	5	2	6	1	6										
EPA 8081A	Esfenvalerate/ Fenvalerate, total	2	5	2	5	2	6	1	6										
EPA 8081A	Permethrin, total	2	5	2	5	2	6	1	6										
Triazines																			
EPA 547M	Glyphosate				5	2	6	1	6										
EPA 549.2M	Paraquat dichloride				5	2	6	1	6										
EPA 619	Atrazine				5	2	6	1	6										
EPA 619	Cyanazine				5	2	6	1	6										
EPA 619	Simazine				5	2	6	1	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*
Metals (Total)																			
EPA 200.8	Arsenic				5	2	6	1	6										
EPA 200.8	Boron				5	2	6	1	6										
EPA 200.8	Cadmium				5	2	6	1	6										
EPA 200.8	Copper				5	2	6	1	6										
EPA 200.8	Lead				5	2	6	1	6										
EPA 200.8	Molybdenum																		
EPA 200.8	Nickel				5	2	6	1	6										
EPA 200.8	Selenium				5	2	2	1	6										
EPA 200.8	Zinc				5	2	6	1	6										
Nutrients																			
SM 2340 C	Hardness as CaCO3				5	2	6	1	6										
EPA 300.0	Nitrate as N				5	2	6	1	6										
EPA 350.2	Ammonia as N				5	2	6	1	6										
EPA 351.3	Nitrogen, Total Kjeldahl				5	2	6	1	6										
EPA 354.1	Nitrite as N				5	2	6	1	6										
EPA 353.2	Nitrate + Nitrite as N																		
EPA 365.2	OrthoPhosphate as P				5	2	6	1	6										
EPA 365.2	Phosphate as P				5	2	6	1	6										
Toxicity																			
EPA 821/R-02-012	*Ceriodaphnia dubia*	3	6	2	6	2	8	1	6							1		2	
EPA 821/R-02-012	*Pimephales promelas*	2	5	2	5	2	7	1	6										
EPA 821/R-02-013	*Selenastrum capricornutum*	3	5	2	5	2	9	2	8					3		2		3	
EPA 600/R-99-064	*Hyalella azteca*		5	1	1	2	1	1	1					1		1		1	

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

Table V-4. Grant Line Canal near Calpack Rd site subwatershed Management Plan Monitoring schedule (2007-2011).

Site Name	Sample Date	Monitoring Type	Chlorpyrifos	*C. dubia*	*S. capricornutum*	*H. azteca*
Grant Line Canal near Calpack Rd	30-Jul-07	A	X	X		
Grant Line Canal near Calpack Rd	28-Aug-07	A	X			
Grant Line Canal near Calpack Rd	13-Apr-10	MPM			X	
Grant Line Canal near Calpack Rd	11-May-10	MPM	X		X	
Grant Line Canal near Calpack Rd	13-Jul-10	MPM	X		X	
Grant Line Canal near Calpack Rd	10-Aug-10	MPM	X			
Grant Line Canal near Calpack Rd	7-Sep-10	MPM				X
Grant Line Canal near Calpack Rd	11-Jan-11	MPM			X	
Grant Line Canal near Calpack Rd	8-Feb-11	MPM			X	
Grant Line Canal near Calpack Rd	8-Mar-11	MPM	X	X		X
Grant Line Canal near Calpack Rd	12-Apr-11	MPM			X	
Grant Line Canal near Calpack Rd	24-May-11	MPM	X	X	X	
Grant Line Canal near Calpack Rd	26-Jul-11	MPM	X		X	
Grant Line Canal near Calpack Rd	23-Aug-11	MPM	X	X		
Grant Line Canal near Calpack Rd	14-Oct-11	MPM				X

A – Additional sampling
X – Constituent sampled for Management Plan Monitoring (MPM).

Exceedance History

During Coalition monitoring, exceedances of WQTLs for field and physical parameters, *E. coli,* metals, pesticides, and water column and sediment toxicity occurred at this site (Table V-5). Sample results from 2005 through 2011 included exceedances of WQTLs for DO (40), SC (54), *E. coli* (19), TDS (25), ammonia (1), arsenic (4), chlorpyrifos (4), DDE (1), disulfoton (1), diuron (1) and linuron (1). Toxicity to *C. dubia* (3)*, S. capricornutum* (11) and *H. azteca* (8) occurred.

In 2011, exceedances of DO (2), SC (7), water column toxicity to *S. capricornutum* (1) and sediment toxicity to *H. azteca* (2) occurred.

All exceedances are listed in Table V-5 by season and date and are based on WQTLs listed in the introduction of the SJCDWQC Management Plan. The Grant Line Canal near Calpack Rd subwatershed priority constituents are chlorpyrifos (A/B) and toxicity to *C. dubia*, *S. capricornutum*, and *H. azteca* (D).

Table V-5. Grant Line near Calpack Rd site subwatershed exceedances (2005-2011).

The WQTLs are listed in the header after the analyte. Data sorted by season and date.

Site Name	Season	Sample Date	Oxygen, Dissolved, >7 mg/L	Specific Conductivity, >700 µS/cm	*E. coli*, >235 MPN/100 mL	Dissolved Solids, >450 mg/L	Ammonia[1], >1.5 mg/L	Arsenic, >10 µg/L	Chlorpyrifos, >0.015 µg/L	DDE (p,p'), >0.00059 µg/L	Disulfoton, >0.05 µg/L	Diuron, >2 µg/L	Linuron, >1.4 µg/L	*C. dubia*, (% Control)	*S. capricornutum*, (% Control)	*H. azteca*, (% Control)
Grant Line Canal near Calpack Rd	Storm	2/16/2005		1412	240	930									7	
Grant Line Canal near Calpack Rd	Storm	2/23/2005	6.8	1834												
Grant Line Canal near Calpack Rd	Storm	3/21/2005		1970		1200			0.076					79		
Grant Line Canal near Calpack Rd	Storm	4/4/2005	4.8	2140												
Grant Line Canal near Calpack Rd	Irrigation	5/17/2005	6.3	847		550										44
Grant Line Canal near Calpack Rd	Irrigation	6/21/2005	5.1	835	1600	520										
Grant Line Canal near Calpack Rd	Irrigation	7/19/2005	4.8		500				0.053							71
Grant Line Canal near Calpack Rd	Irrigation	8/16/2005	3.8	1077	1600	670			0.15					5		
Grant Line Canal near Calpack Rd	Irrigation	8/23/2005	4.2	759												
Grant Line Canal near Calpack Rd	Irrigation	9/20/2005	2.9	1390	500	840										91
Grant Line Canal near Calpack Rd	Storm	2/27/2006		1910		1200										
Grant Line Canal near Calpack Rd	Storm	3/15/2006		1660		1100										
Grant Line Canal near Calpack Rd	Storm	4/27/2006	5	2220												21
Grant Line Canal near Calpack Rd	Irrigation	5/16/2006	1		2400			12	0.12					11		
Grant Line Canal near Calpack Rd	Irrigation	5/25/2006	4.1	806												
Grant Line Canal near Calpack Rd	Irrigation	6/20/2006	2.88	791	2400	530		16								
Grant Line Canal near Calpack Rd	Irrigation	7/18/2006	2.2	757	2000	590				0.0067						
Grant Line Canal near Calpack Rd	Irrigation	8/15/2006	1.3	727	2400		4.1						1.6			
Grant Line Canal near Calpack Rd	Irrigation	9/19/2006	2.8		300											
Grant Line Canal near Calpack Rd	Storm	2/11/2007		1583	2000	1000										

Site Name	Season	Sample Date	Oxygen, Dissolved, >7 mg/L	Specific Conductivity, >700 µS/cm	*E. coli*, >235 MPN/100 mL	Dissolved Solids, >450 mg/L	Ammonia[1], >1.5 mg/L	Arsenic, >10 µg/L	Chlorpyrifos, >0.015 µg/L	DDE (p,p'), >0.00059 µg/L	Disulfoton, >0.05 µg/L	Diuron, >2 µg/L	Linuron, >1.4 µg/L	*C. dubia*, (% Control)	*S. capricornutum*, (% Control)	*H. azteca*, (% Control)
Grant Line Canal near Calpack Rd	Storm	2/28/2007		1505		940										
Grant Line Canal near Calpack Rd	Storm	3/7/2007		1624												13
Grant Line Canal near Calpack Rd	Storm	3/29/2007		1200												5
Grant Line Canal near Calpack Rd	Irrigation	4/11/2007	2.76	972	490	610									44	
Grant Line Canal near Calpack Rd	Irrigation	4/19/2007													89	
Grant Line Canal near Calpack Rd	Irrigation	5/22/2007	6.24	1222		750										
Grant Line Canal near Calpack Rd	Irrigation	6/12/2007	5.48	1209	980	790										
Grant Line Canal near Calpack Rd	Irrigation	7/10/2007	6.2	1289	550	790									79	
Grant Line Canal near Calpack Rd	Irrigation	7/17/2007	3	1123												
Grant Line Canal near Calpack Rd	Irrigation	7/30/2007	1.22	998												
Grant Line Canal near Calpack Rd	Irrigation	8/7/2007	3.42	956	980	630					0.083	2.8				
Grant Line Canal near Calpack Rd	Irrigation	8/9/2007	4.97	1174												
Grant Line Canal near Calpack Rd	Irrigation	8/28/2007	2.3	1654												
Grant Line Canal near Calpack Rd	Irrigation	9/4/2007	1.89	1225		810		12								
Grant Line Canal near Calpack Rd	Storm	1/23/2008	5.49	1736		1200									2	
Grant Line Canal near Calpack Rd	Storm	1/30/2008	5.34	1877											25	
Grant Line Canal near Calpack Rd	Sediment	3/18/2008		1891												
Grant Line Canal near Calpack Rd	Irrigation	4/15/2008	5.84	1205		800									12	
Grant Line Canal near Calpack Rd	Irrigation	4/23/2008	3.59	1112											52	
Grant Line Canal near Calpack Rd	Irrigation	5/13/2008		1733		1100									1	
Grant Line Canal near Calpack Rd	Irrigation	5/21/2008	4.95	1067											49	

Site Name	Season	Sample Date	Oxygen, Dissolved, >7 mg/L	Specific Conductivity, >700 µS/cm	*E. coli*, >235 MPN/100 mL	Dissolved Solids, >450 mg/L	Ammonia[1], >1.5 mg/L	Arsenic, >10 µg/L	Chlorpyrifos, >0.015 µg/L	DDE (p,p'), >0.00059 µg/L	Disulfoton, >0.05 µg/L	Diuron, >2 µg/L	Linuron, >1.4 µg/L	*C. dubia*, (% Control)	*S. capricornutum*, (% Control)	*H. azteca*, (% Control)
Grant Line Canal near Calpack Rd	Irrigation	6/10/2008	3.33	1066	240	560										
Grant Line Canal near Calpack Rd	Irrigation	7/15/2008	3.8	927	>2400	530										
Grant Line Canal near Calpack Rd	Irrigation	8/12/2008	0.45	945	>2400	570										
Grant Line Canal near Calpack Rd	Sediment	8/13/2008	2.79	899												
Grant Line Canal near Calpack Rd	Irrigation	9/16/2008	0.47	1049	2400	680		11								
Grant Line Canal near Calpack Rd	Irrigation	4/13/2010		1713												
Grant Line Canal near Calpack Rd	Irrigation	5/11/2010	4.75	1357												
Grant Line Canal near Calpack Rd	Irrigation	7/13/2010	6.55	934												
Grant Line Canal near Calpack Rd	Irrigation	8/10/2010	5.50	925												
Grant Line Canal near Calpack Rd	Irrigation	9/7/2010		1017												91
Grant Line Canal near Calpack Rd	Winter	1/11/2011		1574											53	
Grant Line Canal near Calpack Rd	Winter	2/8/2011		1435												
Grant Line Canal near Calpack Rd	Winter	3/8/2011		1586												
Grant Line Canal near Calpack Rd	Irrigation	4/12/2011		909												
Grant Line Canal near Calpack Rd	Irrigation	5/24/2011		1921												
Grant Line Canal near Calpack Rd	Irrigation	7/26/2011	6.00													
Grant Line Canal near Calpack Rd	Irrigation	9/20/2011		1177												
Grant Line Canal near Calpack Rd	Irrigation	10/14/2011	6.28	1325												86
Constituent Priority			**E**	**E**	**E**	**E**	**NP**	**E**	**A/B**	**NP**	**NP**	**NP**	**NP**	**D**	**D**	**D**

[1]Ammonia WQTL variable based on pH and temperature.
NP – Not Prioritized; less than two exceedances within three consecutive monitoring years and currently no TMDL.

2007-2011 Management Plan Monitoring Results

All monitoring results for high priority management plan constituents in the Grant Line Canal near Calpack Rd site subwatershed are listed in Table V-6. These constituents include chlorpyrifos, water column toxicity to *S. capricornutum* and *C. dubia*, and sediment toxicity to *H. azteca.*

Chlorpyrifos MPM was initiated at Grant Line near Calpack Rd after exceedances of the WQTL occurred during 2005 (March, July, and August) Normal Monitoring. In 2006, during Normal Monitoring, there was a single exceedance of chlorpyrifos in May. From 2007 (Normal Monitoring and additional MPM) through 2008 (Normal Monitoring) no exceedances of chlorpyrifos occurred in any sample collected from the site. In 2009, monitoring did not occur at the site. In 2010 and 2011, MPM (May, July, and August) resulted in no exceedances. In 2012, MPM is scheduled for March, May, July, and August.

Toxicity to *C. dubia* was added to the management plan at the same time as chlorpyrifos due to 2005 (March and August) toxicities that occurred during Normal Monitoring. In 2006, toxicity to *C. dubia* in May coincided with an exceedance of the chlorpyrifos WQTL. There has been no toxicity to *C. dubia* since May 2006. Sampling events with no toxicity include 2007 Normal Monitoring and additional MPM (July and August), 2008 Normal Monitoring, and 2011 MPM (March, May, and August). During 2009, the site was not monitored and toxicity to *C. dubia* was not monitored in 2010. In 2012, MPM is scheduled for March, May, and August.

Sediment toxicity to *H. azteca* was added to the Grant Line Canal near Calpack Rd management plan as a result of toxic sediment samples collected during 2005 Normal Monitoring (May, July, and September). Normal Monitoring occurred from 2006 through 2008, and sediment toxicity occurred in samples collected during 2006 (April) and 2007 (March). In 2009, monitoring was not scheduled at the site. In 2010, MPM (September only) for toxicity to *H. azteca* occurred, and samples were toxic. In 2011, MPM (March and September) for *H. azteca* toxicity continued, however during the analysis of the September sediment samples, there was a lab error and the results were discarded. Sediment samples were recollected in October and resulted in toxicity to *H. azteca*. In 2012, sediment toxicity to *H. azteca* remains on the MPM schedule for March and September.

Toxicity to *S. capricornutum* was included in the Grant Line Canal near Calpack Rd management plan after samples collected during 2005 storm event (February) and 2007 irrigation events (April and July) were toxic. In 2008, Normal Monitoring occurred and samples collected in January, April, and May were toxic to *S. capricornutum*. In 2009, monitoring was not scheduled at the site. In 2010, samples collected for MPM (April, May, and July) were not toxic. In 2011, samples collected for MPM in January were toxic. In 2012, MPM is scheduled to continue for toxicity to *S. capricornutum* in January, February, April, May, and July.

Table V-6. Grant Line Canal near Calpack 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
2007 NM (near Calpack Rd)	Date	NA	NA	NA	4/10/07	5/22/07	6/12/07	7/10/07	8/07/07	9/04/07	NA
	Chlorpyrifos (µg/L)	NA	NA	NA	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	NA
	C. dubia toxicity (% Control)	NA	NA	NA	111	95	95	100	100	100	NA
2007 MPM A (near Calpack Rd)	Date	NA	NA	NA	NA	NA	NA	7/30/07	8/28/07	NA	NA
	Chlorpyrifos (µg/L)	NA	NA	NA	NA	NA	NA	<0.003	<0.003	NA	NA
	C. dubia toxicity (% Control)	NA	NA	NA	NA	NA	NA	NA	100	NA	NA
2008 NM (near Calpack Rd)	Date	NA	NA	NA	4/15/08	5/13/08	6/10/08	7/15/08	8/12/08	9/16/08	NA
	Chlorpyrifos (µg/L)	NA	NA	NA	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	NA
	C. dubia toxicity (% Control)	NA	NA	NA	100	88	100	100	100	100	NA
2010 MPM (near Calpack Rd)	Date	NA	NA	NA	4/13/10	5/11/10	NA	7/13/10	8/10/10	9/07/10	NA
	Chlorpyrifos (µg/L)	NA	NA	NA	NA	<0.003	NA	<0.003	<0.003	NA	NA
	S. capricornutum toxicity (% Control)	NA	NA	NA	426	691	NA	620	NA	NA	NA
	H. azteca toxicity (% Control)	NA	NA	NA	NA	NA	NA	NA	NA	**91**	NA
2011 MPM (near Calpack Rd)	Date	1/11/11	2/8/11	3/8/11	4/12/11	5/24/11	NA	7/26/11	8/23/11	NA	10/14/11
	Chlorpyrifos (µg/L)	NA	NA	<0.003	NA	<0.003	NA	<0.003	<0.003	NA	NA
	C. dubia toxicity (% Control)	NA	NA	100	NA	95	NA	NA	100	NA	NA
	S. capricornutum toxicity (% Control)	**53**	126	NA	846	254	NA	311	NA	NA	NA
	H. azteca toxicity (% Control)	NA	NA	98	NA	NA	NA	NA	NA	NA	**86**

A – Additional Monitoring, 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.

Load Calculations

Loads have been calculated for the chlorpyrifos detections (Table V-7) based on the following formula:

Load = Discharge (cfs) X 28.317L/ft^3 X Concentration (mg/L X 1000 or µg/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 that samples were collected.

Table V-7. Grant Line Canal near Calpack Rd site subwatershed instantaneous load calculations for chlorpyrifos. Sorted by analyte and date.

Site Name	Analyte Name	Sample Date	Discharge cfs	Concentration µg/L	Loading Rate µg/sec
Grant Line Canal near Calpack Rd	Chlorpyrifos	03/21/05	0	0.076	0
Grant Line Canal near Calpack Rd	Chlorpyrifos	07/19/05	0	0.053	0
Grant Line Canal near Calpack Rd	Chlorpyrifos	08/16/05	0	0.15	0
Grant Line Canal near Calpack Rd	Chlorpyrifos	06/20/06	0	0.011	0

Source Identification and Outreach

The Coalition addressed source identification for the Grant Line Canal near Calpack Rd subwatershed in the 2011 MPUR and, in the following sections, considers 2011 monitoring results and PUR data as it expands upon that discussion. The PUR data were available for review through May 2011 for San Joaquin County. Given that any data included after May 2011 is preliminary, yearly evaluations are only considered complete through 2010.

Since the Grant Line Canal near Calpack Rd subwatershed became high priority in 2010, the Coalition has actively engaged in grower outreach education to address Grant Line Canal near Calpack 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. Individual grower meetings and follow up meetings with targeted members informed growers about management practices as well as assessed current and newly implemented management practices.

Additional MPM was initiated in this subwatershed in 2007; MPM of high priority constituents began in 2010 and has continued through 2012.

Priority A/B Constituents

Chlorpyrifos is the only priority A/B constituent listed under the Grant Line Canal @ near Calpack Rd site subwatershed Management Plan.

Chlorpyrifos

Four exceedances of the chlorpyrifos WQTL (0.015 µg/L) occurred in this subwatershed from 2005 through 2011, with the most recent exceedance occurring in May 2006 (Table V-5). Grant Line Canal near Calpack Rd was not sampled in 2009 and there were no exceedances of the chlorpyrifos WQTL during MPM sampling in 2010 (May, July and August) or 2011 (March, May, July and August).

The PUR data were reviewed from 2004 through the data available for 2011 for the number of applications, amount of the chlorpyrifos applied (pounds applied), and acres treated (Table V-8, Figure V-2). The greatest amount of chlorpyrifos use occurred in 2005 (1,043 lbs AI) and has dropped dramatically since (there was no reported use of chlorpyrifos in 2008 or 2011). Not all exceedances occurred during months of the greatest use, however applications were made in all months with exceedances (Figure V-2).

The Coalition also uses PUR data to assess which crops receive the most applications of chlorpyrifos (Table V-9). The largest amount of chlorpyrifos applied was to alfalfa (1,495 lbs AI) followed by asparagus (751 lbs AI). The most common product containing chlorpyrifos used within this subwatershed was Lorsban.

Table V-8. Grant Line Canal near Calpack Rd site subwatershed chlorpyrifos applications, lbs AI applied, and acres treated by month (2005–2011).

No chlorpyrifos PUR data were reported for 2008 and 2011. If a month is not included in the table, no applications were made.

Month/Year	Number of Chlorpyrifos Applications	Pounds AI Applied	Acres Treated
March, 2005	20	331.8	694
July, 2005	16	394.9	816
August, 2005	6	244.6	327.2
September, 2005	2	71.5	183
March, 2006	13	249.9	698.5
May, 2006	5	77.7	118
July, 2006	1	40.1	80
August, 2006	4	201.4	279
September, 2006	2	91.6	183
October, 2006	6	304.0	344
September, 2007	2	82.4	164.1
October, 2007	3	106.7	107
August, 2009	1	0.9	2
August, 2010	3	99.0	103.4
Summaries by Year			
2005 Total	44	1042.7	2020.2
2006 Total	31	964.6	1702.5
2007 Total	5	189.1	271.1
2009 Total	1	0.9	2
2010 Total	3	99.0	103.4
Total	**84**	**2296.3**	**4099.2**

Figure V-2. Grant Line Canal near Calpack Rd site subwatershed lbs chlorpyrifos applied by month (2005-2011).

No chlorpyrifos PUR data reported for 2008 and 2011. Asterisk (*) denotes months with exceedances.

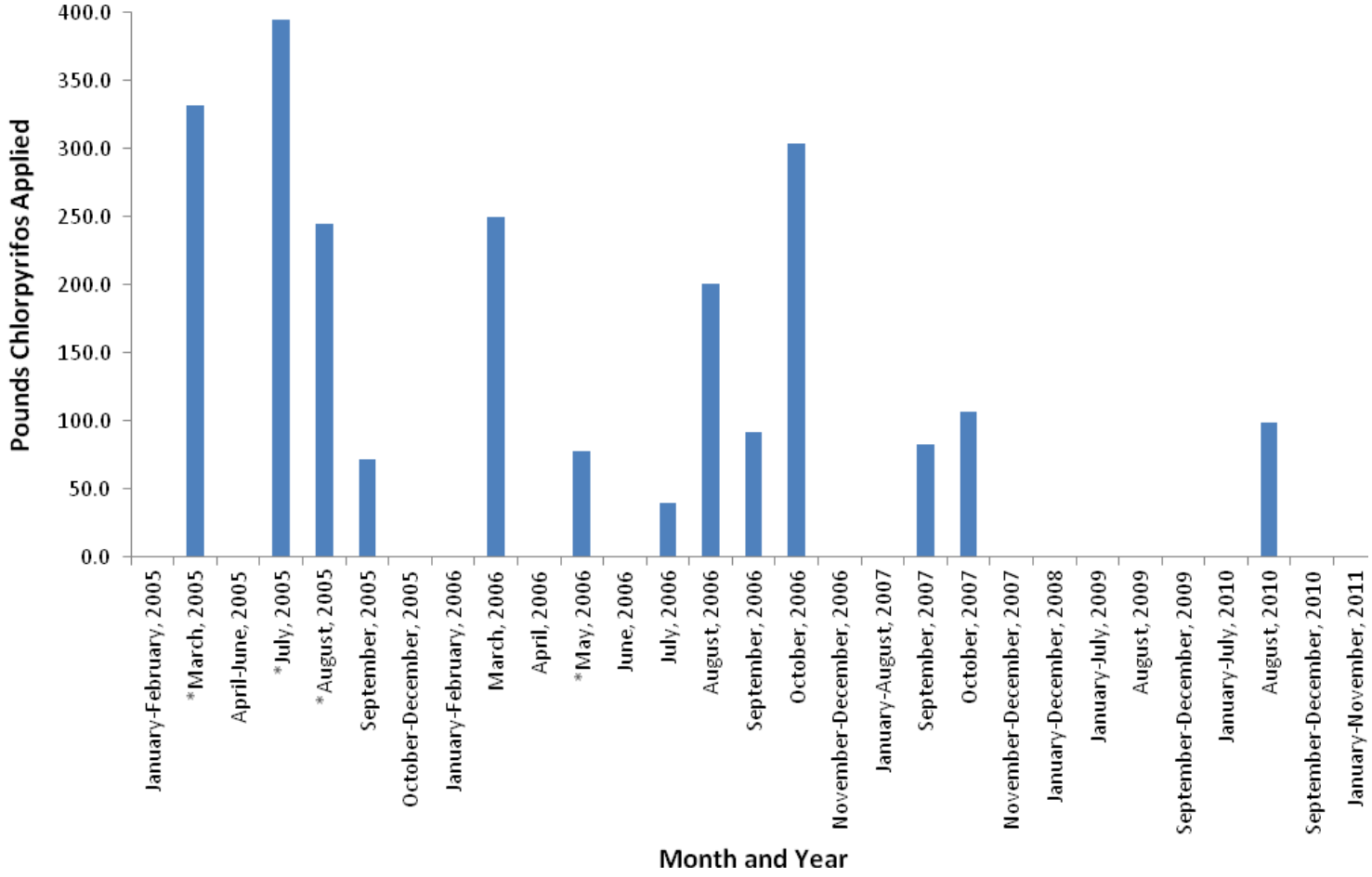


Table V-9. Grant Line Canal near Calpack Rd site subwatershed chlorpyrifos PUR data (2005-2011).
No chlorpyrifos PUR data reported for 2008 and 2011.

Chemical Name	Commodity	Product Name	Lbs AI Applied
CHLORPYRIFOS	ALFALFA (FORAGE - FODDER) (ALFALFA HAY)	LOCK-ON INSECTICIDE	665.9
		LORSBAN 4E-HF	828.4
		LORSBAN ADVANCED	0.9
	ASPARAGUS (SPEARS, FERNS, ETC.)	LORSBAN 4E-HF	651.9
		LORSBAN ADVANCED	99.0
	ONION (DRY, SPANISH, WHITE, YELLOW, RED, ETC.)	LORSBAN 15G GRANULAR INSECTICIDE	50.3

ALFALFA - Total Pounds Chlorpyrifos Applied	**1495.2**
ASPARAGUS - Total Pounds Chlorpyrifos Applied	**750.9**
ONION - Total Pounds Chlorpyrifos Applied	**50.3**
Total Pounds Chlorpyrifos Applied (2005-2011)	**2296.3**

The Coalition determined that the most efficient and effective method of outreach is to target specific members who used chlorpyrifos in the past and to contact both the growers and associated permittees. Chlorpyrifos use dropped significantly since 2005 and no exceedances have occurred in the subwatershed since 2006. Targeted outreach in this subwatershed resulted in increased use of irrigation water management practices within Grant Line Canal near Calpack Rd.

Since 2007, Coalition outreach included grower meetings and the mailing/distribution of information. A complete list of Coalition outreach that occurred in high priority subwatersheds during 2011 is provided in the Performance Goals and Schedules section of this report. The Coalition focused outreach to growers who used chlorpyrifos within the last two years and contacted permittees associated with the targeted growers. In early January 2010, the Coalition sent out mailings to six targeted growers to invite members and their associated permittees to a meeting on January 28, 2010 to discuss the Grant Line Canal management plan strategy and relevant management practices. During the meetings, Coalition representatives presented an overview of the Coalition's purpose, current water quality impairments, and status of the ILRP. Various management practices that are effective in reducing runoff and sediment deposition were discussed. The attendees at the meeting grow alfalfa or other row crops. Therefore, the Coalition discussed alfalfa weevil, worm, and aphid management as well as switching to products other than those containing chlorpyrifos. The Coalition also focused on spray drift, including minimizing the potential for drift by spraying in favorable conditions, using appropriate nozzle sizes and spray pressure, and maintaining low speeds when applying by ground (6 mph). Although the meeting focused mainly on chlorpyrifos exceedances, all water quality results were reviewed and discussed including, *C. dubia*, *S. capricornutum,* and *H. azteca* toxicities, and exceedances of arsenic , *E. coli*, DO, SC, and TDS. Grower surveys completed at the meeting documenting the members' current practices and indicating which recommended practices growers anticipated implementing in the upcoming years have been compiled and assessed by the Coalition.

As discussed in the previous section; because of the small number of members in the Grant Line Canal near Calpack Rd site subwatershed and the similarity in impairments and crop types to the Grant Line Canal @ Clifton Court Rd site subwatershed, these subwatersheds have been targeted jointly. The

Coalition sent mailings to the targeted growers from both subwatersheds (two members from either subwatershed) in early January to invite members and their associated permittees to a meeting on January 28, 2010. All of the growers contacted by the Coalition within the two Grant Line Canal subwatersheds completed and returned surveys. This accounts for 686 acres in the Grant Line Canal near Calpack Rd subwatershed. To date, the Coalition received surveys for all targeted members and thus achieved 100% targeted grower contact.

The Coalition began contacting members in the winter of 2011 to determine what management practices were implemented in 2010 and if additional practices are planned for 2011. To obtain information on practices implemented since the meeting, the Coalition sent out a brief letter that included a survey for the grower to complete. Two targeted growers were required to complete the follow up survey. To date, 100% of the follow up meetings with the second high priority subwatersheds have been completed and all members with recommended management practices have implemented new practices. Of the two growers who implemented management practices, 39% of acres with recorded practices reduced runoff water volume, 38% of acres with recorded practices reduced use of pesticides found in exceedances, and 23% of acres with recorded practices treat runoff waters with PAM or other materials. The growers who implemented new management practices represent 100% or 686 acres of the 686 targeted acres.

The Coalition will continue MPM for chlorpyrifos at the site during 2012 (March, May, July and August).

Priority D Constituents

Priority D constituents under the Grant Line Canal near Calpack Rd include water column toxicity to *C. dubia* and *S. capricornutum* and sediment toxicity to *H. azteca*.

***C. dubia* toxicity**

Toxicity to *C. dubia* occurred three times during Normal Monitoring, in March and August 2005 and May 2006 (Table V-5). All three toxicities were associated with chlorpyrifos exceedances. The Coalition conducted additional MPM in 2007 along with Normal Monitoring in 2007 and 2008, but no toxicity occurred. *C. dubia* received MPM starting in 2011 (March, May and August), and toxicity did not occur.

The Coalition's strategy for eliminating *C. dubia* toxicity is to focus on chlorpyrifos. If chlorpyrifos is prevented from entering the waterways during the irrigation season, the Coalition believes that *C. dubia* toxicity can be eliminated. All but one chlorpyrifos exceedance was associated with *C. dubia* toxicity, and the last chlorpyrifos exceedance coincided with the last *C. dubia* toxicity, which further suggests that the Coalition's strategy should be effective.

***S. capricornutum* toxicity**

S. capricornutum toxicity occurred 11 times since 2005, including four resampling events to test for persistence of the toxicity (Table V-5). The Coalition initiated MPM for *S. capricornutum* toxicity in 2010 (April, May and July) and continued with MPM in 2011 (January, February, April, May and July). Toxicity did not occur during MPM in 2010; however, samples collected during MPM in January 2011 were toxic.

In 2012 MPM for *S. capricornutum* toxicity is scheduled for January, February, April, May and July. The Coalition believes that management of copper and herbicides will eliminate the toxicity to algae.

H. azteca toxicity

H. azteca toxicity has occurred seven times (including one resampling event to test for toxicity persistence) since sediment monitoring began in this subwatershed (Table V-5). The Coalition initiated sediment MPM in September 2010 and continued in March and October 2011. The MPM samples collected in September 2010 and October 2011 were toxic to *H. azteca.* As of 2009, the Coalition tests for total organic carbon and grain size in all sediments and pyrethroids and chlorpyrifos in sediment that exhibits toxicity. Sediment toxicity to *H. azteca* is scheduled for MPM in March and September 2012.

Priority E Constituents

Priority E constituents under the Grant Line Canal near Calpack Rd management plan include arsenic, DO, SC, TDS and *E. coli*. Although these constituents will remain low priority, the Coalition continues to collect priority E constituent monitoring data for DO and SC during each monitoring event. TDS, *E. coli* and arsenic will be monitored when Assessment Monitoring resumes at this site after 2035. The priority E constituents are discussed during targeted grower meetings and will continue to be discussed at annual grower meetings. To address *E. coli* exceedances, the Coalition plans to participate in the focus group along with other Coalitions and Regional Board staff to develop a joint Work Plan to characterize the potential agricultural sources of *E. coli* and identify management practices to prevent discharges to surface waters.

There were four exceedances of the arsenic WQTL (10 µg/L) from 2006 through 2011; all occurring during irrigation months. Available PUR data indicate no product containing arsenic was applied in this subwatershed in the past 10 years.

Evaluation

Grant Line Canal near Calpack Rd is one of the second priority site subwatersheds within the SJCDWQC and has completed its second year of focused outreach (2010-2012).

The Coalition's strategy for the Grant Line Canal near Calpack Rd subwatershed is to target growers who applied chlorpyrifos in the past. The Coalition outreach focus is on tailwater management and minimizing spray drift. Outreach included grower notification, management practice education, tracking of management practices implementation, and providing information on special studies of management practice efficacy.

Individual grower surveys documenting current management practices and assessing planned implementations were completed and returned representing 100% of targeted growers. The Second Priority Summary of Management Practices section of this report summarizes the results of these contacts. The final stages of outreach include following up with growers to identify newly implemented practices followed by monitoring to evaluate water quality improvement. As growers indicated that

they implemented all intended practices in 2010 (and did not plan to implement additional practices in 2011), additional follow up to determine 2011 practices was not initiated. The Coalition continues MPM of chlorpyrifos and other high priority constituents in months of past exceedances in 2012.

VI. LITTLEJOHNS CREEK @ JACK TONE RD

Management Plan Constituents

Priority A/B

- Chlorpyrifos
- Diazinon

Priority C

- Copper

Priority D

- *Selenastrum capricornutum* water column toxicity

Priority E

- Dissolved Oxygen
- *E. coli*
- pH

Description of Littlejohns Creek @ Jack Tone Rd Site Subwatershed

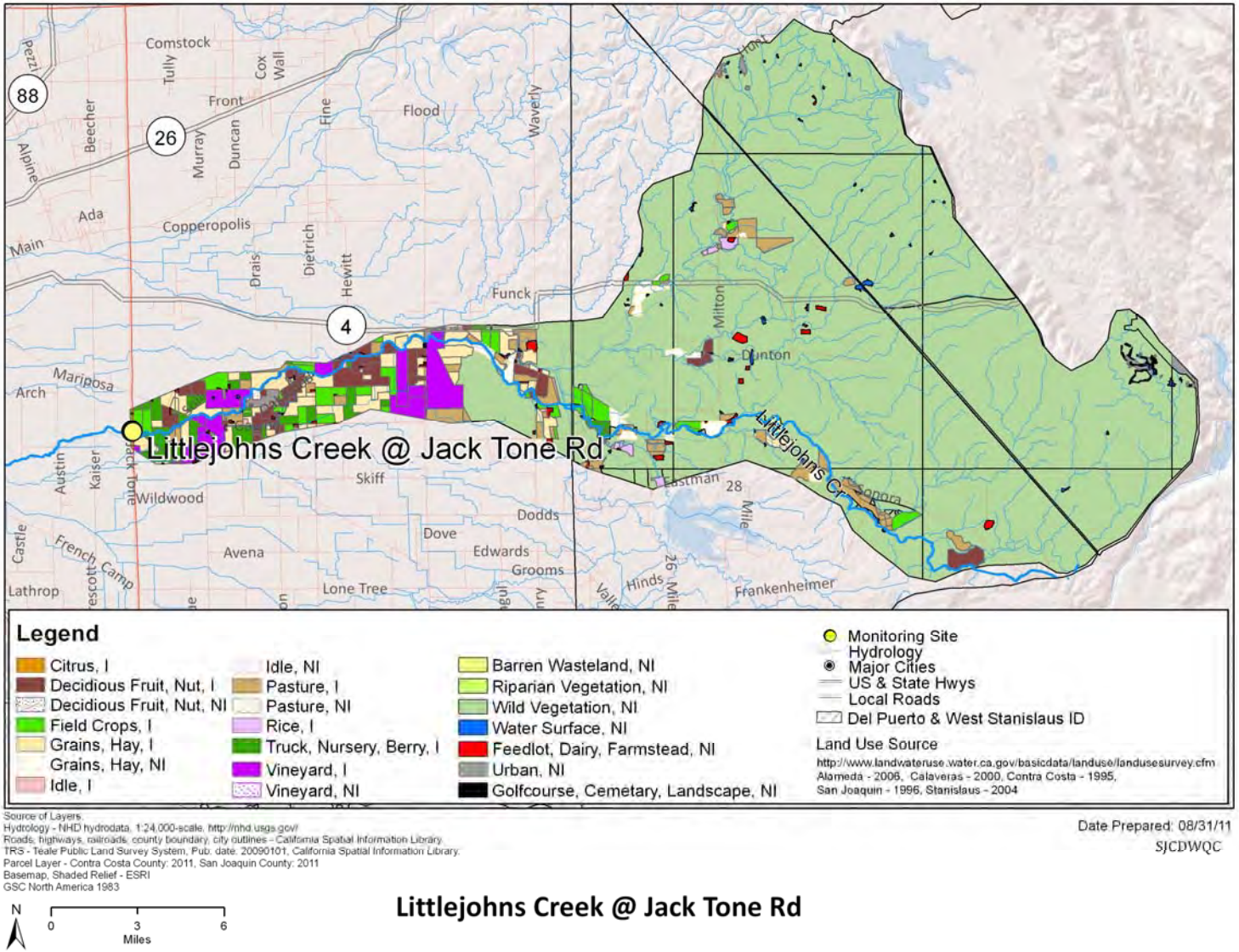
Littlejohns Creek @ Jack Tone Rd (16,167 irrigated acres) originates at the western edge of Woodward Reservoir, flowing east through the Farmington Flood Control basin and eventually confluences with Lone Tree Creek to form French Camp Slough. The Creek originally flowed intermittently, but summer releases from water storage (from at least five dams) and irrigation return flows result in year-round flow. Within the Woodward Reservoir subwatershed there are at least 38 mines, both underground and open pit, and at least five underground mines were active through 1955. This site subwatershed includes two upstream locations (Littlejohns Creek @ 26 Mile Rd and Littlejohns Creek @ Escalon Bellota) which were sampled in 2008. Table VI-1 includes the station name (site name), station code and target latitude/longitudes for sites sampled within this subwatershed. The crops grown in the site subwatershed represent all of the major types of agriculture present in the Coalition region including field crops, orchards, grains, and vineyards as well as irrigated pasture (Figure VI-1).

Table VI-1. Littlejohns Creek site subwatershed sampling locations coordinates.

Site Name	Station Code	Target Latitude	Target Longitude
Littlejohns Creek @ Escalon Bellota [U]	531XLCAER	37.9255	-120.9991
Littlejohns Creek @ 26 Mile Rd [U]	531LCATMR	37.8932	-120.8776
Littlejohns Creek @ Jack Tone Rd [*]	531XLCAJR	37.8896	-121.1461

[U] Upstream sites
*Original SJCDWQC sampling site

Figure VI-1. Littlejohns Creek @ Jack Tone Rd site subwatershed land use map.



Subwatershed Monitoring History

The Littlejohns Creek @ Jack Tone Rd site subwatershed is located within the French Camp Slough @ Airport Way Zone (Zone 2). Monitoring of ambient water at Littlejohns Creek @ Jack Tone Rd was initiated during the irrigation season of 2004 and continued through the 2008 irrigation season (Table VI-2). Beginning in October 2008, Littlejohns Creek @ Jack Tone Rd was removed from the monitoring schedule and became a rotating Assessment Monitoring site under the current 2008 MRPP. It is scheduled for Assessment Monitoring in 2021. Table VI-3 lists specific information on the analyses conducted across each of the monitoring seasons from 2005 through 2011.

In addition to Normal Monitoring at Littlejohns Creek @ Jack Tone Rd in 2007 and 2008, additional MPM occurred in 2007 and upstream MPM occurred in 2008. Additional MPM samples were collected for chlorpyrifos in July and for toxicity to *S. capricornutum* in August. In 2008, upstream MPM occurred for total metals (May-September) at Littlejohns Creek @ 26 Mile Rd. Upstream MPM also occurred at Littlejohns Creek @ Escalon Bellota Rd for total metals (May and June) and for chlorpyrifos and toxicity to *S. capricornutum* (July and August). No monitoring occurred at the site in 2009, however in 2010, high priority MPM began at the site. In 2010, MPM was conducted for copper (May, June, and September), chlorpyrifos (April, June, and July) and toxicity to *S. capricornutum* (April, July and August). Management Plan Monitoring occurred in 2011 for copper (February, May, June, and September), chlorpyrifos (February, April, June, July, and November), diazinon (February), and toxicity to *S. capricornutum* (March, April, July, and August). Table VI-4 lists all MPM dates and constituents for the Duck Creek subwatershed from 2007 through 2011.

During 2010, additional samples were collected for chlorpyrifos and diazinon (June-December) as well as sediment toxicity (September) as part of a DPR grant to reduce the impact of agricultural discharge on water quality. The DPR grant monitoring continued into the beginning of 2011 and samples were collected for both chlorpyrifos and diazinon in January (Table VI-4).

Littlejohns Creek is considered an impaired waterbody is currently on California's 2008-2010 303d List of Impaired Waterbodies for *E. coli* and unknown toxicity.

Table VI-2. Littlejohns Creek @ Jack Tone Rd site subwatershed sampling events per season and year (including MPM).

Year	Season	Events Sampled	Events Not Sampled[1]	Total
2004	Irrigation	2	0	**2**
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	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	6	0	**6**
	Fall	3	0	**3**
2011	Winter	3	0	**3**
	Storm	NA	NA	**NA**
	Irrigation	6	0	**6**
	Fall	1	0	**1**

[1]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. Littlejohns Creek @ Jack Tone Rd site subwatershed analyses per 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-Fall*	Winter*	Storm*	Irrigation	Fall	Winter	Storm*	Irrigation	Fall
Field and Physical Parameters																				
NA	Dissolved Oxygen	2	4	5	2	5	3	10	2	7					7	3	3		6	1
NA	Specific Conductivity	2	4	5	3	5	3	10	2	7					7	3	3		6	1
NA	pH	2	4	5	3	5	3	10	2	7					7	3	3		6	1
EPA 110.2	Color	2	2	5	2	5	2	8	1	6										
EPA 160.1	Dissolved Solids	2	2	5	2	5	2	9	1	6										
EPA 160.2	Suspended Solids																			
EPA 180.1	Turbidity	2	2	5	2	5	2	8	1	6										
SM 9223	*E. coli*	2	2	5	2	6	2	7	1	6										
EPA 415.1	Total Organic Carbon	2	2	5	2	7	2	6	1	6										
EPA 405.1	BOD					1	2	2												
Carbamates																				
EPA 8321A	Aldicarb					5	2	6	1	6										
EPA 8321A	Carbaryl					5	2	6	1	6										
EPA 8321A	Carbofuran					5	2	6	1	6										
EPA 8321A	Diuron					5	2	6	1	6										
EPA 8321A	Linuron					5	2	6	1	6										
EPA 8321A	Methiocarb					5	2	6	1	6										
EPA 8321A	Methomyl					5	2	6	1	6										
EPA 8321A	Oxamyl					5	2	6	1	6										
Organochlorines																				
EPA 8081A	DDD(p,p')					5	2	6	1	6										
EPA 8081A	DDE(p,p')					5	2	6	1	6										
EPA 8081A	DDT(p,p')					5	2	6	1	6										
EPA 8081A	Dicofol					5	2	6	1	6										
EPA 8081A	Dieldrin					5	2	6	1	6										
EPA 8081A	Endrin					5	2	6	1	6										
EPA 8081A	Methoxychlor					5	2	6	1	6										

Method	Analyte	2004	2005		2006		2007		2008			2009	2010				2011			
		Irrigation	Storm	Irrigation	Storm	Irrigation	Storm	Irrigation	Storm	Irrigation	Fall*	Winter-Fall*	Winter*	Storm*	Irrigation	Fall	Winter	Storm*	Irrigation	Fall
Organophosphates																				
EPA 8141A	Azinphos methyl					5	2	6	1	6										
EPA 8141A	Chlorpyrifos	2	2	5	2	5	2	7	1	6					5	3	2		3	1
EPA 8141A	Demeton-s																			
EPA 8141A	Diazinon	2	2	5	2	5	2	6	1	6					4	3	2			
EPA 8141A	Dichlorvos																			
EPA 8141A	Dimethoate					5	2	6	1	6										
EPA 8141A	Disulfoton					5	2	6	1	6										
EPA 8141A	Malathion					5	2	6	1	6										
EPA 8321A	Methamidophos					5	2	6	1	6										
EPA 8141A	Methidathion					5	2	6	1	6										
EPA 8141A	Molinate					5	2	6	1	6										
EPA 8141A	Parathion, Methyl					5	2	6	1	6										
EPA 8141A	Phorate					5	2	6	1	6										
EPA 8141A	Phosmet					5	2	6	1	6										
EPA 8141A	Thiobencarb					5	2	6	1	6										
Pyrethroids																				
EPA 8081A	Bifenthrin			1	2	5	2	6	1	6										
EPA 8081A	Cyfluthrin, total			1	2	5	2	6	1	6										
EPA 8081A	Cyhalothrin, lambda, total	2	2	5	2	5	2	6	1	6										
EPA 8081A	Cypermethrin, total	2	2	5	2	5	2	6	1	6										
EPA 8081A	Esfenvalerate/ Fenvalerate, total	2	2	5	2	5	2	6	1	6										
EPA 8081A	Permethrin, total	2	2	5	2	5	2	6	1	6										
Triazines																				
EPA 547M	Glyphosate					5	2	6	1	6										
EPA 549.2M	Paraquat dichloride					5	2	6	1	6										
EPA 619	Atrazine					5	2	6	1	6										
EPA 619	Cyanazine					5	2	6	1	6										
EPA 619	Simazine					5	2	6	1	6										
Metals (Total)																				
EPA 200.8	Arsenic					6	2	6	1	6										

Method	Analyte	2004	2005		2006		2007		2008			2009	2010				2011			
		Irrigation	Storm	Irrigation	Storm	Irrigation	Storm	Irrigation	Storm	Irrigation	Fall*	Winter-Fall*	Winter*	Storm*	Irrigation	Fall	Winter	Storm*	Irrigation	Fall
EPA 200.8	Boron					6	2	6	1	6										
EPA 200.8	Cadmium					6	2	6	1	6										
EPA 200.8	Copper					6	2	6	1	6					3		1		3	
EPA 200.8	Lead					6	2	6	1	6										
EPA 200.8	Molybdenum																			
EPA 200.8	Nickel					6	2	6	1	6										
EPA 200.8	Selenium					6	2	2	1	6										
EPA 200.8	Zinc					6	2	6	1	6										
Metals (Dissolved)																				
EPA 200.8	Cadmium																			
EPA 200.8	Copper														3		1		3	
EPA 200.8	Lead																			
EPA 200.8	Nickel																			
EPA 200.8	Zinc																			
Nutrients																				
SM 2340 C	Hardness as CaCO3					7	2	6	1	6					3				3	
EPA 300.0	Nitrate as N					6	2	6	1	6										
EPA 350.2	Ammonia as N					6	2	6	1	6										
EPA 351.3	Nitrogen, Total Kjeldahl					6	2	6	1	6										
EPA 354.1	Nitrite as N					6	2	6	1	6										
EPA 353.2	Nitrate + Nitrite as N																			
EPA 365.2	OrthoPhosphate as P					6	2	6	1	6										
EPA 365.2	Phosphate as P					6	2	6	1	6										
Toxicity																				
EPA 821/R-02-012	*Ceriodaphnia dubia*	2	2	5	2	6	2	7	1	6										
EPA 821/R-02-012	*Pimephales promelas*	2	3	5	2	5	2	7	1	6										
EPA 821/R-02-013	*Selenastrum capricornutum*	3	3	5	2	5	2	9	1	7					3		1		3	
EPA 600/R-99-064	*Hyalella azteca*	2		5	1	1	2	2	1	1					1					

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

Table VI-4. Littlejohns Creek site subwatershed Management Plan Monitoring schedule (2007-2011).

Site Name	Sample Date	Monitoring Type	Copper	Total Metals	Chlorpyrifos	Diazinon	*S. capricornutum*	*H. azteca*
Littlejohns Creek @ Jack Tone Rd	30-Jul-07	A			X			
Littlejohns Creek @ Jack Tone Rd	28-Aug-07	A					X	
Littlejohns Creek @ 26 Mile Rd	13-May-08	U		X				
Littlejohns Creek @ Escalon Bellota Rd	13-May-08	U		X				
Littlejohns Creek @ 26 Mile Rd	10-Jun-08	U		X				
Littlejohns Creek @ Escalon Bellota Rd	10-Jun-08	U		X				
Littlejohns Creek @ 26 Mile Rd	15-Jul-08	U		X				
Littlejohns Creek @ Escalon Bellota Rd	15-Jul-08	U			X		X	
Littlejohns Creek @ 26 Mile Rd	12-Aug-08	U		X				
Littlejohns Creek @ Escalon Bellota Rd	12-Aug-08	U			X		X	
Littlejohns Creek @ 26 Mile Rd	16-Sep-08	U		X				
Littlejohns Creek @ Jack Tone Rd	13-Apr-10	MPM			X		X	
Littlejohns Creek @ Jack Tone Rd	11-May-10	MPM	X					
Littlejohns Creek @ Jack Tone Rd	8-Jun-10	MPM	X		X[1]	X[2]		
Littlejohns Creek @ Jack Tone Rd	13-Jul-10	MPM			X[1]	X[2]	X	
Littlejohns Creek @ Jack Tone Rd	10-Aug-10	MPM			X[2]	X[2]	X	
Littlejohns Creek @ Jack Tone Rd	7-Sep-10	MPM	X		X[2]	X[2]		X[2]
Littlejohns Creek @ Jack Tone Rd	12-Oct-10	MPM			X[2]	X[2]		
Littlejohns Creek @ Jack Tone Rd	9-Nov-10	MPM			X[2]	X[2]		
Littlejohns Creek @ Jack Tone Rd	7-Dec-10	MPM			X[2]	X[2]		
Littlejohns Creek @ Jack Tone Rd	11-Jan-11	MPM			X[2]	X[2]		
Littlejohns Creek @ Jack Tone Rd	8-Feb-11	MPM	X		X[1]	X[1]		
Littlejohns Creek @ Jack Tone Rd	8-Mar-11	MPM					X	
Littlejohns Creek @ Jack Tone Rd	12-Apr-11	MPM			X		X	
Littlejohns Creek @ Jack Tone Rd	24-May-11	MPM	X					
Littlejohns Creek @ Jack Tone Rd	28-Jun-11	MPM	X		X			
Littlejohns Creek @ Jack Tone Rd	26-Jul-11	MPM			X		X	
Littlejohns Creek @ Jack Tone Rd	23-Aug-11	MPM					X	
Littlejohns Creek @ Jack Tone Rd	20-Sep-11	MPM	X					
Littlejohns Creek @ Jack Tone Rd	15-Nov-11	MPM			X			

[1]MPM and Department of Pesticide Regulation (DPR) grant monitoring.
[2]DPR grant monitoring only.
A – Additional sampling
U – Upstream sampling
X – Constituent sampled for Management Plan Monitoring (MPM).

Exceedance History

Exceedances of WQTLs for field and physical parameters, *E. coli,* metals, pesticides, and water column and sediment toxicity occurred at this site (Table VI-5). For monitoring between 2004 and 2011 there were exceedances of WQTLs for DO (24), pH (3), *E. coli* (6), total copper (5), dissolved copper (2), carbofuran (1), chlorpyrifos (9), and diazinon (1). Toxicity to *P. promelas* (1), *S. capricornutum* (5), and *H. azteca* sediment (2) occurred.

Exceedances of the WQTL during 2011 MPM included DO (3), pH (1), dissolved copper (1), and chlorpyrifos (1).

All exceedances are listed in Table VI-5 by season and date and are based on WQTLs listed in the introduction of the SJCDWQC Management Plan. The top priority constituents for the Littlejohns Creek subwatershed are chlorpyrifos and diazinon (A/B), copper (C) and toxicity to *S. capricornutum* (D).

Table VI-5. Littlejohns Creek site subwatershed exceedances (2004-2011).

The WQTLs are listed in the header after the analyte. Data sorted by season and date.
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[1], µg/L	Copper, Total[2], > 1,300 µg/L	Carbofuran, >0 µg/L	Chlorpyrifos, >0.015 µg/L	Diazinon, >0.1 µg/L	*P. promelas*, (% Control)	*S. capricornutum*, (% Control)	*H. azteca*, (% Control)
Littlejohns Creek @ Jack Tone Rd	Irrigation	8/24/2004										55	
Littlejohns Creek @ Jack Tone Rd	Irrigation	9/23/2004	6.7										
Littlejohns Creek @ Jack Tone Rd	Storm	2/16/2005			1600						70		
Littlejohns Creek @ Jack Tone Rd	Storm	3/1/2005		6.37									
Littlejohns Creek @ Jack Tone Rd	Storm	3/21/2005			900							85	
Littlejohns Creek @ Jack Tone Rd	Irrigation	5/17/2005			900								
Littlejohns Creek @ Jack Tone Rd	Irrigation	7/19/2005	6.6						0.017				
Littlejohns Creek @ Jack Tone Rd	Irrigation	9/20/2005	5.4		900								
Littlejohns Creek @ Jack Tone Rd	Storm	3/15/2006			1600								
Littlejohns Creek @ Jack Tone Rd	Irrigation	5/16/2006					4.4 (3.9)						
Littlejohns Creek @ Jack Tone Rd	Irrigation	6/20/2006	6.7										
Littlejohns Creek @ Jack Tone Rd	Irrigation	7/18/2006	3.1						0.027				
Littlejohns Creek @ Jack Tone Rd	Irrigation	9/19/2006	5.4										
Littlejohns Creek @ Jack Tone Rd	Storm	2/11/2007							0.029	0.11			
Littlejohns Creek @ Jack Tone Rd	Storm	2/28/2007			2400		11 (9)						
Littlejohns Creek @ Jack Tone Rd	Storm	3/6/2007											80
Littlejohns Creek @ Jack Tone Rd	Storm	3/29/2007											88
Littlejohns Creek @ Jack Tone Rd	Irrigation	6/12/2007					3.6 (3.3)						
Littlejohns Creek @ Jack Tone Rd	Irrigation	7/10/2007	6.85									71	

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[1], µg/L	Copper, Total[2], > 1,300 µg/L	Carbofuran, >0 µg/L	Chlorpyrifos, >0.015 µg/L	Diazinon, >0.1 µg/L	*P. promelas*, (% Control)	*S. capricornutum*, (% Control)	*H. azteca*, (% Control)
Littlejohns Creek @ Jack Tone Rd	Irrigation	7/17/2007	6.6										
Littlejohns Creek @ Jack Tone Rd	Irrigation	7/30/2007							0.018				
Littlejohns Creek @ Jack Tone Rd	Irrigation	8/28/2007	5.85										
Littlejohns Creek @ Jack Tone Rd	Irrigation	9/4/2007	5.72										
Littlejohns Creek @ Jack Tone Rd	Irrigation	4/15/2008							0.034			6	
Littlejohns Creek @ Jack Tone Rd	Irrigation	4/23/2008										44	
Littlejohns Creek @ Jack Tone Rd	Irrigation	5/13/2008	6.7				4.2 (4.1)	0.41					
Littlejohns Creek @ 26 Mile Rd	*Irrigation*	*5/13/2008*	*4.54*	*6.32*									
Littlejohns Creek @ Jack Tone Rd	Irrigation	6/10/2008							0.077				
Littlejohns Creek @ Jack Tone Rd	Irrigation	7/15/2008							0.025				
Littlejohns Creek @ 26 Mile Rd	*Irrigation*	*7/15/2008*	*5.50*										
Littlejohns Creek @ Jack Tone Rd	Sediment	8/13/2008	6.19										
Littlejohns Creek @ 26 Mile Rd	*Irrigation*	*8/12/2008*	*6.45*										
Littlejohns Creek @ Jack Tone Rd	Irrigation	9/16/2008	6.34				4.2 (3.5)						
Littlejohns Creek @ 26 Mile Rd	*Irrigation*	*9/16/2008*	*3.65*										
Littlejohns Creek @ Jack Tone Rd	Irrigation	5/11/2010				1.7 (1.46)							
Littlejohns Creek @ Jack Tone Rd	Irrigation	7/13/2010	6.53										
Littlejohns Creek @ Jack Tone Rd	Irrigation	8/10/2010	6.25										
Littlejohns Creek @ Jack Tone Rd	Irrigation	9/7/2010	5.50										
Littlejohns Creek @ Jack Tone Rd	Irrigation	10/12/2010	6.00										
Littlejohns Creek @ Jack Tone Rd	Fall	11/9/2010							0.04				
Littlejohns Creek @ Jack Tone Rd	Winter	2/8/2011		8.96									
Littlejohns Creek @ Jack Tone Rd	Irrigation	5/24/2011				1.7 (1.03)							
Littlejohns Creek @ Jack Tone Rd	Irrigation	7/26/2011	6.78										
Littlejohns Creek @ Jack Tone Rd	Irrigation	8/23/2011	5.20										
Littlejohns Creek @ Jack Tone Rd	Irrigation	9/20/2011	6.17										
Littlejohns Creek @ Jack Tone Rd	Fall	11/15/2011							0.022				
		Constituent Priority	**E**	**E**	**E**	**C**	**C**	**NP**	**A/B**	**A/B**	**NP**	**D**	**NP[T]**

[1]Dissolved metals not analyzed until October 2008; WQTL variable based on hardness.
[2]Total metal WQTL variable based on hardness.
NP – Not Prioritized; less than two exceedances within three consecutive monitoring years and currently no TMDL.
NP[T] – Not prioritized; both toxic samples were from the same sampling event (sample and resample to test for persistence).

2007-2011 Management Plan Monitoring Results

All monitoring results for high priority management plan constituents in the Littlejohns Creek @ Jack Tone Road site subwatershed are listed in Table VI-6. These constituents include water column toxicity to *S. capricornutum*, chlorpyrifos, copper, and diazinon.

In 2007, MPM was initiated at Littlejohns Creek @ Jack Tone Rd following 2004 irrigation (August) and a 2005 storm (March) toxicities to *S. capricornutum*. In 2007, Normal Monitoring and additional MPM (August) occurred, and toxicity to *S. capricornutum* occurred in July. In 2008, Normal Monitoring at Littlejohns Creek @ Jack Tone Rd as well as upstream MPM (July and August) at Littlejohns Creek @ Escalon Bellota Rd occurred. The sample collected in April at Littlejohns Creek @ Jack Tone Rd was toxic to *S. capricornutum*. In 2009, the site was not schedule for monitoring. Toxicity to *S. capricornutum* did not occur during 2010 MPM (April, July, and August) and 2011 MPM (March, April, July, and August). In 2012, MPM is scheduled for toxicity to *S. capricornutum*.

Chlorpyrifos was added to the MPM schedule following exceedances of the WQTL during Normal Monitoring in July of 2005 and 2006. In 2007, exceedances occurred in February and July during Normal Monitoring and again in July during additional MPM. In 2008, samples were collected at Littlejohns Creek @ Jack Tone Rd during Normal Monitoring and at Littlejohns Creek @ Escalon Bellota Rd during upstream MPM (July and August). Three of the Normal Monitoring samples exceeded the WQTL (April, June, and July); however, there were no exceedances at the upstream site. In 2009, monitoring did not occur at the site. In 2010, MPM samples collected in April, June, and July did not exceed the chlorpyrifos WQTL. However, DPR grant monitoring samples resulted in an exceedance of chlorpyrifos in November 2010. In 2011, MPM occurred in February, April, June, July, and November with only one exceedance of the WQTL for chlorpyrifos again in November. Chlorpyrifos will remain on the MPM schedule in 2012.

Copper was added to the MPM schedule after exceedances of the WQTL during Normal Monitoring in 2006 (May) and 2007 (February and June). In 2008, Normal Monitoring occurred at Littlejohns Creek @ Jack Tone Rd, and upstream MPM for copper occurred at both Littlejohns Creek @ Escalon Bellota Rd (April and May) and Littlejohns Creek @ 26 Mile Rd (May-August). Exceedances occurred in May and September during Normal Monitoring and in July during upstream MPM at Littlejohns Creek @ 26 Mile Rd. In 2009, the site was not schedule for Normal Monitoring or MPM and no sampling occurred. Management Plan Monitoring occurred in 2010 (May, June, and September) and 2011 (February, May, June, and September) and there was an exceedance of the copper WQTL in May of both years. Copper will continue to be analyzed for during MPM in 2012.

Diazinon was added to the MPM schedule after a single exceedance during Normal Monitoring in February 2007 due to the Delta TMDL for chlorpyrifos and diazinon. In 2008, there were no exceedances of diazinon during Normal Monitoring. In 2009, the site was not schedule for Normal Monitoring or MPM, and no sampling occurred. DPR Grant Monitoring for diazinon occurred from June 2010 through February 2011 without a single exceedance or detection during that time. Diazinon is currently on the 2012 MPM schedule and will not be analyzed for in February only.

Table VI-6. Littlejohns Creek site subwatershed monitoring results for high priority constituents (2007-2011).

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

	Month:	Jan	Feb		Mar	Apr	May	Jun	Jul	Aug	Sep		Oct	Nov	Dec
2007 NM (@Jack Tone Rd)	Date	NA	2/11/07	2/28/07	NA	4/10/07	5/22/07	6/12/07	7/10/07	8/07/07	9/04/07		NA	NA	NA
	Chlorpyrifos (µg/L)	NA	**0.029**	<0.003	NA	<0.003	<0.003	<0.003	0.013	<0.003	<0.003		NA	NA	NA
	S. capricornutum toxicity (% Control)	NA	230	125	NA	133	164	251	**71**	192	182		NA	NA	NA
2007 MPM A (@ Jack Tone Rd)	Date	NA	NA		NA	4/10/07	5/22/07	6/12/07	7/30/07	8/28/07	NA		NA	NA	NA
	Chlorpyrifos (µg/L)	NA	NA		NA	NA	NA	NA	**0.018**	NA	NA		NA	NA	NA
	S. capricornutum toxicity (% Control)	NA	NA		NA	NA	NA	NA	NA	363	NA		NA	NA	NA
2008 NM (@ Jack Tone Rd)	Date	NA	NA		NA	4/15/08	5/13/08	6/10/08	7/13/08	8/12/08	9/16/08		NA	NA	NA
	Copper (µg/L)	NA	NA		NA	3.9	**4.2 (4.1)**	3.1	3.4	2.0	**4.2 (3.5)**		NA	NA	NA
	Chlorpyrifos (µg/L)	NA	NA		NA	**0.034**	<0.003	**0.077**	**0.025**	<0.003	<0.003		NA	NA	NA
	S. capricornutum toxicity (% Control)	NA	NA		NA	**6**	93	131	184	167	155		NA	NA	NA
2008 MPM US (@ 26 Mile Rd)	Date	NA	NA		NA	NA	5/13/08	6/10/08	7/15/08	8/12/08	9/16/08		NA	NA	NA
	Copper (µg/L)	NA	NA		NA	NA	1.6	0.9	**3.1**	0.8	1.0		NA	NA	NA
2008 MPM US (@ Escalon Bellota Rd)	Date	NA	NA		NA	NA	5/13/08	6/10/08	7/15/08	8/12/08	9/16/08		NA	NA	NA
	Copper (µg/L)	NA	NA		NA	1.9	1.8	NA	NA	NA	NA		NA	NA	NA
	Chlorpyrifos (µg/L)	NA	NA		NA	NA	NA	NA	<0.003	<0.003	NA		NA	NA	NA
	S. capricornutum toxicity (% Control)	NA	NA		NA	NA	NA	NA	139	117	NA		NA	NA	NA
2010 MPM (@ Jack Tone Rd)	Date	NA	NA		NA	4/13/10	5/11/10	6/08/10	7/13/10	8/10/10	9/07/10	9/14/10	10/12/10	11/09/10	12/07/10
	Copper, dissolved (µg/L)	NA	NA		NA	NA	**1.7**	2.2	NA	NA	2.5	NA	NA	NA	NA
	Copper, total (µg/L)	NA	NA		NA	NA	2.4	4.5	NA	NA	2.3	NA	NA	NA	NA
	Chlorpyrifos (µg/L)	NA	NA		NA	<0.003	NA	<0.003	<0.003	<0.003*	0.013*	NA	<0.003*	**0.040***	0.014*
	Diazinon (µg/L)	NA	NA		NA	NA	NA	<0.004*	<0.004*	<0.004*	<0.004*	NA	<0.004*	<0.004*	<0.004*
	S. capricornutum toxicity (% Control)	NA	NA		NA	904	NA	NA	360	879	NA	NA	NA	NA	NA

	Month:	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep		Oct	Nov	Dec
	H. azteca toxicity (% Control)	NA	NA	NA	NA	NA	NA	NA	NA	NA	110*	NA	NA	NA
2011 MPM (@ Jack Tone Rd)	Date	1/11/11	2/8/11	3/8/11	4/12/11	5/24/11	6/28/11	7/26/11	8/23/11	9/20/11		NA	11/15/11	NA
	Copper, dissolved (µg/L)	NA	2	NA	NA	**1.7**	1.1	NA	NA	1.2		NA	NA	NA
	Copper, total (µg/L)	NA	2.8	NA	NA	2.8	2.7	NA	NA	2.2		NA	NA	NA
	Chlorpyrifos (µg/L)	<0.003*	<0.003	NA	<0.003	NA	<0.003	<0.003	NA	NA		NA	**0.022**	NA
	Diazinon (µg/L)	<0.004*	<0.004	NA	NA	NA	NA	NA	NA	NA		NA	NA	NA
	S. capricornutum toxicity (% Control)	NA	NA	679	1643	NA	NA	684	650	NA		NA	NA	NA
	H. azteca toxicity (% Control)	NA	NA	NA	NA	NA	NA	NA	NA	NA		NA	NA	NA

A – Additional Monitoring, 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 Monitoring, conducted in 2008 only.
*Additional Department of Pesticide Regulation (DPR) grant monitoring.

Load Calculations

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

Load = Discharge (cfs) X 28.317L/ft^3 X Concentration (mg/L X 1000 or µg/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 that samples were collected.

Table VI-7. Littlejohns Creek site subwatershed instantaneous load calculations for chlorpyrifos, copper and diazinon.

Sorted by analyte and date. Upstream site is italicized.

Site Name	Analyte Name	Sample Date	Discharge cfs	Concentration µg/L	Loading Rate µg/sec
Littlejohns Creek @ Jack Tone Rd	Chlorpyrifos	02/11/07	0	0.029	0
Littlejohns Creek @ Jack Tone Rd	Chlorpyrifos	01/23/08	2.45	0.0039	0.27
Littlejohns Creek @ Jack Tone Rd	Chlorpyrifos	11/09/10	0	0.04	0
Littlejohns Creek @ Jack Tone Rd	Chlorpyrifos	12/07/10	0	0.014	0
Littlejohns Creek @ Jack Tone Rd	Chlorpyrifos	11/15/11	0	0.022	0
Littlejohns Creek @ Jack Tone Rd	Copper	05/16/06	23.5	4.4	2927.98
Littlejohns Creek @ Jack Tone Rd*	Copper	08/15/06	12.79	2.1	760.57
Littlejohns Creek @ Jack Tone Rd*	Copper	08/15/06	12.79	2.2	796.78
Littlejohns Creek @ Jack Tone Rd	Copper	08/15/06	12.79	2.5	905.44
Littlejohns Creek @ Jack Tone Rd	Copper	02/11/07	0	6.8	0
Littlejohns Creek @ Jack Tone Rd	Copper	09/04/07	0	2.7	0
Littlejohns Creek @ Jack Tone Rd	Copper	01/23/08	2.45	3.8	263.63
Littlejohns Creek @ 26 Mile Rd	*Copper*	*09/16/08*	*0*	*1*	*0*
Littlejohns Creek @ Jack Tone Rd	Copper	02/08/11	0	2.8	0
Littlejohns Creek @ Jack Tone Rd	Copper (D)	02/08/11	0	2	0
Littlejohns Creek @ Jack Tone Rd	Diazinon	02/27/06	10.45	0.035	10.36
Littlejohns Creek @ Jack Tone Rd	Diazinon	02/11/07	0	0.11	0
Littlejohns Creek @ Jack Tone Rd	Diazinon	01/23/08	2.45	0.017	1.18

*Field Duplicate

Source Identification and Outreach

The Coalition previously addressed source identification in the 2011 MPUR and, in the following sections, takes into consideration 2011 monitoring results along with the most current PUR data to expand upon that discussion. The PUR data were available for review through May 2011 for San Joaquin County and November 2011 for Stanislaus County. Given that any data included after May 2011 is preliminary, yearly evaluations are only considered complete through 2010.

In the past (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 resumed in 2010 and continued through 2011 during months when exceedances historically occurred to continue to assess water quality in the subwatershed as outreach in the area progressed.

Since the Littlejohns Creek @ Jack Tone Rd became high priority in 2010, the Coalition actively engaged in grower outreach and education to address Littlejohns Creek @ Jack Tone Rd management plan's highest priority constituents. The Coalition organized meetings and mailings to educate growers about management practices and their importance in achieving acceptable water quality. Individual grower meetings and follow up meetings with targeted members informed growers about management practices as well as assessed current and newly implemented management practices.

While focused outreach is effective for most priority constituents, water quality data from 2011 indicates that it would be beneficial for additional growers to implement management practices specific to chlorpyrifos. The Coalition developed a strategy for additional outreach to growers in the Littlejohns Creek subwatershed for 2012, similar to the strategy outlined in the first priority subwatersheds; topics will be discussed with targeted growers in the Littlejohns Creek subwatershed as described in the Duck Creek subwatershed Source ID and Outreach section.

Priority A/B Constituents

Chlorpyrifos and diazinon are listed as priority A/B constituents under management plan for the Littlejohns Creek site subwatershed.

Chlorpyrifos

Nine exceedances of the chlorpyrifos WQTL (0.015 µg/L) occurred in samples collected from 2004 through 2011 during Normal Monitoring and MPM in the Littlejohns Creek subwatershed (Table VI-5). The most recent exceedance of chlorpyrifos occurred in November 2011.

The PUR data from 2004 through data available for 2011 were reviewed for the number of applications, the amount of the active ingredient applied (pounds applied), and acres treated with chlorpyrifos (Table VI-8, Figure VI-2). The greatest amount of chlorpyrifos applied was in 2009 (7,068 lbs AI) with the lowest amount in 2008 (2,874 lbs AI). Applications for chlorpyrifos typically fall between April and September; however, in 2009 and 2010, increased applications occurred in the months of October and November, accounting for half of lbs AI applied for both years (Figure VI-2). Overall, the number of applications and acres treated with chlorpyrifos in this subwatershed has decreased steadily since 2004, especially in irrigation months. Exceedances did not always occur during months of the greatest amount of use; however, most exceedances did occur in months when applications were made (Figure VI-2).

The Coalition also uses PUR data to assess which crops received the most applications of chlorpyrifos (Table VI-9). The largest amount of chlorpyrifos was applied to walnuts (20,080 lbs AI), followed by grapes (6,087 lbs AI). The Coalition has focused its outreach to target growers farming these crops. The most common product containing chlorpyrifos used within this subwatershed was Lorsban (Table VI-9).

Table VI-8. Littlejohns Creek @ Jack Tone Rd site subwatershed chlorpyrifos applications, lbs AI applied, and acres treated by month (2004-2011).

PUR data available through May 2011 for San Joaquin County and through November 2011 for Stanislaus County; all PUR data after May 2011 are preliminary. If a month is not included in the table, no applications were made.

Month/Year	Number of Chlorpyrifos Applications	Pounds of AI Applied	Acres Treated
February, 2004	1	1.9	38
March, 2004	20	897.7	957.7
April, 2004	3	202.5	170
May, 2004	18	1453.8	686.5
June, 2004	6	799.9	545.5
July, 2004	19	1817.5	930
August, 2004	20	1089.6	632.2
March, 2005	4	61.5	103
April, 2005	1	33.6	67.2
May, 2005	22	1441.3	804.3
June, 2005	7	744.9	452.5
July, 2005	22	1674.3	1245.1
August, 2005	8	348.0	393.2
September, 2005	1	34.8	25
March, 2006	1	50.0	25
May, 2006	22	1741.7	970.3
June, 2006	15	1368.7	809.5
July, 2006	16	1252.1	838.5
August, 2006	12	646.3	703.5
September, 2006	3	120.1	120
March, 2007	10	624.0	542
April, 2007	5	244.6	218
May, 2007	11	682.5	462
June, 2007	12	513.3	480
July, 2007	7	361.5	240
August, 2007	6	316.3	334.5
September, 2007	2	167.3	120
March, 2008	6	259.1	250.8
April, 2008	4	191.5	181
May, 2008	11	1153.7	630.5
June, 2008	5	113.6	205
July, 2008	14	926.0	548
August, 2008	2	229.6	111
March, 2009	4	174.9	161
April, 2009	1	40.0	57.3
May, 2009	2	414.8	211.5
June, 2009	9	1257.1	637.4
July, 2009	9	909.1	453.5
August, 2009	7	569.1	285
September, 2009	3	40.0	40
October, 2009	4	2617.9	1394
November, 2009	5	1045.1	556.5
March, 2010	4	91.7	131.4
April, 2010	1	28.5	57
May, 2010	2	67.5	72
June, 2010	10	1134.5	565.2

Month/Year	Number of Chlorpyrifos Applications	Pounds of AI Applied	Acres Treated
July, 2010	13	732.2	493
August, 2010	10	426.2	294
September, 2010	2	93.9	50
October, 2010	3	1493.0	795
November, 2010	2	860.1	458
December, 2010	1	44.0	25
April, 2011	1	58.0	57
May, 2011	2	232.3	115
June, 2011	2	122.1	65
July, 2011	3	303.3	180
August, 2011	4	356.8	190
September, 2011	3	80.8	43
Summaries by Year			
2004 Total	87	6262.9	3959.9
2005 Total	65	4338.4	3090.3
2006 Total	69	5178.9	3466.8
2007 Total	53	2909.5	2396.5
2008 Total	42	2873.5	1926.3
2009 Total	44	7068.1	3796.2
2010 Total	48	4971.8	2940.6
2011 Total	15	1153.2	650
Total	**423**	**34756.3**	**22226.6**

Figure VI-2. Littlejohns Creek @ Jack Tone Rd site subwatershed lbs chlorpyrifos applied by month (2004-2011).

PUR data available through May 2011 for San Joaquin County and through November 2011 for Stanislaus County; all PUR data after May 2011 are preliminary. Asterisk (*) denotes months with exceedances.

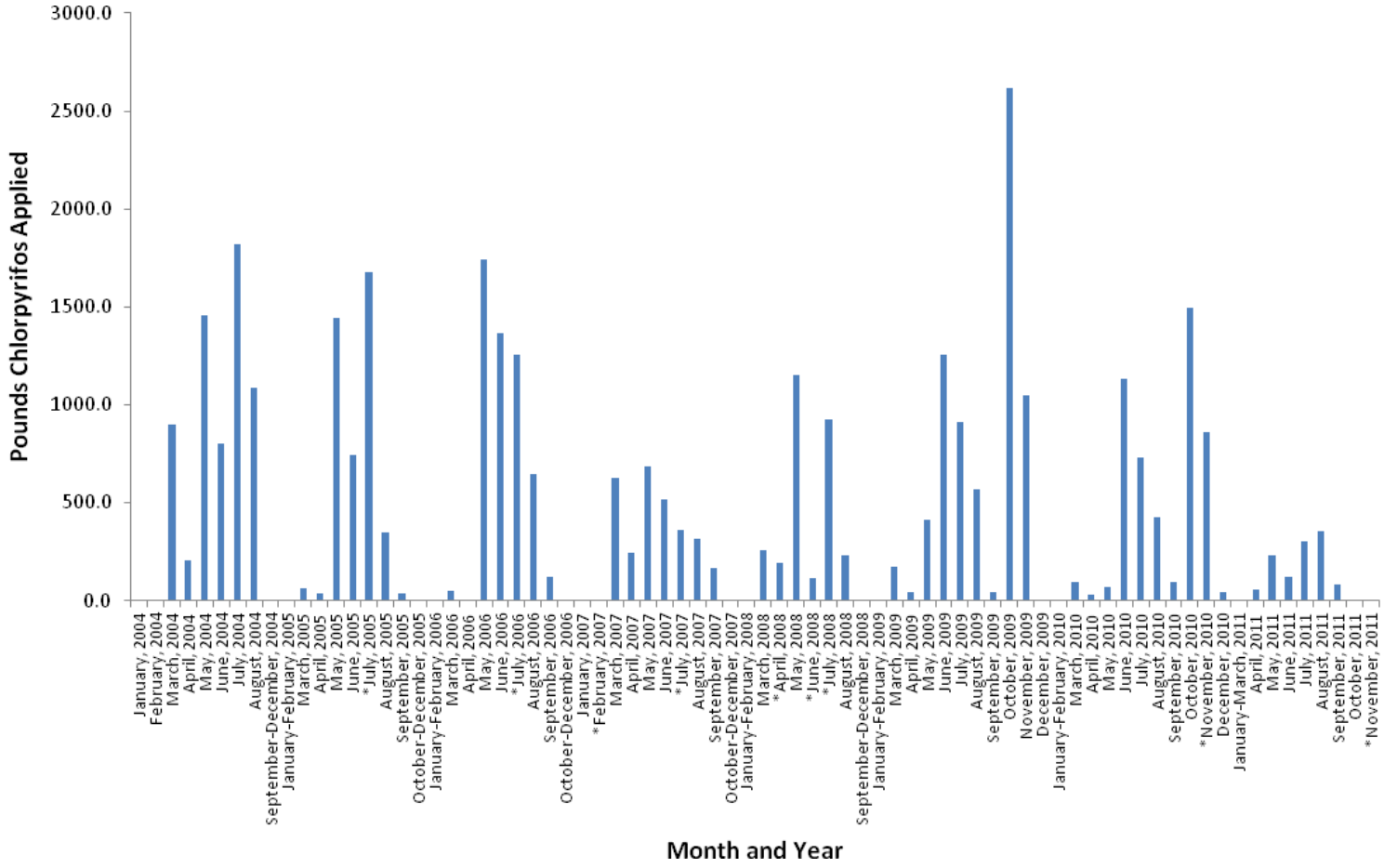


Table VI-9. Littlejohns Creek @ Jack Tone Rd site subwatershed chlorpyrifos PUR data (2004-2011).

PUR data available through May 2011 for San Joaquin County and through November 2011 for Stanislaus County; all PUR data after May 2011 are preliminary.

Chemical Name	Commodity	Product Name	Lbs AI Applied
CHLORPYRIFOS	ALFALFA (FORAGE - FODDER) (ALFALFA HAY)	LOCK-ON INSECTICIDE	788.7
		LORSBAN 4E-HF	49.2
		LORSBAN-4E	574.9
		NUFOS 4E	114.9
	ALMOND	GOVERN 4E INSECTICIDE	40.4
		LORSBAN 4E-HF	392.7
		LORSBAN ADVANCED	167.1
		LORSBAN-4E	1230.6
		NUFOS 4E	20.3
	APPLE	LORSBAN 4E-HF	356.5
		LORSBAN ADVANCED	99.5
		LORSBAN-4E	609.5
	CORN (FORAGE - FODDER)	CHLORPYRIFOS 4E AG	85.4
		LORSBAN 15G GRANULAR INSECTICIDE	1186.5
		LORSBAN 4E-HF	343.9
		LORSBAN-4E	508.3
		NUFOS 15G	1407.6
		NUFOS 4E	163.7
	GRAPES	LORSBAN 4E-HF	16.0
		LORSBAN ADVANCED	18.8
		LORSBAN-4E	36.0
	GRAPES (WINE)	LORSBAN ADVANCED	6016.2
	N-OUTDR GRWN TRNSPLNT/PRPGTV MTRL	LORSBAN ADVANCED	44.0
		LORSBAN-4E	240.1
	WALNUT (ENGLISH WALNUT, PERSIAN WALNUT)	CHLORPYRIFOS 4E AG	961.0
		GOVERN 4E INSECTICIDE	1932.4
		LORSBAN 4E INSECTICIDE	3172.2
		LORSBAN 4E-HF	3338.7
		LORSBAN ADVANCED	1453.6
		LORSBAN-4E	8679.6
		NUFOS 4E	163.7
		WARHAWK	303.0
		WHIRLWIND	76.0
	WHEAT (GENERAL)	LORSBAN 4E-SG	165.4

ALFALFA - Total Pounds Chlorpyrifos Applied	**1527.7**
ALMOND - Total Pounds Chlorpyrifos Applied	**1851.2**
APPLE - Total Pounds Chlorpyrifos Applied	**1065.6**
CORN - Total Pounds Chlorpyrifos Applied	**3695.3**
GRAPES - Total Pounds Chlorpyrifos Applied	**6086.9**
N-OUTDR GRWN TRNSPLNT - Total Pounds Chlorpyrifos Applied	**284.1**
WALNUT - Total Pounds Chlorpyrifos Applied	**20080.2**
WHEAT - Total Pounds Chlorpyrifos Applied	**165.4**
Total Pounds Chlorpyrifos Applied (2004-2011)	**34756.3**

Previous analysis conducted by the Coalition indicated that targeted outreach should focus on increasing the use of irrigation tailwater management practices within Littlejohns Creek @ Jack Tone Rd. Since 2007, Coalition outreach included grower meetings and the mailing/distribution of information. A complete list of Coalition outreach that occurred in high priority subwatersheds during 2011 is provided in the Performance Goals and Schedules section of this report. The Coalition determined that the most efficient and effective method of outreach is to target specific members who have used chlorpyrifos in the past two years and to contact both the growers and associated permittees. In early January 2010, the Coalition sent out mailings to targeted growers to invite members and their associated permittees to a meeting in January 2010 to discuss the Littlejohns Creek management plan strategy and relevant management practices. Various management practices that are effective in reducing runoff of water and sediment specifically related to chlorpyrifos, diazinon, copper, and algae toxicity, were discussed. The attendees at the meeting held in January 2010 operate mostly orchards and vineyards. Therefore, time was spent addressing orchard blight management practices. Discussion also focused on drift and concerns including minimizing spray drift by spraying in favorable conditions, using appropriate nozzle sizes and spray pressures, and maintaining low speeds when applying by ground (6 mph). Additionally, due to the high number of algae toxicities in the subwatershed, herbicide use was also addressed. All water quality results were reviewed and discussed including diazinon and copper WQTL exceedances, *S. capricornutum* toxicity and exceedances of the *E. coli* and DO WQTLs. Grower surveys completed at the meetings, documenting members' current practices and indicating which recommended practices growers anticipated implementing in the upcoming years, were compiled and assessed by the Coalition. The Coalition contacted 16 growers within the Littlejohns Creek subwatershed, accounting for 2,796 acres. To date, the Coalition has received surveys for all targeted members and thus has achieved 100% of targeted grower contacts.

The Coalition began contacting members in the winter of 2011 to determine what additional management practices were implemented in 2010 and if additional practices are planned for 2011. Of the initial 16 targeted growers 13 members were required to participate in completing a follow up survey. To date, 100% of the follow up meetings with the second priority subwatersheds have been completed and all members with recommended management practices implemented those practices. Of the 13 growers who implemented management practices, 34% of acres with recorded practices reduced runoff water volume, 28% of acres with recorded practices reduced use of pesticides found in exceedances, 25% of acres with recorded practices use center grass rows, grass waterways/filter strips, and 13% of acres with recorded practices installed sprinkler or micro irrigation systems. The growers who implemented new management practices represent 92% (2,566 acres) of the 2,796 targeted acres.

Chlorpyrifos was scheduled for MPM during 2011 in the months of January, February, April, June, July and November (January and February monitored as part of DPR grant monitoring). Due to a chlorpyrifos exceedance in the November 2011 sample, the Coalition will continue MPM in 2012 to assess the water quality in Littlejohns Creek (during the months of February, April, June, July and November). Furthermore, in 2012, additional growers will be targeted for focused outreach based on their recent use of chlorpyrifos and associations to recent exceedances. Outreach will focus mainly on discontinuing

the use of chlorpyrifos; however, improved management practices such as recycling runoff water and being mindful of buffer zones will be discussed for all pesticides in use.

Diazinon

Diazinon levels exceeded the WQTL (0.1 µg/L) once in this subwatershed during storm monitoring in February 2007 (Table VI-5). Littlejohns Creek @ Jack Tone Rd was not sampled for diazinon during 2009 or 2010 MPM, however, as part of DPR grant monitoring, diazinon was monitored in Littlejohns Creek monthly from June 2010 through February 2011. Diazinon was initially sampled as part of MPM in February 2011; MPM is scheduled to continue in February 2012.

The PUR data indicate that from 2004 through 2006, the majority of applications took place during the winter season; however starting in 2007, applications were applied more heavily in irrigation/summer months (Table VI-10, Figure VI-3). Diazinon use was at its lowest in 2008 (20 lbs AI), however in 2010 and 2011, use increased slightly. Overall, the amount of diazinon applied within the subwatershed decreased since 2004, when 367 lbs AI were applied. The single exceedance occurred in February 2007; however the most recent application prior to this exceedance was in May 2006 (Figure VI-3).

The Coalition also used PUR data to assess which crops receive the most applications of diazinon. The largest amount of diazinon applied was associated with apples (365 lbs AI) and almonds (313 lbs AI), see Table VI-11.

Table VI-10. Littlejohns Creek @ Jack Tone Rd site subwatershed diazinon applications, lbs AI applied, and acres treated by month (2004-2011).

PUR data available through May 2011 for San Joaquin County and through November 2011 for Stanislaus County; all PUR data after May 2011 are preliminary. If a month is not included in the table, no applications were made.

Month/Year	Number of Diazinon Applications	Pounds of AI Applied	Acres Treated
January, 2004	1	42.0	28
February, 2004	1	26.9	18
March, 2004	2	176.0	88
May, 2004	1	10.0	10
December, 2004	2	111.6	75
January, 2005	1	56.0	28
January, 2006	3	76.9	50
February, 2006	1	16.0	8
May, 2006	4	6.7	5.1
March, 2007	1	16.0	8
April, 2007	1	1.6	3
May, 2007	3	8.9	3
June, 2007	1	1.5	0.5
April, 2008	2	9.7	2.5
May, 2008	3	10.1	2.5
March, 2009	1	16.0	8
December, 2009	2	15.9	16
April, 2010	2	60.0	35
June, 2010	1	50.0	25
August, 2010	1	22.5	15

Month/Year	Number of Diazinon Applications	Pounds of AI Applied	Acres Treated
December, 2010	2	23.8	16
April, 2011	1	14.9	15
July, 2011	2	86.0	43
September, 2011	1	30.0	15
Summaries by Year			
2004 Total	7	366.5	219
2005 Total	1	56.0	28
2006 Total	8	99.6	63.1
2007 Total	6	27.9	14.5
2008 Total	5	19.7	5
2009 Total	3	31.9	24
2010 Total	6	156.3	91
2011 Total	4	130.9	73
Total	**40**	**888.8**	**517.6**

Figure VI-3. Littlejohns Creek @ Jack Tone Rd site subwatershed lbs diazinon applied by month (2004-2011).

PUR data available through May 2011 for San Joaquin County and through November 2011 for Stanislaus County; all PUR data after May 2011 are preliminary. Asterisk (*) denotes months with exceedances.

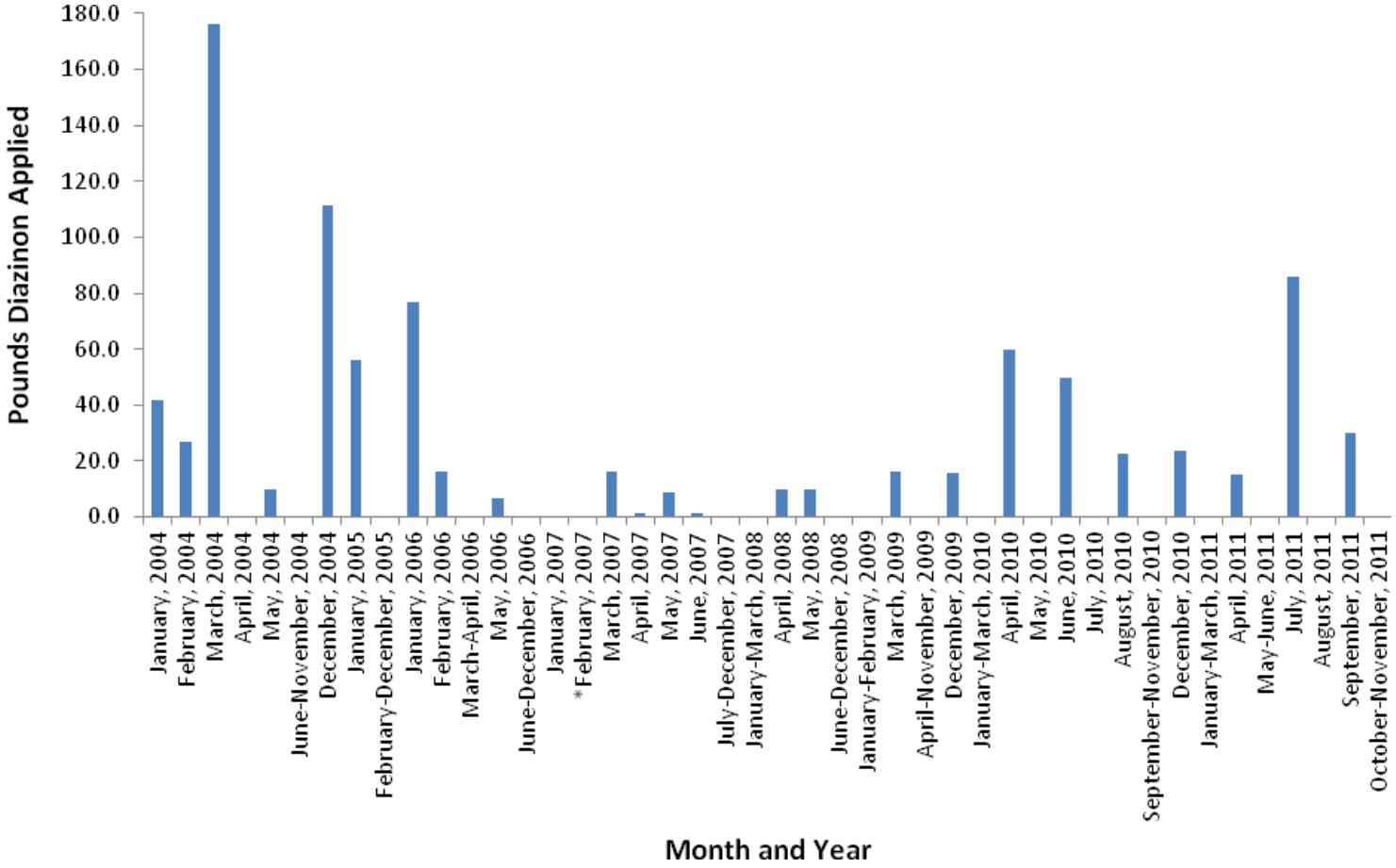


Table VI-11. Littlejohns Creek @ Jack Tone Rd site subwatershed diazinon PUR data (2004-2011).
PUR data available through May 2011 for San Joaquin County and through November 2011 for Stanislaus County; all PUR data after May 2011 are preliminary.

Chemical Name	Commodity	Product Name	Lbs AI Applied
DIAZINON	ALMOND	DIAZINON AG 500	67.0
		DIAZINON AG500	124.8
		DIAZOL AG 500	121.5
	APPLE	CLEAN CROP DIAZINON 50 WP	176.0
		DIAZINON 50W	188.5
	CHERRY	DIAZINON 50W	108.0
		DIAZINON AG600 WBC INSECTICIDE	14.9
	NECTARINE	DIAZINON AG 500	19.8
	PEACH	DIAZINON AG 500	19.8
	TOMATOES, FOR PROCESSING/CANNING	DIAZINON 50W	18.6
		DIAZINON AG 500	19.7
		GOWAN DIAZINON 4E	10.0

ALMOND - Total Pounds Diazinon Applied	**313.4**
APPLE - Total Pounds Diazinon Applied	**364.5**
CHERRY - Total Pounds Diazinon Applied	**122.9**
NECTARINE - Total Pounds Diazinon Applied	**19.8**
PEACH - Total Pounds Diazinon Applied	**19.8**
TOMATOES - Total Pounds Diazinon Applied	**48.3**
Total Pounds Diazinon Applied (2004-2011)	**888.8**

There were no reported applications of diazinon for seven months prior to the single exceedance in February 2007. Consequently, the source of the diazinon exceedance is unknown. The Coalition has focused its outreach to address irrigation and storm water management. Targeted outreach occurring within this subwatershed is described under the chlorpyrifos outreach section above and included discussions of diazinon exceedances and management practices.

Priority C Constituents

Copper is the only priority C constituent listed in the Littlejohns Creek @ Jack Tone Rd management plan.

Copper

Copper exceeded the WQTL seven times in this subwatershed from 2004 through 2011, with the most recent exceedance occurring during MPM in May 2011 (Table VI-5). Copper was not monitored at Littlejohns Creek in 2009. Copper was added to the MPM schedule beginning in 2010 (May, June and September) and continuing through 2011 (February, May, June and September). Copper will continue to be monitored as part of MPM in 2012 (February, May, June and September).

The PUR data were reviewed for the number of monthly copper applications, pounds of active ingredient applied, and acres treated (Table VI-12, Figure VI-4). Copper is one of the most heavily applied constituents in the site subwatershed. Normally, there are fewer applications from the summer through the fall; with the bulk of the applications occurring in the winter and spring (use consistently

peaks in April). Copper applications were at their peak in 2005 (32,586 lbs AI), but since decreased by more than one third, with 2010 having 18,996 lbs AI applied. 2008 had the least amount of copper applied (14,692 lbs AI). Not all exceedances occur in months with the greatest use (Figure VI-4).

The Coalition also uses PUR data to determine which crops received the most applications (Table VI-13). The largest amount of copper applied from 2004 through 2011 was to walnuts (135,706 lbs AI). The most common products used in this subwatershed containing copper are Kocide and Nu-Cop (Table VI-13).

Table VI-12. Littlejohns Creek @ Jack Tone Rd site subwatershed copper applications, lbs AI applied, and acres treated by month (2004-2011).

PUR data available through May 2011 for San Joaquin County and through November 2011 for Stanislaus County; all PUR data after May 2011 are preliminary. If a month is not included in the table, no applications were made.

Month/Year	Number of Copper Applications	Pounds of AI Applied	Acres Treated
January, 2004	2	369.0	68
February, 2004	4	197.0	106
March, 2004	23	3597.8	1229.6
April, 2004	34	9858.4	2121.4
May, 2004	4	933.7	105
September, 2004	6	316.8	229.5
October, 2004	4	201.1	99
November, 2004	2	98.2	40
December, 2004	2	460.5	75
January, 2005	2	383.1	78
February, 2005	1	33.2	8
March, 2005	19	2852.7	558.8
April, 2005	50	16048.9	2930.7
May, 2005	40	11994.4	2444.7
June, 2005	7	587.8	378.3
July, 2005	3	167.0	130
September, 2005	1	36.8	20
October, 2005	3	229.6	187
December, 2005	4	252.8	75
January, 2006	6	954.5	200
February, 2006	3	82.3	88
March, 2006	5	99.5	92
April, 2006	39	8705.8	1845.1
May, 2006	30	8374.1	1565
June, 2006	10	2676.3	662
July, 2006	7	663.7	431
August, 2006	5	344.8	263
September, 2006	8	445.4	296.5
October, 2006	10	640.3	432
November, 2006	2	116.2	40
January, 2007	3	790.5	214
February, 2007	3	124.8	83
March, 2007	12	2465.9	418.3
April, 2007	50	13612.2	2294.1
May, 2007	10	3161.0	512.7

Month/Year	Number of Copper Applications	Pounds of AI Applied	Acres Treated
June, 2007	2	111.1	36
July, 2007	4	77.0	100
September, 2007	2	92.3	122
November, 2007	4	329.2	107
December, 2007	3	146.9	24
February, 2008	2	125.4	83
March, 2008	13	2583.2	465.3
April, 2008	37	11146.9	1985.2
May, 2008	3	818.3	145
December, 2008	1	18.4	10
January, 2009	4	1675.7	394.5
February, 2009	2	259.5	210
March, 2009	9	3571.0	364.8
April, 2009	39	10766.6	3420.9
May, 2009	13	3111.6	679
November, 2009	4	387.4	127.5
December, 2009	3	314.0	25
January, 2010	1	34.6	15
February, 2010	2	138.8	258
March, 2010	11	2224.2	578.3
April, 2010	60	10110.5	4240.6
May, 2010	37	5543.5	1892.6
June, 2010	8	302.3	325
July, 2010	3	48.8	141
September, 2010	1	15.4	10
November, 2010	3	438.9	114
December, 2010	3	138.8	41
February, 2011	2	385.0	420
March, 2011	5	376.8	485
April, 2011	48	8062.7	2591.5
May, 2011	25	3516.2	1187.5
June, 2011	13	370.0	282.5
July, 2011	1	46.1	25
Summaries by Year			
2004 Total	81	16032.4	4073.5
2005 Total	130	32586.4	6810.5
2006 Total	125	23102.9	5914.6
2007 Total	93	20910.9	3911.1
2008 Total	56	14692.2	2688.5
2009 Total	74	20085.9	5221.7
2010 Total	129	18995.7	7615.5
2011 Total	94	12756.8	4991.5
Total	**782**	**159163.2**	**41226.8**

Figure VI-4. Littlejohns Creek @ Jack Tone Rd site subwatershed lbs copper applied by month (2004-2011).

PUR data available through May 2011 for San Joaquin County and through November 2011 for Stanislaus County; all PUR data after May 2011 are preliminary. Asterisk (*) denotes months with exceedances.

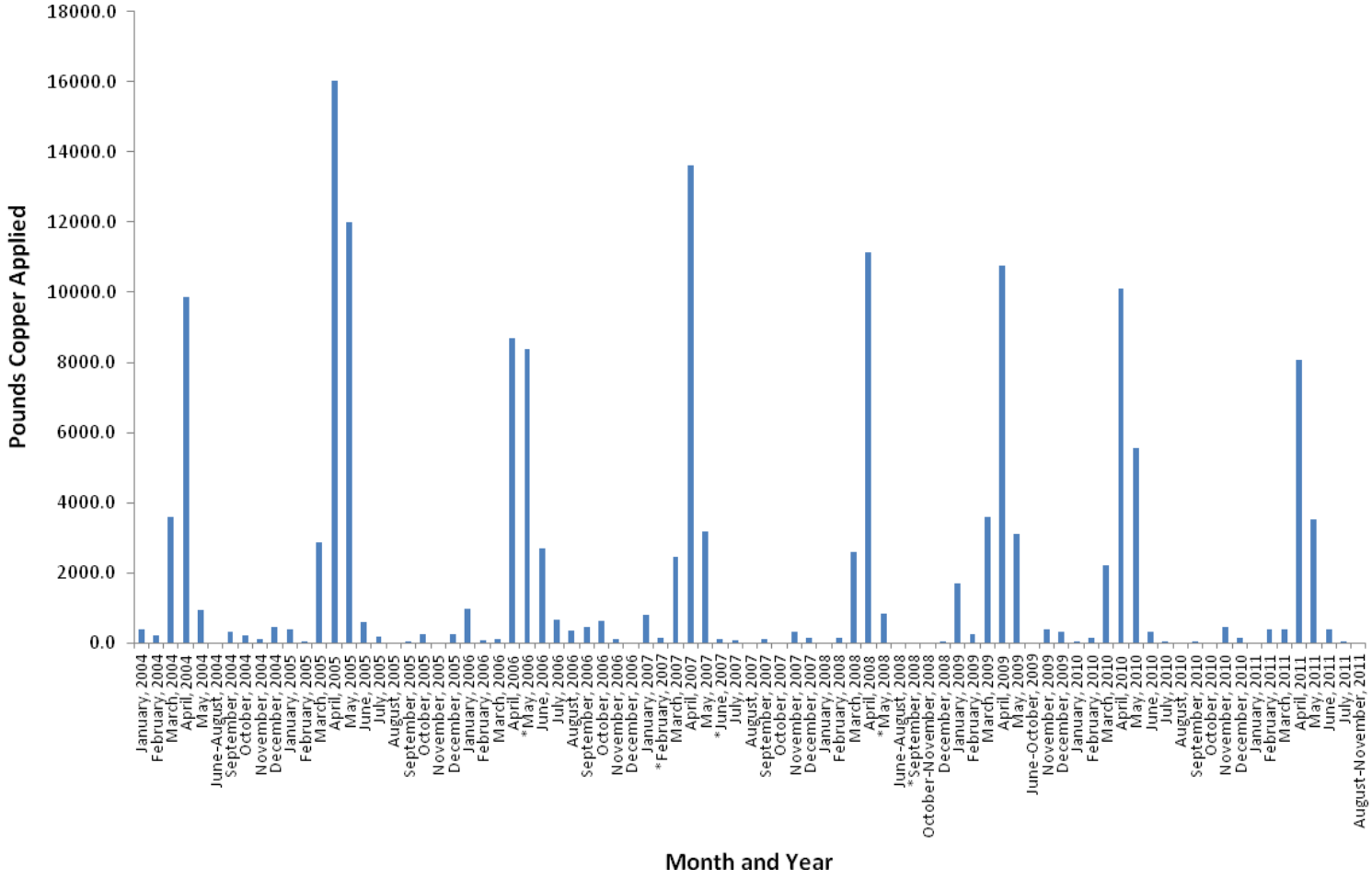


Table VI-13. Littlejohns Creek @ Jack Tone Rd site subwatershed copper PUR data (2004-2011).

PUR data available through May 2011 for San Joaquin County and through November 2011 for Stanislaus County; all PUR data after May 2011 are preliminary.

Chemical Name	Commodity	Product Name	Lbs AI Applied
COPPER	ALFALFA (FORAGE - FODDER) (ALFALFA HAY)	KOCIDE 101	15.4
	ALMOND	DUPONT KOCIDE 2000 FUNGICIDE/BACTERICIDE	493.9
		KOCIDE 101	277.2
		KOCIDE 2000	581.0
		KOCIDE DF	1826.7
		NORDOX 75 WG	1752.2
		NU-COP 50DF	1232.0
	APPLE	KOCIDE 101	107.8
		KOCIDE DF	78.6
		NU-COP 50DF	329.2
	CHERRY	DUPONT KOCIDE 3000 FUNGICIDE/BACTERICIDE	34.6
		KOCIDE 101	406.9
		NU-COP 50DF	30.8
	GRAPES	CHAMP FORMULA 2 FLOWABLE	1254.4
		HYDROX	92.4
		KENTAN DF	24.5
		KOCIDE 101	1197.7
		KOCIDE 2000	80.7
		KOCIDE DF	243.7
		TENN-COP 5E	109.4
		TENN-COP 5E FUNGICIDE/BACTERICIDE	170.8
	GRAPES (WINE)	CHAMP FORMULA 2 FLOWABLE	87.5
		COPPER-COUNT-N	1.5
		DUPONT GX-569 FUNGICIDE/BACTERICIDE	835.4
		DUPONT KOCIDE 3000 FUNGICIDE/BACTERICIDE	854.7
		NU-COP 3L	95.3
		TENN-COP 5E FUNGICIDE/BACTERICIDE	9.8
	NECTARINE	NORDOX 75 WG	136.9
	N-OUTDR GRWN TRNSPLNT/PRPGTV MTRL	CHAMP FORMULA 2 FLOWABLE	193.2
		KOCIDE 2000	16.7
		KOCIDE 2000 T/N/O	10.8
		PHYTON-27 BACTERICIDE & FUNGICIDE	3.5
		PHYTON-27 FUNGICIDE	1.3
	OLIVE (ALL OR UNSPEC)	DUPONT KOCIDE 2000 FUNGICIDE/BACTERICIDE	387.4
		NU-COP 50DF	1285.9
	ONION (DRY, SPANISH, WHITE, YELLOW, RED, ETC.)	CHAMP FORMULA 2 FLOWABLE	75.7
		DUPONT KOCIDE 3000 FUNGICIDE/BACTERICIDE	212.3
		KOCIDE 101	1055.7
		KOCIDE DF	601.7
		NU-COP 50DF	409.6
	PEACH	DUPONT KOCIDE 3000 FUNGICIDE/BACTERICIDE	18.4
		NORDOX 75 WG	177.3
	PEAR	KOCIDE 101	60.1
		KOCIDE DF	13.8
	PEPPERS (FRUITING VEGETABLE), (BELL, CHILI, ETC.)	DUPONT KOCIDE 3000 FUNGICIDE/BACTERICIDE	27.7
		DUPONT KOCIDE 4.5LF FUNGICIDE/BACTERICIDE	9.1
		KOCIDE DF	194.0
	RICE (ALL OR UNSPEC)	CHIPCO COPPER SULFATE CRYSTALS	2831.4

Chemical Name	Commodity	Product Name	Lbs AI Applied
COPPER	TOMATOES (FOR PROCESSING/CANNING)	CHAMP 30 DP	10.7
		CHAMP FORMULA 2 FLOWABLE	0.8
		DUPONT KOCIDE 3000 FUNGICIDE/BACTERICIDE	6.5
		DUPONT KOCIDE 4.5LF FUNGICIDE/BACTERICIDE	13.6
		HYDROX	101.6
		KENTAN DF	212.7
		KOCIDE 101	80.5
		KOCIDE 4.5 LF	151.8
		KOCIDE 606 FLOWABLE AGRICULTURAL FUNGICIDE	51.9
		KOCIDE DF	1665.4
		NU-COP 3L	62.0
		NU-COP 50DF	1078.8
		NU-COP 50WP	73.9
	WALNUT (ENGLISH WALNUT, PERSIAN WALNUT)	BADGE X2	152.0
		BASIC COPPER 53	2156.0
		BLUE SHIELD DF	215.6
		CHAMP FORMULA 2 FLOWABLE	740.7
		CHAMPION WETTABLE POWDER	154.0
		COPPER SULFATE CRYSTALS	222.8
		CUPROFIX ULTRA 40 DISPERSS	631.4
		DUPONT GX-569 FUNGICIDE/BACTERICIDE	284.0
		DUPONT KOCIDE 101 FUNGICIDE/BACTERICIDE	492.8
		DUPONT KOCIDE 2000 FUNGICIDE/BACTERICIDE	1685.3
		DUPONT KOCIDE 3000 FUNGICIDE/BACTERICIDE	6823.4
		DUPONT KOCIDE DF FUNGICIDE/BACTERICIDE	3861.8
		HYDROX	2610.3
		KENTAN DF	4356.0
		KOCIDE 101	42470.2
		KOCIDE 2000	3148.1
		KOCIDE DF	16502.7
		NORDOX	137.6
		NORDOX 75 WG	1472.4
		NU-COP 50 WP	3394.4
		NU-COP 50DF	41960.6
		NUCOP DF	260.0
		NU-COP HB	1974.3
		ALFALFA - Total Pounds Copper Applied	**15.4**
		ALMOND - Total Pounds Copper Applied	**6163.0**
		APPLE - Total Pounds Copper Applied	**515.6**
		CHERRY - Total Pounds Copper Applied	**472.3**
		GRAPES - Total Pounds Copper Applied	**5057.9**
		NECTARINE- Total Pounds Copper Applied	**136.9**
		N-OUTDR GRWN TRNSPLNT - Total Pounds Copper Applied	**225.4**
		OLIVE - Total Pounds Copper Applied	**1673.3**
		ONION - Total Pounds Copper Applied	**2355.1**
		PEACH - Total Pounds Copper Applied	**195.7**
		PEAR - Total Pounds Copper Applied	**74.0**
		PEPPERS - Total Pounds Copper Applied	**230.8**
		RICE - Total Pounds Copper Applied	**2831.4**
		TOMATOES - Total Pounds Copper Applied	**3510.1**
		WALNUT - Total Pounds Copper Applied	**135706.3**
		Total Pounds Copper Applied (2004-2011)	**159163.2**

The Coalition will continue with its strategy for copper outlined above under the chlorpyrifos outreach section. Orchard and vineyard operators are advised to consider irrigation tailwater management to prevent copper from entering the waterway with runoff. Storm runoff management relevant to copper applications will also be discussed to prevent the winter exceedances. Targeted outreach occurring in 2012 within this subwatershed will include discussions of copper exceedances and the above management practices. This is consistent with the strategy used to address priority A/B constituent exceedances.

Priority D Constituents

Water column toxicity to *S. capricornutum* is the only priority D constituent listed under the Littlejohns Creek management plan.

***S. capricornutum* toxicity**

Although the Coalition will continue to monitor for toxicity to *S. capricornutum,* it remains low priority. Toxicity to *S. capricornutum* has occurred five times in the Littlejohns Creek subwatershed from 2004 through 2011, including one resample event to test for toxicity persistence (Table VI-5). Copper exceedances were not associated with any of the *S. capricornutum* toxicities.

To date, no herbicides such as copper or diuron, can be associated with *S. capricornutum* toxicity. However, the Coalition believes that eliminating discharge to surface water will eliminate toxicity to *S. capricornutum*. *S. capricornutum* toxicity has been highlighted in meetings by Coalition representatives and management practices relevant to toxicity, such as water retention, have been discussed as well. The Coalition sampled for *S. capricornutum* toxicity as a part of 2011 MPM (March, April, July and August); however, there was no toxicity to *S. capricornutum*. If copper exceedances subside, but toxicity persists, the Coalition will assess other herbicides used within the subwatershed as potential causes.

Priority E Constituents

Priority E constituents listed under the Littlejohns Creek management plan are DO, *E. coli*, and pH. Although these constituents remain low priority, the Coalition will continue to collect monitoring data for DO and pH during each monitoring event; *E. coli* will not be monitored again until Assessment Monitoring resumes at this site in 2021. The priority E constituents are discussed during targeted outreach and will continue to be discussed at annual grower meetings. To address *E. coli* exceedances, the Coalition plans to participate in the focus group along with other Coalitions and Regional Board staff to develop a joint Work Plan to characterize the potential agricultural sources of *E. coli* and identify management practices to prevent discharges to surface waters.

Evaluation

Littlejohns Creek is one of the second priority site subwatersheds within the SJCDWQC and just completed its second year of focused outreach (2010-2012).

The Coalition's strategy for the Littlejohns Creek @ Jack Tone Rd subwatershed is to target growers applying products containing or related to priority constituents (chlorpyrifos and diazinon) in the past two years and to identify the sources of agricultural discharge within the subwatershed that could result in water quality impairments. Outreach included grower notification, management practice 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 implementations were completed and returned representing 100% of targeted growers. The Second Priority Summary of Management Practices section of this report summarizes the results of these contacts. The final stages of outreach include following up with growers to identify newly implemented practices and future monitoring to evaluate water quality improvement. As growers indicated that they implemented all intended practices in 2010 (and did not plan to implement additional practices in 2011), additional outreach to determine 2011 practices was not initiated. However, due to a chlorpyrifos exceedance in 2011, the Coalition is expanding its outreach efforts to growers with recent reported use of chlorpyrifos. Additional focused outreach is scheduled to begin in 2012. General outreach includes grower notification, management practice education, tracking of management practice implementation, and providing information to growers on special studies of management practice efficacy. In the case of additional focused outreach, individual meetings are scheduled with growers to review their operation and to discuss management practices and pesticides currently in use.

While the acres treated and pounds of chlorpyrifos applied have generally decreased since 2004, samples with chlorpyrifos exceeded the WQTL again in November 2011. Usage increased in November, suggesting that additional management practices to improve tailwater runoff and spray drift need to be implemented. Littlejohns Creek is scheduled for MPM in 2012 in order to continue the progress the health of the waterbody in regards to chlorpyrifos and other high priority constituents. If any additional exceedances of priority A-D constituents occur, the Coalition will discuss with the Regional Board necessary actions. The Coalition will continue to conduct outreach on a general and focused level throughout 2012.

HIGH PRIORITY SITE SUBWATERSHEDS (2011 – 2013)

VII. FRENCH CAMP SLOUGH@ AIRPORT WAY

Management Plan Constituents

Priority A/B

- Chlorpyrifos
- Diazinon

Priority C

- Copper
- Diuron

Priority D

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

Priority E

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

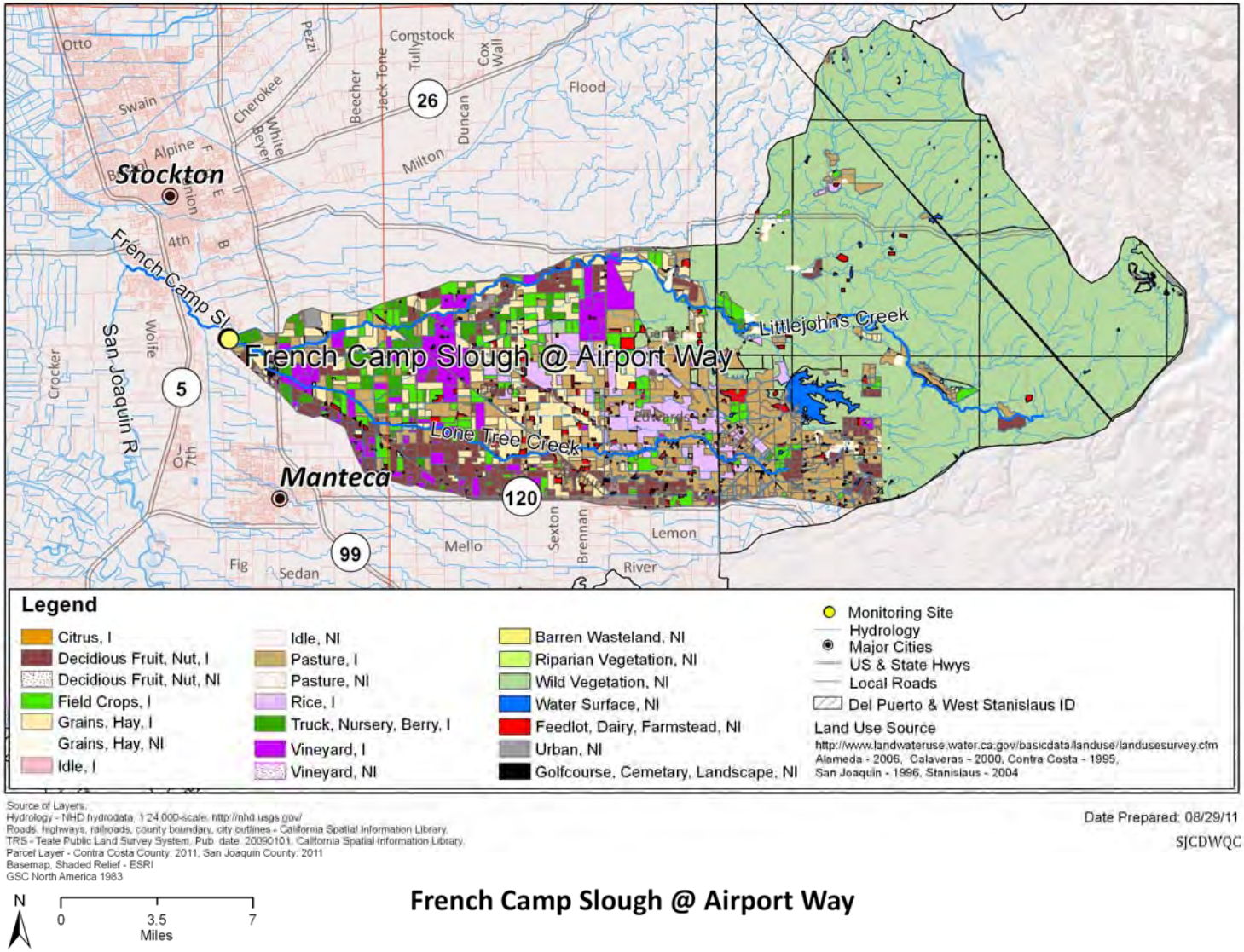
Description of French Camp Slough @ Airport Way Site Subwatershed

French Camp Slough @ Airport Way (83,229 irrigated acres) is the Core site for the French Camp Slough Zone (Zone 2); its location coordinates are provided in Table VII-1. Littlejohns Creek and Lone Tree Creek are the main waterbodies draining the subwatershed and the two creeks confluence to form French Camp Slough. The French Camp Slough @ Airport Way site was selected as a downstream companion site to the Littlejohns Creek @ Jack Tone Road and Lone Tree Creek @ Jack Tone Road sites. These waterbodies drain agricultural land to the east of Manteca and Stockton and eventually flow through urban areas prior to their discharge to the San Joaquin River. This site represents all major types of agriculture present in the Coalition region including field crops, orchards, grains, hay, rice, tomatoes, vineyards, and irrigated pasture (Figure VII-1).

Table VII-1. French Camp Slough @ Airport Way site subwatershed coordinates.

Site Name	Station Code	Target Latitude	Target Longitude
French Camp Slough @ Airport Way	531SJC504	37.8817	-121.2493

Figure VII-1. French Camp Slough @ Airport Way site subwatershed land use map.



Subwatershed Monitoring History

Monitoring was initiated at French Camp Slough @ Airport Way during the storm season of 2005 and has occurred continuously through 2011 (Table VII-2). Under the 2008 MRPP, French Camp Slough @ Airport Way is the Core site in Zone 2, and Core Monitoring occurred during the fall of 2008, 2009 and 2010 (Table VII-3). Assessment Monitoring occurred at the site during 2011 and is scheduled to occur every third year (2014, 2017, etc.). Core Monitoring resumed at this location in 2012.

Management Plan Monitoring at French Camp Slough began in 2007 and resumed in 2010 and continued through 2011. Management Plan Monitoring was initiated in 2007 for copper (June-August) and chlorpyrifos (July and August), but did not take place in 2008 and 2009 (Table VII-4). However, carbamates, organochlorines and organophosphates were sampled during all 2009 events to provide additional data to evaluate the high priority subwatersheds upstream of the French Camp Slough site, which include Littlejohns Creek @ Jack Tone Rd, Lone Tree Creek @ Jack Tone Rd, and Unnamed Drain to Lone Tree Creek @ Jack Tone Rd. French Camp Slough is a high priority subwatershed from 2011 through 2013, and hence Year 0 MPM occurred in 2010 for *S. capricornutum* toxicity (April), copper (May-August), chlorpyrifos (May, July-October), dieldrin (July), and toxicity to *H. azteca* (September). In 2011, all constituents were monitored monthly as a part of Assessment Monitoring and the following constituents were noted as both Assessment Monitoring and MPM: *C. dubia* toxicity (February and March), *S. capricornutum* toxicity (February and April), copper (January, May-August), chlorpyrifos (February, May, July-October), diazinon (January and February), dieldrin (July), diuron (January and February), and toxicity to *H. azteca* (March and September). The Coalition also conducted MPM during 2011 at the upstream sites along Littlejohns Creek, Lone Tree Creek, and Unnamed Drain to Lone Tree Creek.

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

Table VII-2. French Camp Slough @ Airport Way site subwatershed sampling events per season and year (including MPM).

Year	Season	Events Sampled	Events Not Sampled[1]	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	2	0	**2**
	Irrigation	6	0	**6**
	Fall	2	0	**2**
2009	Winter	3	0	**3**
	Storm	0	0	**0**
	Irrigation	6	0	**6**
	Fall	3	0	**3**
2010	Winter	2	0	**2**
	Storm	1	0	**1**
	Irrigation	6	0	**6**
	Fall	3	0	**3**
2011	Winter	3	0	**3**
	Storm	1	0	**1**
	Irrigation	6	0	**6**
	Fall	2	0	**2**

[1]If an event was not sampled during scheduled monitoring, the site was dry.

Table VII-3. French Camp Slough @ Airport Way 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																						
NA	Dissolved Oxygen	3	5	4	4	4	10	3	7	2	4		6	3	2	1	6	3	4	1	7	2
NA	Specific Conductivity	3	5	4	5	4	10	3	7	2	4		6	3	2	1	6	3	4	1	7	2
NA	pH	3	5	4	5	4	10	3	7	2	4		6	3	2	1	6	3	4	1	7	2
EPA 110.2	Color	2	5	2	5	2	7	1	6													
EPA 160.1	Dissolved Solids	2	5	2	5	2	6	2	6	2	3		6	3	2	1	6	3	3	1	6	2
EPA 160.2	Suspended Solids							1		2	3		6	3	2	1	6	3	3	1	6	2
EPA 180.1	Turbidity	2	5	2	5	2	7	2	6	2	3		6	3	2	1	6	3	3	1	6	2
EPA 415.1	Total Organic Carbon	2	5	2	6	2	6	2	6	2	3		6	3	2	1	6	3	3	1	6	2
SM 9223	*E. coli*	2	5	2	5	2	7	2	6	2	3		6	3	2	1	6	3	3	1	6	2
Walkley-Black	Total Organic Carbon (sediment)																1		1			
ASTM D422 or ASTM D4464	Grain size (sediment)																1		1		1	
EPA 405.1	BOD				1	2	2															
Carbamates																						
EPA 8321A	Aldicarb				5	2	6	2	6	2	3		6	3	2	1	6	3	3	1	6	2
EPA 8321A	Carbaryl				5	2	6	2	6	2	3		6	3	2	1	6	3	3	1	6	2
EPA 8321A	Carbofuran				5	2	6	2	6	2	3		6	3	2	1	6	3	3	1	6	2
EPA 8321A	Diuron				5	2	6	2	6	2			1						3	1	6	2
EPA 8321A	Linuron				5	2	6	2	6	2			1						3	1	6	2
EPA 8321A	Methiocarb				5	2	6	2	6	2	3		6	3	2	1	6	3	3	1	6	2
EPA 8321A	Methomyl				5	2	6	2	6	2	3		6	3	2	1	6	3	3	1	6	2
EPA 8321A	Oxamyl				5	2	6	2	6	2	3		6	3	2	1	6	3	3	1	6	2
Organochlorines																						
EPA 8081A	DDD(p,p')				5	2	6	2	6	2	3		6	3					3	1	6	2
EPA 8081A	DDE(p,p')				5	2	6	2	6	2	3		6	3					3	1	6	2
EPA 8081A	DDT(p,p')				5	2	6	2	6	2	3		6	3					3	1	6	2
EPA 8081A	Dicofol				5	2	6	2	6	2	3		6	3					3	1	6	2
EPA 8081A	Dieldrin				5	2	6	2	6	2	3		6	3			1		3	1	6	2
EPA 8081A	Endrin				5	2	6	2	6	2	3		6	3					3	1	6	2

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	3		6	3					3	1	6	2
Group A Pesticides																						
EPA 8081A	Aldrin												5	3								
EPA 8081A	Chlordane												5	3								
EPA 8081A	Endosulfan I												5	3								
EPA 8081A	Endosulfan II												5	3								
EPA 8081A	HCH, alpha												5	3								
EPA 8081A	HCH, beta												5	3								
EPA 8081A	HCH, delta												5	3								
EPA 8081A	HCH, gamma												5	3								
EPA 8081A	Heptachlor												5	3								
EPA 8081A	Heptachlor epoxide												5	3								
EPA 8081A	Toxaphene												5	3								
Organophosphates																						
EPA 8141A	Azinphos methyl				5	2	6	2	6	2	3		6	3					3	1	6	2
EPA 8141A	Chlorpyrifos	2	5	2	5	2	8	2	6	2	3		6	3			4	1	3	1	6	2
EPA 8141A	Demeton-s							1		2	3		6	3					3	1	6	2
EPA 8141A	Diazinon	2	5	2	5	2	6	2	6	2	3		6	3					3	1	6	2
EPA 8141A	Dichlorvos							1		2	3		6	3					3	1	6	2
EPA 8141A	Dimethoate				5	2	6	2	6	2	3		6	3					3	1	6	2
EPA 8141A	Disulfoton				5	2	6	2	6	2	3		6	3					3	1	6	2
EPA 8141A	Malathion				5	2	6	2	6	2	3		6	3					3	1	6	2
EPA 8321A	Methamidophos				5	2	6	2	6	2	3		6	3					3	1	6	2
EPA 8141A	Methidathion				5	2	6	2	6	2	3		6	3					3	1	6	2
EPA 8141A	Molinate				5	2	6	1	6													
EPA 8141A	Parathion, Methyl				5	2	6	2	6	2	3		6	3					3	1	6	2
EPA 8141A	Phorate				5	2	6	2	6	2	3		6	3					3	1	6	2
EPA 8141A	Phosmet				5	2	6	2	6	2	3		6	3					3	1	6	2
EPA 8141A	Thiobencarb				5	2	6	1	6													
EPA 8141A	Trifluralin												1						3	1	6	2

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
Pyrethroids																						
EPA 8081A	Bifenthrin		1	2	5	2	6	1	6													
EPA 8081A	Cyfluthrin, total		1	2	5	2	6	1	6													
EPA 8081A	Cyhalothrin, lambda, total	2	5	2	5	2	6	1	6													
EPA 8081A	Cypermethrin, total	2	5	2	5	2	6	1	6													
EPA 8081A	Esfenvalerate/ Fenvalerate, total	2	5	2	5	2	6	1	6													
EPA 8081A	Permethrin, total	2	5	2	5	2	6	1	6													
Triazines																						
EPA 547M	Glyphosate				5	2	6	1	6										3	1	6	2
EPA 549.2M	Paraquat dichloride				5	2	6	1	6										3	1	6	2
EPA 619	Atrazine				5	2	6	1	6				1						3	1	6	2
EPA 619	Cyanazine				5	2	6	1	6				1						3	1	6	2
EPA 619	Simazine				5	2	6	1	6				1						3	1	6	2
Metals (Total)																						
EPA 200.8	Arsenic				5	2	6	1	6										3	1	6	2
EPA 200.8	Boron				5	2	6	1	6										3	1	6	2
EPA 200.8	Cadmium				5	2	6	1	6										3	1	6	2
EPA 200.8	Copper				5	2	9	1	6								4		3	1	6	2
EPA 200.8	Lead				5	2	6	1	6										3	1	6	2
EPA 200.8	Molybdenum																		3	1	6	2
EPA 200.8	Nickel				5	2	6	1	6										3	1	6	2
EPA 200.8	Selenium				5	2	2	1	6										3	1	6	2
EPA 200.8	Zinc				5	2	6	1	6										3	1	6	2
Metals (Dissolved)																						
EPA 200.8	Cadmium																		3	1	6	2
EPA 200.8	Copper																4		3	1	6	2
EPA 200.8	Lead																		3	1	6	2
EPA 200.8	Nickel																		3	1	6	2
EPA 200.8	Zinc																		3	1	6	2
Nutrients																						
SM 2340 C	Hardness as CaCO3				6	2	9	1	6								4		3	1	6	2

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 300.0	Nitrate as N				5	2	6	1	6													
EPA 350.2	Ammonia as N				5	2	6	2	6	2	3		6	3	2	1	6	3	3	1	6	2
EPA 351.3	Nitrogen, Total Kjeldahl				5	2	6	2	6	2	3		6	3	2	1	6	3	3	1	6	2
EPA 354.1	Nitrite as N				5	2	6	1	6													
EPA 353.2	Nitrate + Nitrite as N							1		2	3		6	3	2	1	6	3	3	1	6	2
EPA 365.2	OrthoPhosphate as P				5	2	6	2	6	2	3		6	3	2	1	6	3	3	1	6	2
EPA 365.2	Phosphate as P				5	2	6	2	6	2	3		6	3	2	1	6	3	3	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*	2	5	3	5	3	6	1	6										3	1	6	2
EPA 821/R-02-012	*Pimephales promelas*	2	5	2	5	2	6	1	6										3	1	6	2
EPA 821/R-02-013	*Selenastrum capricornutum*	3	5	2	5	2	6	1	7								1		3	1	6	2
EPA 600/R-99-064	*Hyalella azteca*		5	1	1	1	2	2	1								1		1		1	

Table VII-4. French Camp Slough @ Airport Way site subwatershed Management Plan Monitoring schedule (2007-2011).

Site Name	Sample Date	Monitoring Type	Copper	Chlorpyrifos	Diazinon	Dieldrin	*Diuron*	*C. dubia*	*S. capricornutum*	*H. azteca*
French Camp Slough @ Airport Way	12-Jun-07	MPM	X							
French Camp Slough @ Airport Way	10-Jul-07	MPM	X	X						
French Camp Slough @ Airport Way	7-Aug-07	MPM	X	X						
French Camp Slough @ Airport Way	13-Apr-10	MPM							X	
French Camp Slough @ Airport Way	11-May-10	MPM	X	X						
French Camp Slough @ Airport Way	8-Jun-10	MPM	X							
French Camp Slough @ Airport Way	13-Jul-10	MPM	X	X		X				
French Camp Slough @ Airport Way	10-Aug-10	MPM	X	X						
French Camp Slough @ Airport Way	7-Sept-10	MPM		X						X
French Camp Slough @ Airport Way	12-Oct-10	MPM		X						
French Camp Slough @ Airport Way	11-Jan-11	MPM	X		X		X			
French Camp Slough @ Airport Way	8-Feb-11	MPM		X	X		X	X	X	
French Camp Slough @ Airport Way	8-Mar-11	MPM						X		X
French Camp Slough @ Airport Way	12-Apr-11	MPM							X	
French Camp Slough @ Airport Way	24-May-11	MPM	X	X						
French Camp Slough @ Airport Way	28-Jun-11	MPM	X							
French Camp Slough @ Airport Way	26-Jul-11	MPM	X	X		X				
French Camp Slough @ Airport Way	23-Aug-11	MPM	X	X						
French Camp Slough @ Airport Way	20-Sep-11	MPM		X						
French Camp Slough @ Airport Way	6-Oct-11	MPM		X						
French Camp Slough @ Airport Way	14-Oct-11	MPM								X

X – Constituent sampled for Management Plan Monitoring (MPM).

Exceedance History

Samples collected from French Camp Slough from 2005 through 2011 exceeded the WQTLs for field parameters, *E. coli,* pesticides, and metals as well as water column and sediment toxicity (Table VII-5). Exceedances include DO (15), pH (6), *E. coli* (31), copper (12), chlorpyrifos (12), two each of lead, diazinon, dieldrin, diuron, and thiobencarb, and one each of azinphos methyl, carbofuran, dimethoate, and methidathion. Toxicity to *C. dubia* (2), *S. capricornutum* (2), and *H. azteca* sediment (5) occurred (Table VII-5).

During 2011, exceedances of pH (3), *E. coli* (5) chlorpyrifos (2) and sediment toxicity to *H. azteca* (1) occurred.

The highest priority constituents in the French Camp Slough site subwatershed are chlorpyrifos (A/B), diazinon (A/B), copper (C), diuron (C), *C. dubia* toxicity (D), *S. capricornutum* toxicity (D), and *H. azteca* toxicity (D).

Table VII-5. French Camp Slough @ Airport Way site subwatershed exceedances (2005-2011).

The WQTLs are listed in the header after the analyte. Data sorted by season and date.

Site Name	Season	Sample Date	Oxygen, Dissolved, >7mg/L	pH, <6.5 and >8.5 units	*E. coli*, >235 MPN/100 mL	Copper, Total[1], > 1,300 µg/L	Lead, Total[1], > 15 µg/L	Azinphos methyl, >0.01µg/L	Carbofuran, ND	Chlorpyrifos, >0.015 µg/L	Diazinon, >0.1 µg/L	Dieldrin, >0.00014 µg/L	Dimethoate, >1.0 µg/L	Diuron, >2 µg/L	Methidathion, ND	Thiobencarb, µ,ND	*C. dubia*, (% Control)	*S. capricornutum*, (% Control)	*H. azteca*, (% Control)
French Camp Slough @ Airport Way	Storm	2/16/2005			1600													78	
French Camp Slough @ Airport Way	Irrigation	5/17/2005		9.02	500														
French Camp Slough @ Airport Way	Irrigation	6/21/2005			300														
French Camp Slough @ Airport Way	Irrigation	7/19/2005	6.00		1600					0.033									
French Camp Slough @ Airport Way	Irrigation	8/16/2005	5.80		1600					0.043									
French Camp Slough @ Airport Way	Irrigation	9/20/2005	4.80		300														
French Camp Slough @ Airport Way	Storm	2/27/2006								0.037									
French Camp Slough @ Airport Way	Storm	3/15/2006			1600												0		
French Camp Slough @ Airport Way	Storm	4/27/2006																	94
French Camp Slough @ Airport Way	Irrigation	5/16/2006			340	8.4 (4.8)	1.5 (1.18)												
French Camp Slough @ Airport Way	Irrigation	6/20/2006	6.80		550	6.6 (6)		0.13											
French Camp Slough @ Airport Way	Irrigation	7/18/2006	6.10		1200	7 (6.2)				0.027									
French Camp Slough @ Airport Way	Irrigation	8/15/2006	6.80		920	8 (6.2)													
French Camp Slough @ Airport Way	Storm	2/11/2007	0.91		2400	30 (14.7)				0.049	0.11			3.2	1.4		0		
French Camp Slough @ Airport Way	Storm	2/28/2007			2400	11 (10.1)													
French Camp Slough @ Airport Way	Irrigation	5/22/2007			310	5.9 (5.3)										0.18			
French Camp Slough @ Airport Way	Irrigation	6/12/2007				5.9 (4.6)	1.2 (1.12)									0.16			
French Camp Slough @ Airport Way	Irrigation	6/20/2007				6.7 (5.7)													
French Camp Slough @ Airport Way	Irrigation	7/10/2007				5.4 (5.3)						0.0053							
French Camp Slough @ Airport Way	Irrigation	7/30/2007				6.9 (5.2)													

Site Name	Season	Sample Date	Oxygen, Dissolved, >7mg/L	pH, <6.5 and >8.5 units	*E. coli*, >235 MPN/100 mL	Copper, Total[1], > 1,300 µg/L	Lead, Total[1], > 15 µg/L	Azinphos methyl, >0.01µg/L	Carbofuran, ND	Chlorpyrifos, >0.015 µg/L	Diazinon, >0.1 µg/L	Dieldrin, >0.00014 µg/L	Dimethoate, >1.0 µg/L	Diuron, >2 µg/L	Methidathion, ND	Thiobencarb, µ,ND	*C. dubia*, (% Control)	*S. capricornutum*, (% Control)	*H. azteca*, (% Control)
French Camp Slough @ Airport Way	Irrigation	8/7/2007			260														
French Camp Slough @ Airport Way	Irrigation	8/9/2007																	34
French Camp Slough @ Airport Way	Irrigation	8/28/2007				5.9 (5.3)													
French Camp Slough @ Airport Way	Irrigation	9/4/2007			290														
French Camp Slough @ Airport Way	Storm	1/23/2008			390						0.12			3.3					
French Camp Slough @ Airport Way	Storm Sediment	3/18/2008																	94
French Camp Slough @ Airport Way	Irrigation	4/15/2008			290													22	
French Camp Slough @ Airport Way	Irrigation	5/13/2008	5.83	5.95	280				0.2	0.4									
French Camp Slough @ Airport Way	Irrigation	6/10/2008																	
French Camp Slough @ Airport Way	Irrigation	7/15/2008			240							0.0083	2						
French Camp Slough @ Airport Way	Irrigation	8/12/2008								0.022									
French Camp Slough @ Airport Way	Irrigation Sediment	8/13/2008	6.27																
French Camp Slough @ Airport Way	Irrigation	9/16/2008	6.51							0.039									
French Camp Slough @ Airport Way	Fall	10/14/2008		4.01															
French Camp Slough @ Airport Way	Fall	11/4/2008	5.05																
French Camp Slough @ Airport Way	Winter, Non-Contiguous	1/13/2009	6.42																
French Camp Slough @ Airport Way	Irrigation	7/14/2009			240														
French Camp Slough @ Airport Way	Irrigation	8/11/2009	5.66																
French Camp Slough @ Airport Way	Fall	10/6/2009								0.029									
French Camp Slough @ Airport Way	Storm	1/13/2010	2.11																
French Camp Slough @ Airport Way	Winter	2/9/2010			1300														

Site Name	Season	Sample Date	Oxygen, Dissolved, >7mg/L	pH, <6.5 and >8.5 units	*E. coli*, >235 MPN/100 mL	Copper, Total[1], > 1,300 µg/L	Lead, Total[1], > 15 µg/L	Azinphos methyl, >0.01µg/L	Carbofuran, ND	Chlorpyrifos, >0.015 µg/L	Diazinon, >0.1 µg/L	Dieldrin, >0.00014 µg/L	Dimethoate, >1.0 µg/L	Diuron, >2 µg/L	Methidathion, ND	Thiobencarb, µ,ND	*C. dubia*, (% Control)	*S. capricornutum*, (% Control)	*H. azteca*, (% Control)
French Camp Slough @ Airport Way	Irrigation	4/13/2010			>2400														
French Camp Slough @ Airport Way	Irrigation	5/11/2010			360														
French Camp Slough @ Airport Way	Irrigation	6/8/2010			270														
French Camp Slough @ Airport Way	Irrigation	8/10/2010								0.022									
French Camp Slough @ Airport Way	Irrigation	9/7/2010			550														1
French Camp Slough @ Airport Way	Fall	11/9/2010	6.36																
French Camp Slough @ Airport Way	Winter	1/13/2011		4.63															
French Camp Slough @ Airport Way	Winter	2/8/2011		9.28															
French Camp Slough @ Airport Way	Winter	3/8/2011			>2400														
French Camp Slough @ Airport Way	Irrigation	4/12/2011			650					0.033									
French Camp Slough @ Airport Way	Irrigation	5/24/2011			390														
French Camp Slough @ Airport Way	Irrigation	8/23/2011			440														
French Camp Slough @ Airport Way	Storm	10/6/2011			>2400					0.097									
French Camp Slough @ Airport Way	Irrigation	10/14/2011																	86
French Camp Slough @ Airport Way	Fall	11/15/2011		9.16															
Constituent Priority			E	E	E	C	E	NP	NP	A/B	A/B	E	NP	C	NP	NP[R]	D	D	D

[1]Total metal WQTL variable based on hardness.
NP – Not Prioritized; less than two exceedances within three consecutive monitoring years and currently no TMDL.
NP[R] – Not Prioritized; Thiobencarb is only applied to rice and therefore will be managed under the Rice Coalition.

2007-2011 Management Plan Monitoring Results

All monitoring results for high priority management plan constituents in the French Camp Slough @ Airport Way subwatershed are listed in Table VII-6. These constituents include chlorpyrifos, diazinon, copper, diuron, *C. dubia* toxicity, *S. capricornutum* toxicity, *H. azteca* sediment toxicity and dieldrin.

Chlorpyrifos exceeded the WQTL twice during the first year (2005, July and August) of monitoring at French Camp Slough and twice again during 2006 (February and July). Normal Monitoring and additional MPM occurred during 2007 and chlorpyrifos exceeded the WQTL in February (Table VII-6). Since Littlejohns Creek, Lone Tree Creek, and Unnamed Drain to Lone Tree Creek are major tributaries upstream of French Camp Slough, upstream data were being gathered during 2008, and hence no specific upstream MPM occurred for French Camp Slough in 2008. Normal Monitoring at the site in 2008 resulted in exceedances of chlorpyrifos in May, August, and September. Although French Camp Slough was not a high priority site until 2011, chlorpyrifos was monitored at the site during 2009 to provide additional data for the upstream subwatersheds that had MPM at the time (Littlejohns Creek, Lone Tree Creek, and Unnamed Drain to Lone Tree Creek). A single chlorpyrifos exceedance occurred in October 2009. The site entered Year 0 monitoring in 2010, prior to becoming a high priority in 2011, and MPM for chlorpyrifos occurred during months of past exceedances; a chlorpyrifos exceedance occurred in August. Assessment Monitoring began in 2011, during which exceedances of chlorpyrifos occurred in April and October.

Diazinon first exceeded the WQTL during January 2007. Only Normal Monitoring occurred during 2008, as explained above, and diazinon exceeded the WQTL in February 2008 (Table VII-6). Diazinon was one of the extra constituents monitored at French Camp Slough during 2009, and there were no exceedances. Management Plan Monitoring did not occur for diazinon in January and February 2010 most likely because the 2010 MPM schedule was not complete until after February 2010 sampling had occurred. Assessment Monitoring in 2011 resulted in no exceedances of diazinon.

Copper exceeded the WQTL four times during 2006 monitoring (May, June, July, and August). Assessment Monitoring and additional MPM occurred during 2007 during which copper exceeded the WQTL in February, May, June (both events), July (both events), and August (Table VII-6). As explained above, there was no upstream MPM for French Camp Slough in 2008 and only Assessment Monitoring occurred; there were no exceedances of copper. Sampling for copper resumed with MPM in 2010 and continued during Assessment Monitoring in 2011; in both years there were no copper exceedances.

Diuron exceeded the WQTL during January 2007 and again in February 2008. Herbicides were sampled during May 2009 at French Camp Slough and there was no exceedance of diuron. Management Plan Monitoring did not occur for diuron in January and February 2010 because the 2010 MPM schedule was not complete until after February 2010 sampling occurred. Assessment Monitoring in 2011 resulted in no exceedances of diuron (Table VII-6).

Toxicity to *C. dubia* occurred in March 2006 and February 2007. The 2007 toxicity coincided with exceedances of the organophosphates chlorpyrifos and diazinon. Toxicity to *C. dubia* did not occur during 2008 Assessment Monitoring despite three exceedances of the chlorpyrifos WQTL and one exceedance of the diazinon WQTL. Toxicity to *C. dubia* was not monitored for again until 2011 Assessment Monitoring, during which there was also no toxicities (Table VII-6).

Toxicity to *S. capricornutum* occurred in February 2005 and again in April 2008; consequently, it was listed as a high priority constituent in the French Camp Slough management plan in 2009. Neither of the toxicities coincided with copper or herbicide exceedances. Management Plan Monitoring during 2010 and Assessment Monitoring during 2011 did not result in any toxicity to *S. capricornutum* (Table VII-6).

Sediment toxicity to *H. azteca* first occurred following the 2006 storm season (April) and again following the 2007 irrigation season (August). Assessment Monitoring during 2008 and MPM during 2010 detected sediment toxicity following the storm season (March 2008) and irrigation season (September 2010). The irrigation sediment sample (October) was toxic during 2011 Assessment Monitoring (Table VII-6).

Samples with dieldrin exceeded the WQTL during July of 2007 and July of 2008. Like chlorpyrifos and diazinon, dieldrin was monitored at French Camp Slough during 2009 to provide additional data for the upstream subwatersheds that had MPM at the time (Littlejohns Creek, Lone Tree Creek, and Unnamed Drain to Lone Tree Creek). Although dieldrin is a priority E constituent, the Coalition decided to conduct MPM for dieldrin during July of 2010 and the constituent was monitored monthly during 2011 as a part of Assessment Monitoring. There were no exceedances of dieldrin during 2009, 2010, and 2011 sampling (Table VII-6).

In 2012, French Camp Slough will be in Year 2 of MPM and the constituents discussed above will be monitored during months of past exceedances. In addition, Core Monitoring is scheduled to resume at French Camp Slough in 2012.

Table VII-6. French Camp Slough @ Airport Way site subwatershed 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 (@ Airport Way)	Date	NA	2/11/07	2/28/07	NA	4/10/07	5/22/07	6/12/07	7/10/07	8/07/07		9/04/07	NA	NA	NA
	Copper (µg/L)	NA	30	11	NA	5.7	**5.9**	**5.9**	**5.4**	5		4.5	NA	NA	NA
	Chlorpyrifos (µg/L)	NA	**0.049**	<0.003	NA	0.013	<0.003	0.013	0.014	<0.003		<0.003	NA	NA	NA
2007 MPM (@ Airport Way)	Date	NA	NA		NA	NA	NA	6/20/07	7/30/07	8/28/07		NA	NA	NA	NA
	Copper (µg/L)	NA	NA		NA	NA	NA	**6.7**	**6.9**	**5.9**		NA	NA	NA	NA
	Chlorpyrifos (µg/L)	NA	NA		NA	NA	NA	NA	0.011	<0.003		NA	NA	NA	NA
2008 NM (@ Airport Way)	Date	1/23/08	NA		3/18/08	4/15/08	5/13/08	6/10/08	7/15/08	8/12/08	8/13/08	9/16/08	10/14/08	11/04/08	12/09/08
	Copper (µg/L)	12	NA		NA	4.9	5.6	3.2	4.8	2.8	NA	3.9	NA	NA	NA
	Chlorpyrifos (µg/L)	0.008	NA		NA	0.003	**0.4**	<0.003	<0.003	**0.022**	NA	**0.039**	<0.003	<0.003	<0.003
	Diazinon (µg/L)	**0.12**	NA		NA	<0.004	<0.004	<0.004	<0.004	<0.004	NA	<0.004	<0.004	<0.004	<0.004
	C. dubia (% Control)	100	NA		NA	100	100	95	100	100	NA	100	NA	NA	NA
	H. azteca (% Control)	NA	NA		**94**	NA	NA	NA	NA	NA	98	NA	NA	NA	NA
2009 NM (@ Airport Way)	Date	1/15/09	2/10/09		3/10/09	4/14/09	5/12/09	6/09/09	7/14/09	8/11/09		9/15/09	10/06/09	11/10/09	12/08/09
	Chlorpyrifos (µg/L)	<0.003	<0.003		<0.003	0.0045	<0.003	<0.003	<0.003	<0.003		<0.003	**0.029**	<0.003	<0.003
	Diazinon (µg/L)	<0.004	<0.004		<0.004	<0.004	<0.004	<0.004	<0.004	<0.004		<0.004	<0.004	<0.004	<0.004
	Dieldrin (µg/L)	<0.005	<0.005		<0.005	<0.005	<0.005	<0.005	<0.005	<0.005		<0.005	<0.005	<0.005	<0.005
	Diuron (µg/L)	NA	NA		NA	NA	<0.2	NA	NA	NA		NA	NA	NA	NA
2010 MPM (@Airport Way)	Date	NA	NA		NA	4/13/10	5/11/10	6/08/10	7/13/10	8/10/10		9/07/10	10/12/10	NA	NA
	Copper, dissolved (µg/L)	NA	NA		NA	NA	2.7	3.5	3.5	2.9		NA	NA	NA	NA
	Copper, total (µg/L)	NA	NA		NA	NA	4.3	6.2	6	4.6		NA	NA	NA	NA
	Chlorpyrifos (µg/L)	NA	NA		NA	NA	<0.003	NA	<0.003	**0.022**		0.009	<0.003	NA	NA
	Dieldrin (µg/L)	NA	NA		NA	NA	NA	NA	<0.005	NA		NA	NA	NA	NA
	S. capricornutum toxicity (% Control)	NA	NA		NA	1923	NA	NA	NA	NA		NA	NA	NA	NA
	H. azteca toxicity (% Control)	NA	NA		NA	NA	NA	NA	NA	NA		**1**	NA	NA	NA

	Month:	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct		Nov	Dec
	Date	1/11/11	2/8/11	3/8/11	4/12/11	5/24/11	6/28/11	7/26/11	8/23/11	9/20/11	10/6/11	10/14/11	11/15/11	12/13/11
2011 NM & MPM (@Airport Way)	Copper, dissolved (µg/L)	3.4*	2.3	4.3	3.5	3.5*	3.5*	1.9*	1.8*	1.8	2.7	NA	2.1	2.1
	Copper, total (µg/L)	6*	2.9	7.7	6.6	6.4*	5.8*	4.2*	3.1*	3.0	4.1	NA	3	3.2
	Chlorpyrifos (µg/L)	<0.003	<0.003*	<0.003	**0.033**	<0.003*	<0.003	<0.003*	<0.003*	<0.003*	**0.097***	NA	<0.003	<0.003
	Diazinon (µg/L)	<0.004*	<0.004*	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	NA	<0.004	<0.004
	Dieldrin (µg/L)	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005*	<0.005	<0.005	<0.005	NA	<0.005	<0.005
	Diuron (µg/L)	<0.2*	<0.2*	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	NA	<0.2	<0.2
	C. dubia toxicity (% Control)	100	100*	100*	100	100	100	100	100	100	100	NA	100	100
	S. capricornutum toxicity (% Control)	624	1021*	668	1554*	1004	442	1425	1509	461	1197	NA	654	460
	H. azteca toxicity (% Control)	NA	NA	100*	NA	NA	NA	NA	NA	NA	NA	**86***	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 and MPM occurred during this date for this constituent.

Load Calculations

Loads were calculated for the chlorpyrifos, copper, diazinon and diuron detections (Table VII-7) based on the following formula:

Load = Discharge (cfs) X 28.317L/ft^3 X Concentration (mg/L X 1000 or µg/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. French Camp Slough @ Airport Way site subwatershed instantaneous load calculations for chlorpyrifos, copper, diazinon, diuron and dieldrin.

Sorted by analyte and date.

Site Name	Analyte Name	Sample Date	Discharge cfs	Concentration µg/L	Loading Rate µg/sec
French Camp Slough @ Airport Way	Chlorpyrifos	05/17/05	43.56	0.011	13.57
French Camp Slough @ Airport Way	Chlorpyrifos	07/19/05	59.4	0.033	55.51
French Camp Slough @ Airport Way	Chlorpyrifos	08/16/05	90.4	0.043	110.07
French Camp Slough @ Airport Way	Chlorpyrifos	03/15/06	2030	0.005	287.42
French Camp Slough @ Airport Way	Chlorpyrifos	05/16/06	54.83	0.015	23.29
French Camp Slough @ Airport Way	Chlorpyrifos	07/18/06	77.96	0.027	59.61
French Camp Slough @ Airport Way	Chlorpyrifos	09/19/06	60.56	0.013	22.29
French Camp Slough @ Airport Way	Chlorpyrifos	02/11/07	70.48	0.049	97.79
French Camp Slough @ Airport Way	Chlorpyrifos	04/10/07	32.12	0.013	11.82
French Camp Slough @ Airport Way	Chlorpyrifos	06/12/07	47.33	0.013	17.42
French Camp Slough @ Airport Way	Chlorpyrifos	07/10/07	27.64	0.014	10.96
French Camp Slough @ Airport Way*	Chlorpyrifos	07/10/07	27.64	0.014	10.96
French Camp Slough @ Airport Way	Chlorpyrifos	07/30/07	66.63	0.011	20.75
French Camp Slough @ Airport Way	Chlorpyrifos	01/23/08	8.13	0.008	1.84
French Camp Slough @ Airport Way	Chlorpyrifos	04/15/08	57.81	0.003	4.91
French Camp Slough @ Airport Way*	Chlorpyrifos	04/15/08	57.81	0.0041	6.71
French Camp Slough @ Airport Way	Chlorpyrifos	05/13/08	52.12	0.4	590.35
French Camp Slough @ Airport Way	Chlorpyrifos	08/12/08	18.46	0.022	11.50
French Camp Slough @ Airport Way	Chlorpyrifos	09/16/08	76.09	0.039	84.03
French Camp Slough @ Airport Way	Chlorpyrifos	04/14/09	56.42	0.0045	7.19
French Camp Slough @ Airport Way	Chlorpyrifos	10/06/09	68.06	0.029	55.89
French Camp Slough @ Airport Way	Chlorpyrifos	08/10/10	25.75	0.022	16.04
French Camp Slough @ Airport Way	Chlorpyrifos	09/07/10	87.76	0.009	22.37
French Camp Slough at Airport Way*	Chlorpyrifos	04/12/11	24.6	0.032	22.29
French Camp Slough at Airport Way	Chlorpyrifos	04/12/11	24.6	0.033	22.99
French Camp Slough at Airport Way	Chlorpyrifos	10/06/11	118.57	0.097	325.68
French Camp Slough at Airport Way*	Chlorpyrifos	10/06/11	118.57	0.092	308.89
French Camp Slough @ Airport Way	Copper	05/16/06	54.83	8.4	13042.02
French Camp Slough @ Airport Way	Copper	07/18/06	77.96	7	15453.15
French Camp Slough @ Airport Way	Copper	08/15/06	90.95	8	20603.45
French Camp Slough @ Airport Way	Copper	09/19/06	60.56	3.8	6516.53

Site Name	Analyte Name	Sample Date	Discharge cfs	Concentration µg/L	Loading Rate µg/sec
French Camp Slough @ Airport Way	Copper	02/11/07	70.48	30	59873.46
French Camp Slough @ Airport Way	Copper	04/10/07	32.12	5.7	5184.39
French Camp Slough @ Airport Way	Copper	05/22/07	71.95	5.9	12020.71
French Camp Slough @ Airport Way	Copper	06/12/07	47.33	5.9	7907.44
French Camp Slough @ Airport Way	Copper	06/20/07	27.38	6.7	5194.64
French Camp Slough @ Airport Way*	Copper	07/10/07	27.64	5.3	4148.21
French Camp Slough @ Airport Way	Copper	07/10/07	27.64	5.4	4226.48
French Camp Slough @ Airport Way	Copper	07/30/07	66.63	6.9	13018.66
French Camp Slough @ Airport Way	Copper	08/07/07	38.79	5	5492.08
French Camp Slough @ Airport Way	Copper	08/28/07	58.55	5.9	9781.97
French Camp Slough @ Airport Way	Copper	09/04/07	44.24	4.5	5637.35
French Camp Slough @ Airport Way	Copper	01/23/08	8.13	12	2762.61
French Camp Slough @ Airport Way*	Copper	04/15/08	57.81	4.7	7693.93
French Camp Slough @ Airport Way	Copper	04/15/08	57.81	4.9	8021.33
French Camp Slough @ Airport Way	Copper	05/13/08	52.12	5.6	8264.94
French Camp Slough @ Airport Way	Copper	06/10/08	19.99	3.2	1811.38
French Camp Slough @ Airport Way	Copper	07/15/08	30.2	4.8	4104.83
French Camp Slough @ Airport Way	Copper	08/12/08	18.46	2.8	1463.65
French Camp Slough @ Airport Way	Copper	09/16/08	76.09	3.9	8403.10
French Camp Slough @ Airport Way	Copper	05/11/10	31.87	4.3	3880.59
French Camp Slough @ Airport Way	Copper	06/08/10	13.89	6.2	2438.60
French Camp Slough @ Airport Way	Copper	07/13/10	45.48	6	7727.14
French Camp Slough @ Airport Way	Copper	08/10/10	25.75	4.6	3354.15
French Camp Slough at Airport Way*	Copper	01/11/11	204.31	6.4	37026.86
French Camp Slough at Airport Way	Copper	01/11/11	204.31	6	34712.68
French Camp Slough at Airport Way	Copper	02/08/11	9.18	2.9	753.86
French Camp Slough at Airport Way*	Copper	02/08/11	9.18	3	779.85
French Camp Slough at Airport Way	Copper	04/12/11	24.6	6.6	4597.55
French Camp Slough at Airport Way*	Copper	04/12/11	24.6	6.3	4388.57
French Camp Slough at Airport Way	Copper	05/24/11	58.85	6.4	10665.31
French Camp Slough at Airport Way*	Copper	05/24/11	58.85	6.2	10332.02
French Camp Slough at Airport Way	Copper	06/28/11	28.26	5.8	4641.38
French Camp Slough at Airport Way*	Copper	06/28/11	28.26	5.8	4641.38
French Camp Slough at Airport Way*	Copper	07/26/11	6.47	4.7	861.09
French Camp Slough at Airport Way	Copper	07/26/11	6.47	4.2	769.49
French Camp Slough at Airport Way*	Copper	08/23/11	48.03	3.3	4488.22
French Camp Slough at Airport Way	Copper	08/23/11	48.03	3.1	4216.20
French Camp Slough at Airport Way	Copper	09/20/11	67.53	3	5736.74
French Camp Slough at Airport Way*	Copper	09/20/11	67.53	2.7	5163.07
French Camp Slough at Airport Way*	Copper	10/06/11	118.57	4.2	14101.70
French Camp Slough at Airport Way	Copper	10/06/11	118.57	4.1	13765.94
French Camp Slough at Airport Way	Copper	11/15/11	0	3	0
French Camp Slough at Airport Way*	Copper	11/15/11	0	3.1	0
French Camp Slough at Airport Way	Copper	12/13/11	2.76	3.2	250.10
French Camp Slough @ Airport Way	Copper (D)	05/11/10	31.87	2.7	2436.65
French Camp Slough @ Airport Way	Copper (D)	06/08/10	13.89	3.5	1376.63
French Camp Slough @ Airport Way	Copper (D)	07/13/10	45.48	3.5	4507.50
French Camp Slough @ Airport Way	Copper (D)	08/10/10	25.75	2.9	2114.57
French Camp Slough at Airport Way	Copper (D)	01/11/11	204.31	3.4	19670.52

Site Name	Analyte Name	Sample Date	Discharge cfs	Concentration µg/L	Loading Rate µg/sec
French Camp Slough at Airport Way*	Copper (D)	01/11/11	204.31	3.4	19670.52
French Camp Slough at Airport Way	Copper (D)	02/08/11	9.18	2.3	597.89
French Camp Slough at Airport Way*	Copper (D)	02/08/11	9.18	2.3	597.89
French Camp Slough at Airport Way	Copper (D)	04/12/11	24.6	3.5	2438.09
French Camp Slough at Airport Way*	Copper (D)	04/12/11	24.6	3.4	2368.43
French Camp Slough at Airport Way	Copper (D)	05/24/11	58.85	3.5	5832.59
French Camp Slough at Airport Way*	Copper (D)	05/24/11	58.85	3.6	5999.24
French Camp Slough at Airport Way*	Copper (D)	06/28/11	28.26	3.6	2880.86
French Camp Slough at Airport Way	Copper (D)	06/28/11	28.26	3.5	2800.83
French Camp Slough at Airport Way*	Copper (D)	07/26/11	6.47	1.8	329.78
French Camp Slough at Airport Way	Copper (D)	07/26/11	6.47	1.9	348.10
French Camp Slough at Airport Way*	Copper (D)	08/23/11	48.03	1.6	2176.10
French Camp Slough at Airport Way	Copper (D)	08/23/11	48.03	1.8	2448.12
French Camp Slough at Airport Way	Copper (D)	09/20/11	67.53	1.8	3442.04
French Camp Slough at Airport Way*	Copper (D)	09/20/11	67.53	1.7	3250.82
French Camp Slough at Airport Way	Copper (D)	10/06/11	118.57	2.7	9065.38
French Camp Slough at Airport Way*	Copper (D)	10/06/11	118.57	2.8	9401.13
French Camp Slough at Airport Way*	Copper (D)	11/15/11	0	2.1	0
French Camp Slough at Airport Way	Copper (D)	11/15/11	0	2.1	0
French Camp Slough at Airport Way	Copper (D)	12/13/11	2.76	2.1	164.13
French Camp Slough @ Airport Way	Diazinon	02/16/05	706	0.052	1039.57
French Camp Slough @ Airport Way	Diazinon	07/19/05	59.4	0.013	21.87
French Camp Slough @ Airport Way	Diazinon	03/15/06	2030	0.087	5001.07
French Camp Slough @ Airport Way	Diazinon	02/11/07	70.48	0.11	219.54
French Camp Slough @ Airport Way	Diazinon	01/23/08	8.13	0.12	27.63
French Camp Slough @ Airport Way	Dieldrin	07/10/07	27.64	0.0053	4.15
French Camp Slough @ Airport Way	Dieldrin	07/15/08	30.2	0.0083	7.10
French Camp Slough @ Airport Way	Diuron	05/16/06	54.83	0.21	326.05
French Camp Slough @ Airport Way	Diuron	02/11/07	70.48	3.2	6386.50
French Camp Slough @ Airport Way	Diuron	04/10/07	32.12	0.36	327.44
French Camp Slough @ Airport Way	Diuron	05/22/07	71.95	0.3	611.22
French Camp Slough @ Airport Way	Diuron	07/10/07	27.64	0.38	297.42
French Camp Slough @ Airport Way*	Diuron	07/10/07	27.64	0.4	313.07
French Camp Slough @ Airport Way	Diuron	01/23/08	8.13	3.3	759.72
French Camp Slough @ Airport Way*	Diuron	04/15/08	57.81	0.79	1293.23
French Camp Slough @ Airport Way	Diuron	04/15/08	57.81	0.84	1375.08
French Camp Slough @ Airport Way	Diuron	06/10/08	19.99	0.23	130.19

Copper (D) – Dissolved Copper
*Field Duplicate

Source Identification and Outreach

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. Chlorpyrifos and copper were the first high priority constituents added to the French Camp Slough management plan and the Coalition conducted additional monitoring during 2007. More high priority constituents were added following 2007 and 2008 monitoring, including diazinon, diuron, *C. dubia* toxicity*, S. capricornutum* toxicity*, and H. azteca* toxicity. In 2010, MPM resumed at French Camp Slough during the months when

past exceedances had occurred and in 2011, Assessment Monitoring took place. In addition, Coalition subwatersheds upstream of French Camp Slough were recently or are currently high priority subwatersheds (Littlejohns Creek in 2010-2012, Lone Tree Creek in 2008-2010, and Unnamed Drain to Lone Tree Creek in 2008-2010), and the results of MPM at those locations will offer further insight to the dynamics of the French Camp Slough subwatershed. Additional focused outreach to growers currently using chlorpyrifos continues during 2012 in all three upstream subwatersheds (as described in the Duck Creek subwatershed Source ID and Outreach section). 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.

French Camp Slough @ Airport Way subwatershed is one of the Coalition's third high priority subwatersheds as of 2011 and will remain so through 2013. The Coalition will actively engage in grower outreach and education to address the French Camp Slough Management Plan's highest priority constituents. The Coalition has 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 during the winter 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 was initiated during the winter of 2012 to determine if additional management practices were implemented in 2011 and if any are to be implemented in the 2012 irrigation season. 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 priority A/B constituents in the French Camp Slough subwatershed.

Chlorpyrifos

The WQTL for chlorpyrifos (0.015 µg/L) was exceeded at this site 12 times in the past (Table VII-5). The February 2007 exceedance was associated with *C. dubia* toxicity.

To assess the potential sources of the pesticide, the Coalition examines associated PUR data and past monitoring results to determine sourcing and, consequently, the most appropriate strategy for outreach.

The Coalition reviewed PUR data for the number of monthly applications of chlorpyrifos, pounds of active ingredient applied, and the acres treated (Table VII-8, Figure VII-2). The greatest chlorpyrifos use is generally between the months of May and August in the subwatershed, and complete PUR data are currently only available through May 2011 for the subwatershed (but some data are available after May 2011). To date, it appears that less chlorpyrifos was applied in 2011 compared to 2010. The greatest amount of chlorpyrifos use between 2005 through 2010 occurred in 2005 (18,647 lbs AI), while the lowest use occurred in 2008 (8,473 lbs AI).

The Coalition also uses PUR data to determine which crops received the most applications of chlorpyrifos (Table VII-9). The largest amount of chlorpyrifos applied from 2004 through 2011 (complete PUR data only available through May 2011) was to walnuts (29,279 lbs AI) followed by corn (21,721 lbs AI). The most common product containing chlorpyrifos used within this subwatershed was Lorsban.

Table VII-8. French Camp Slough @ Airport Way site subwatershed chlorpyrifos applications, lbs AI applied, and acres treated by month (2005-2011).

PUR data available through May 2011 for San Joaquin County and through November 2011 for Stanislaus County; all PUR data after May 2011 are preliminary. If a month is not included in the table, no applications were made.

Month/Year	Number of Chlorpyrifos Applications	Pounds of AI Applied	Acres Treated
January, 2005	6	620.7	340.0
March, 2005	25	836.8	1572.0
April, 2005	1	33.6	67.2
May, 2005	51	3732.0	1576.3
June, 2005	50	5778.2	3113.1
July, 2005	105	5597.0	4193.6
August, 2005	33	1364.0	1367.2
September, 2005	4	109.2	273.0
December, 2005	5	575.6	288.4
January, 2006	13	927.2	516.0
March, 2006	10	369.1	693.0
April, 2006	11	487.9	804.0
May, 2006	58	3880.3	2378.8
June, 2006	63	5714.3	4014.6
July, 2006	77	4522.8	3226.3
August, 2006	29	1382.3	1396.5
September, 2006	16	651.2	733.0
October, 2006	3	297.6	152.4
November, 2006	2	249.0	134.0
January, 2007	15	1737.7	931.0
March, 2007	20	1020.0	1364.0
April, 2007	10	391.4	416.0
May, 2007	48	3168.9	2282.0
June, 2007	64	4924.7	3774.0
July, 2007	46	3089.6	1781.4
August, 2007	31	1101.8	969.5
September, 2007	8	368.8	295.0
October, 2007	1	199.4	100.0
December, 2007	2	10.0	7.2
March, 2008	19	697.7	1131.6
April, 2008	4	191.5	181.0
May, 2008	30	2362.8	1470.0
June, 2008	19	849.6	766.0
July, 2008	49	3897.4	1909.1
August, 2008	4	309.6	151.0
September, 2008	3	94.8	80.0
October, 2008	2	69.5	114.3
January, 2009	1	4.0	10.0

Month/Year	Number of Chlorpyrifos Applications	Pounds of AI Applied	Acres Treated
March, 2009	19	1095.6	1331.5
April, 2009	2	110.1	92.3
May, 2009	15	1491.3	774.0
June, 2009	18	1551.0	790.4
July, 2009	49	3561.8	2103.1
August, 2009	26	1167.2	912.8
September, 2009	10	350.7	307.0
October, 2009	9	3152.0	1677.4
November, 2009	5	1045.1	556.5
January, 2010	16	1781.9	942.0
February, 2010	2	41.9	81.0
March, 2010	12	379.4	667.2
April, 2010	2	220.4	152.0
May, 2010	4	279.1	192.0
June, 2010	20	1907.9	1112.9
July, 2010	33	1468.0	1065.5
August, 2010	36	1493.4	1016.0
September, 2010	2	93.9	50.0
October, 2010	14	2356.9	1255.0
November, 2010	3	1718.4	915.0
December, 2010	1	44.0	25.0
March, 2011	2	69.3	108.0
April, 2011	1	58.0	57.0
May, 2011	5	388.7	195.7
June, 2011	8	512.1	658.5
July, 2011	5	386.1	221.0
August, 2011	9	1049.8	674.5
September, 2011	3	80.8	43.0
Summaries by Year			
2005 Total	280	18647.3	12790.8
2006 Total	282	18481.7	14048.6
2007 Total	245	16012.3	11920.1
2008 Total	130	8473.0	5803.0
2009 Total	154	13528.7	8555.0
2010 Total	145	11785.1	7473.6
2011 Total	33	2544.8	1957.7
Total	**1269**	**89472.8**	**62548.8**

Figure VII-2. French Camp Slough @ Airport Way site subwatershed lbs chlorpyrifos applied by month (2005-2011).

PUR data available through May 2011 for San Joaquin County and through November 2011 for Stanislaus County; all PUR data after May 2011 are preliminary. Asterisk (*) denotes months with exceedances.

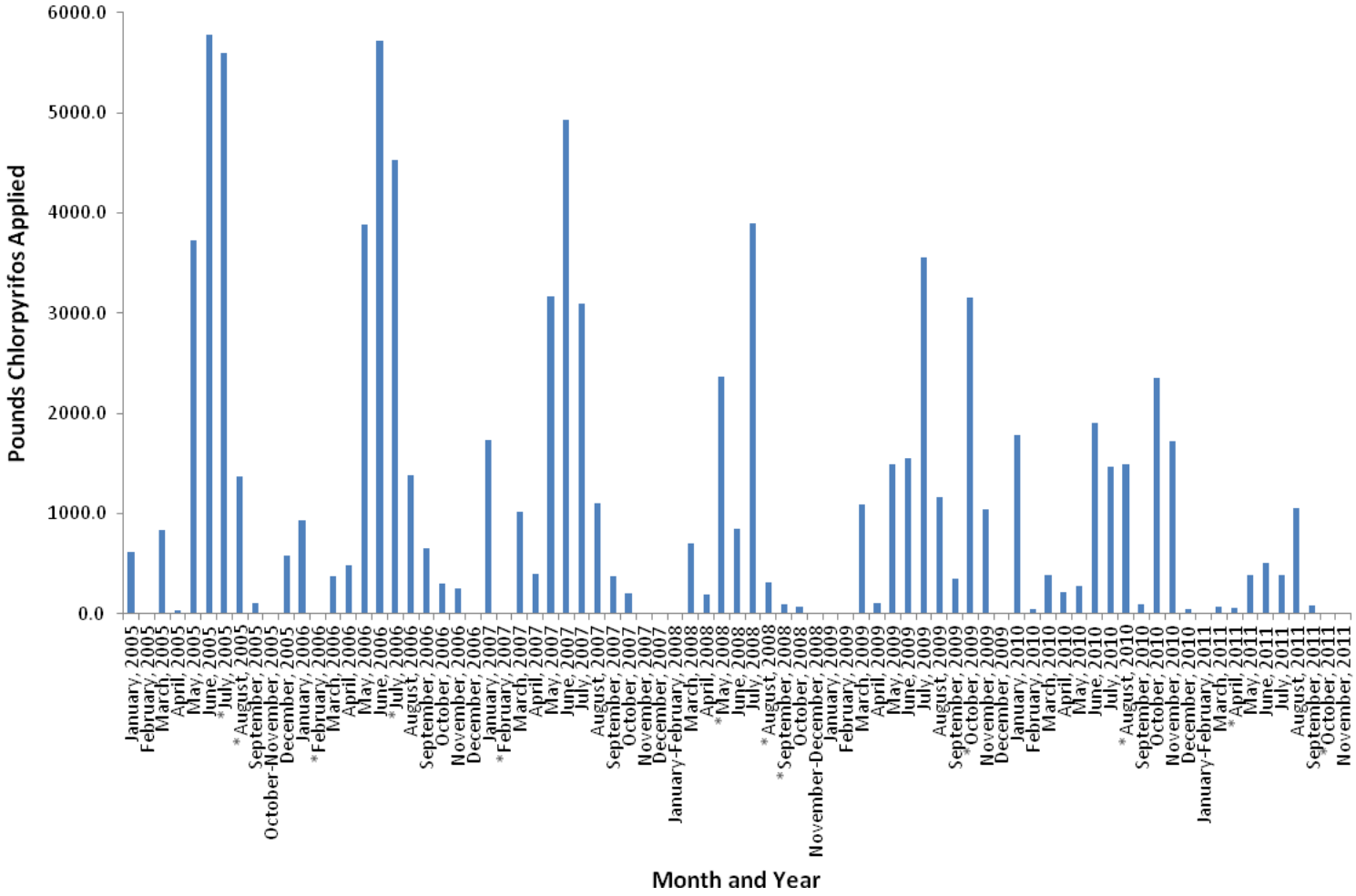


Table VII-9. French Camp Slough @ Airport Way site subwatershed chlorpyrifos PUR data (2005-2011).

PUR data available through May 2011 for San Joaquin County and through November 2011 for Stanislaus County; all PUR data after May 2011 are preliminary.

Chemical Name	Commodity	Product Name	Lbs AI Applied
CHLORPYRIFOS	ALFALFA (FORAGE - FODDER) (ALFALFA HAY)	GOVERN 4E INSECTICIDE	72.2
		LOCK-ON INSECTICIDE	2164.8
		LORSBAN 4E-HF	2716.6
		LORSBAN ADVANCED	278.8
		LORSBAN-4E	814.2
	ALMOND	CHLORPYRIFOS 4E AG	2386.2
		GOVERN 4E INSECTICIDE	353.3
		LORSBAN 4E INSECTICIDE	774.7
		LORSBAN 4E-HF	2230.2
		LORSBAN ADVANCED	3267.9
		LORSBAN-4E	11624.3
		NUFOS 4E	63.0
		WARHAWK	659.9
	APPLE	LORSBAN 4E-HF	51.5
		LORSBAN ADVANCED	99.5
		LORSBAN-4E	711.7
	CORN (FORAGE - FODDER)	CHLORPYRIFOS 4E AG	71.6
		GOVERN 4E INSECTICIDE	313.1
		LORSBAN 15G GRANULAR INSECTICIDE	12888.6
		LORSBAN 4E-HF	1419.8
		LORSBAN ADVANCED	473.5
		LORSBAN-4E	853.5
		NUFOS 15G	5466.8
		NUFOS 4E	222.2
		WARHAWK	11.4
	GRAPES	LORSBAN 4E-HF	16.0
		LORSBAN ADVANCED	18.8
	GRAPES (WINE)	LORSBAN 4E-HF	860.7
		LORSBAN ADVANCED	8272.4
		LORSBAN-4E	739.6
	NECTARINE	LORSBAN 4E INSECTICIDE	5.0
	N-OUTDR GRWN TRNSPLNT/PRPGTV MTRL	LORSBAN ADVANCED	44.0
		LORSBAN-4E	240.1
		WARHAWK	3.0
	PEACH	LORSBAN 4E INSECTICIDE	5.0
	WALNUT (ENGLISH WALNUT, PERSIAN WALNUT)	CHLORPYRIFOS 4E AG	524.2
		GOVERN 4E INSECTICIDE	4475.2
		LORSBAN 4E INSECTICIDE	3946.5
		LORSBAN 4E-HF	6165.0
		LORSBAN 50W INSECTICIDE IN WATER SOLUBLE PACKETS	1.0
		LORSBAN ADVANCED	2382.6
		LORSBAN-4E	11207.4
		NUFOS 4E	139.3
		WARHAWK	361.6
		WHIRLWIND	76.0

Chemical Name	Commodity	Product Name	Lbs AI Applied
		ALFALFA - Total Pounds Chlorpyrifos Applied	6046.7
		ALMOND - Total Pounds Chlorpyrifos Applied	21359.5
		APPLE - Total Pounds Chlorpyrifos Applied	862.7
		CORN - Total Pounds Chlorpyrifos Applied	21720.5
		GRAPES - Total Pounds Chlorpyrifos Applied	9907.5
		NECTARINE - Total Pounds Chlorpyrifos Applied	5.0
		N-OUTDR GRWN TRNSPLNT - Total Pounds Chlorpyrifos Applied	287.1
		PEACH - Total Pounds Chlorpyrifos Applied	5.0
		WALNUT - Total Pounds Chlorpyrifos Applied	29278.7
		Total Pounds Chlorpyrifos Applied (2005-2011)	89472.8

Chlorpyrifos exceedances at the French Camp Slough site often coincide with chlorpyrifos exceedances that occurred at upstream Coalition site subwatersheds (Littlejohns Creek @ Jack Tone Rd, Lone Tree Creek @ Jack Tone Rd, and Unnamed Drain to Lone Tree Creek @ Jack Tone Rd). Of the 12 chlorpyrifos exceedances at French Camp Slough, 10 exceedances occurred when at least one of the upstream sites were monitored on the same day. Samples from at least one of the upstream sites exceeded the chlorpyrifos WQTL on the same day as eight of the 10 chlorpyrifos exceedances at French Camp Slough.

The Coalition noted in the 2008 Management Plan that the chlorpyrifos concentrations found in French Camp Slough were most likely the result of runoff in storm water or irrigation return flows rather than spray drift. The relatively large concentrations of chlorpyrifos that resulted in exceedances further supports this assumption since most likely spray drift alone cannot account for transferring such large amounts of pesticides to waterways. Given the large geographic area with chlorpyrifos applications prior to exceedances, the correlation between exceedances in French Camp Slough and upstream sites, and the size of the subwatershed, the Coalition recommended in the 2008 Management Plan that management of chlorpyrifos in French Camp Slough occur via the smaller site subwatersheds upstream.

Consequently, the upstream sites became high priority subwatersheds and received focused outreach prior to shifting resources to French Camp Slough. Lone Tree Creek and Unnamed Drain to Lone Tree Creek both became high priority site subwatersheds in 2008 and Littlejohns Creek became a high priority site subwatershed in 2010. Intensive outreach to encourage growers to implement new management practices to improve irrigation and storm water management occurred and is ongoing in all three upstream subwatersheds. Despite this effort, chlorpyrifos exceedances continue to occur at Littlejohns Creek (November) and Unnamed Drain to Lone Tree Creek (January and July) during 2011 MPM. The Coalition reviewed previous survey results along with the most recent PUR data and developed a list of growers to contact (or, in some cases, re-contact) in the Littlejohns Creek, Lone Tree Creek, and Unnamed Drain to Lone Tree Creek subwatersheds that have the greatest likelihood of contributing to the recent chlorpyrifos impairments. The Coalition plans to make additional contacts during 2012. In addition, there are several growers who are not members of the Coalition who apply chlorpyrifos.

In the meantime, the Coalition continues to move forward with its outreach strategy for the French Camp Slough site subwatershed. Management of chlorpyrifos in this watershed is being accomplished by providing information on a watershed 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.

Since 2007, Coalition outreach included grower meetings and the mailing/distribution of information to all growers in the subwatershed. A complete list of Coalition outreach in high priority subwatersheds during 2011 is provided in the Performance Goals and Schedules section of this report. Focused outreach is directed at growers who farm parcels in the direct drainage area of the subwatershed and who used chlorpyrifos within the last two years. From these criteria, the Coalition compiled a list of targeted growers which predominately consists of orchard/vineyard operators.

The Coalition conducted individual meetings with targeted growers during the winter of 2011. Although meetings focused mainly on chlorpyrifos exceedances, all water quality results were reviewed and discussed including exceedances of DO, pH, *E. coli,* dieldrin, lead, diazinon, diuron, copper, and *C. dubia, H. azteca,* and *S. capricornutum* toxicity. The Coalition contacted 13 targeted growers accounting for 3,767 acres of direct drainage within the subwatershed. To date, the Coalition achieved 100% of its initial contacts for targeted growers in the French Camp Slough subwatershed.

Grower surveys completed at the meetings, documenting members' current practices and indicating which recommended practices growers anticipated implementing in the upcoming years, were compiled and assessed by the Coalition in the Third Priority Summary of Management Practices section of this report. The Coalition began follow up contacts with targeted growers during the winter of 2012 to determine what additional management practices were implemented in 2011 and if additional practices are planned for 2012.

Assessment Monitoring occurred during 2011 at French Camp Slough @ Airport Way. Core Monitoring is scheduled to resume in 2012 and the Coalition plans to conduct MPM in 2012 and 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 at this site (February 2007 and January 2008, Table VII-5). The February 2007 exceedance coincided with *C. dubia* toxicity. The two exceedances of diazinon in French Camp Slough both occurred on the same day as a diazinon exceedance occurred in one of the Coalition's upstream site subwatersheds—diazinon exceeded the WQTL at Littlejohns Creek and Lone Tree Creek in February 2007 and at Lone Tree Creek in January 2008.

The PUR from the French Camp Slough subwatershed area were reviewed for diazinon use (Table VII-10, Figure VII-3). The greatest amount of diazinon use occurred in 2005 (2,348 lbs AI) with the lowest use in

2010 (446 lbs AI). And although complete PUR data are only available through May 2011, the pattern and amount of use in 2011 seems similar to 2010. The greatest diazinon use is consistently in the month of January and the majority of diazinon applications are during the winter months.

The Coalition also uses PUR data to determine which crops receive the most applications of diazinon (Table VII-11). The largest amount of diazinon applied from 2004 through 2011 was to almonds (5,782 lbs AI) followed by cherries (537 lbs AI). Diazol and Diazinon were the most common products containing diazinon used within this subwatershed.

Table VII-10. French Camp Slough @ Airport Way site subwatershed diazinon applications, lbs AI applied, and acres treated by month (2005-2011).

PUR data available through May 2011 for San Joaquin County and through November 2011 for Stanislaus County; all PUR data after May 2011 are preliminary. If a month is not included in the table, no applications were made.

Month/Year	Number of Diazinon Applications	Pounds of AI Applied	Acres Treated
January, 2005	29	1629.1	1047.5
February, 2005	7	354.0	187.5
August, 2005	1	39.7	40
December, 2005	8	325.6	192.5
January, 2006	40	2022.3	1343.5
February, 2006	4	78.6	179
March, 2006	1	1.1	120
May, 2006	4	6.7	5.12
December, 2006	10	156.1	101.5
January, 2007	6	244.6	140.5
February, 2007	6	73.4	43.4
March, 2007	3	33.3	17.4
April, 2007	1	1.6	3
May, 2007	3	8.9	3
June, 2007	1	1.5	0.5
July, 2007	4	257.6	210
August, 2007	2	12.3	40
December, 2007	5	5.3	4.25
January, 2008	11	747.0	481
February, 2008	3	51.0	22
March, 2008	1	1.0	2
April, 2008	2	9.7	2.5
May, 2008	3	10.1	2.5
July, 2008	1	2.0	10
December, 2008	1	15.9	8
January, 2009	3	95.5	58
March, 2009	1	16.0	8
May, 2009	2	14.9	7.8
June, 2009	2	58.6	98.2
August, 2009	1	1.9	10
December, 2009	16	379.6	161.8
January, 2010	4	76.9	45.5
February, 2010	1	12.6	6

Month/Year	Number of Diazinon Applications	Pounds of AI Applied	Acres Treated
April, 2010	10	258.0	176
June, 2010	2	52.3	26.5
August, 2010	1	22.5	15
December, 2010	2	23.8	16
January, 2011	1	22.3	14
April, 2011	2	94.9	55
July, 2011	2	86.0	43
September, 2011	1	30.0	15
Summaries by Year			
2005 Total	45	2348.3	1467.5
2006 Total	59	2264.8	1749.1
2007 Total	31	638.4	462.1
2008 Total	22	836.6	528
2009 Total	25	566.4	343.8
2010 Total	20	446.1	285
2011 Total	6	233.3	127
Total	**208**	**7333.9**	**4962.4**

Figure VII-3. French Camp Slough @ Airport Way site subwatershed lbs diazinon applied by month (2005-2011).

PUR data available through May 2011 for San Joaquin County and through November 2011 for Stanislaus County; all PUR data after May 2011 are preliminary. Asterisk (*) denotes months with exceedances.

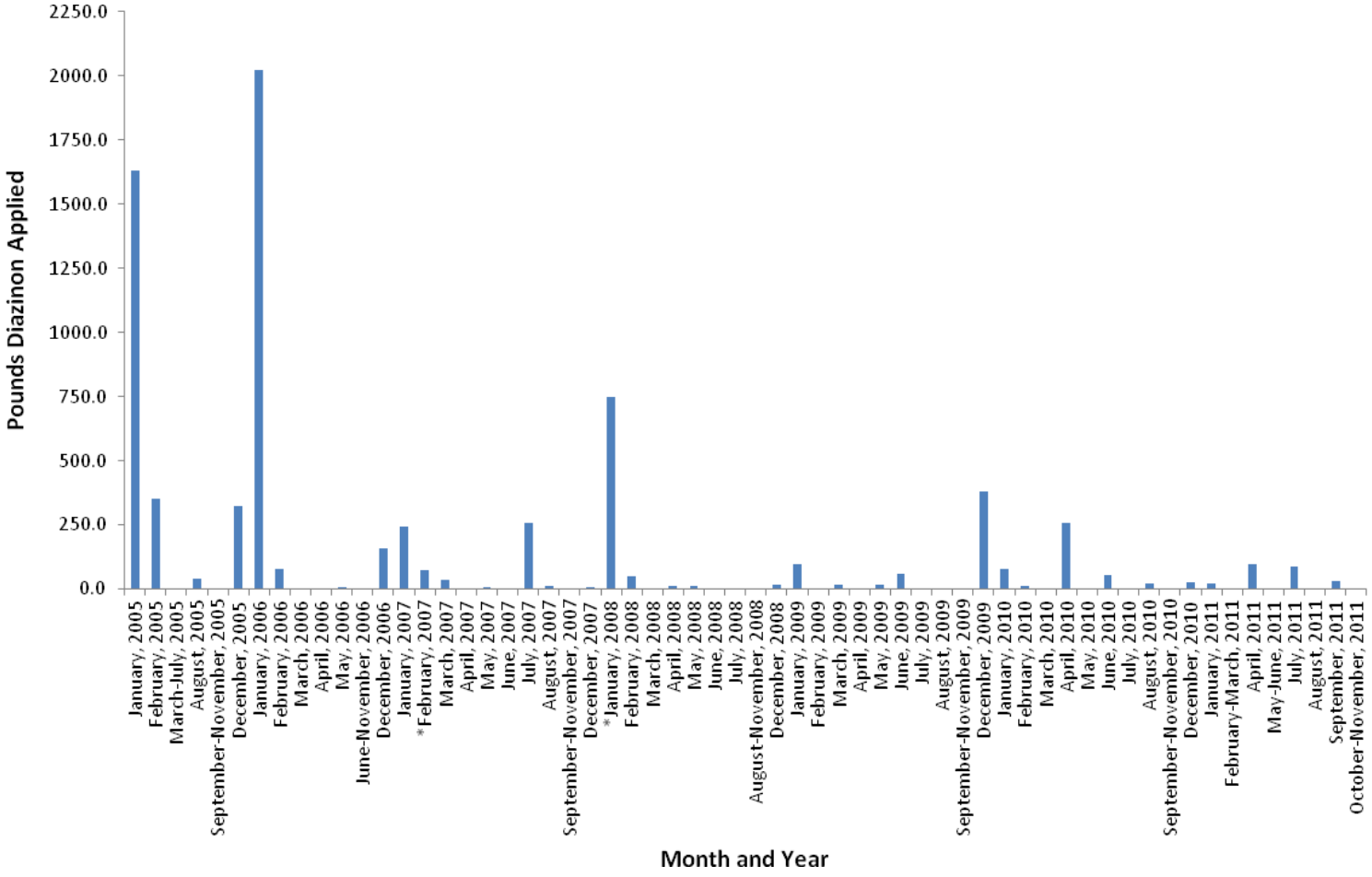


Table VII-11. French Camp Slough @ Airport Way site subwatershed diazinon PUR data (2005-2011).

PUR data available through May 2011 for San Joaquin County and through November 2011 for Stanislaus County; all PUR data after May 2011 are preliminary.

Chemical Name	Commodity	Product Name	Lbs AI Applied
DIAZINON	ALMOND	CLEAN CROP DIAZINON AG600 WBC	233.3
		DIAZINON 50W	195.5
		DIAZINON AG 500	2546.8
		DIAZINON AG500	314.3
		DIAZINON AG500 INSECTICIDE	119.5
		DIAZOL 50 W	344.0
		DIAZOL AG 500	1470.0
		GOWAN DIAZINON 4E	521.8
		SMCP DIAZINON AG500	36.7
	APPLE	D.Z.N. DIAZINON 50W (WITHDRAWN)	53.6
		DIAZINON 50W	188.5
		DIAZOL 50 W	8.5
	APRICOT	CLEAN CROP DIAZINON AG600 WBC	2.5
		DIAZOL 50 W	6.3
	CHERRY	CLEAN CROP DIAZINON 50 WP	35.0
		CLEAN CROP DIAZINON AG600 WBC	39.9
		D.Z.N. DIAZINON AG600 WBC (WITHDRAWN)	44.9
		DIAZINON 50W	397.0
		DIAZINON AG600 WBC INSECTICIDE	14.9
		DIAZOL 50 W	5.0
	GRAPES	DIAZINON AG 500	19.8
	NECTARINE	CLEAN CROP DIAZINON AG600 WBC	6.2
		D.Z.N. DIAZINON AG600 WBC (WITHDRAWN)	7.5
		DIAZINON AG 500	19.8
		DIAZOL 50 W	3.8
		DIAZOL AG 500	19.8
	PEACH	CLEAN CROP DIAZINON AG600 WBC	252.1
		DIAZINON AG 500	51.6
		DIAZOL 50 W	4.8
		DIAZOL AG 500	9.9
	PLUM (INCLUDES WILD PLUMS FOR HUMAN CONSUMPTION)	DIAZOL 50 W	6.3
	TOMATOES (FOR PROCESSING/CANNING)	DIAZINON 50W	18.6
		DIAZINON AG 500	19.7
		DIAZOL AG 500	4.8
	WALNUT (ENGLISH WALNUT, PERSIAN WALNUT)	CLEAN CROP DIAZINON AG500 INSECTICIDE	7.6
		DIAZINON 50W	250.0
		DIAZINON AG 500	39.7
		DIAZOL AG 500	7.4
		PROKIL DIAZINON 4EC	6.4

ALMOND - Total Pounds Diazinon Applied	**5781.9**
APPLE - Total Pounds Diazinon Applied	**250.6**
APRICOT - Total Pounds Diazinon Applied	**8.7**
CHERRY - Total Pounds Diazinon Applied	**536.7**
GRAPES - Total Pounds Diazinon Applied	**19.8**

NECTARINE - Total Pounds Diazinon Applied	57.2
PEACH - Total Pounds Diazinon Applied	318.3
PLUM - Total Pounds Diazinon Applied	6.3
TOMATOES - Total Pounds Diazinon Applied	43.2
WALNUT - Total Pounds Diazinon Applied	311.1
Total Pounds Diazinon Applied (2005-2011)	7333.9

The Coalition's strategy for addressing diazinon exceedances in the French Camp Slough subwatershed includes contacting specific growers whose parcels potentially drain to the creek and who applied diazinon in the last two years. Since diazinon exceedances occurred only during the winter, the Coalition suspects storm water runoff from orchards following ill-timed dormant sprays to be the likely source. Individual grower contacts that occurred within this subwatershed are described in the chlorpyrifos outreach section above and included discussions of management practices relevant to storm water retention.

Priority C Constituents

Copper and diuron are listed as Priority C constituents for the French Camp Slough subwatershed.

Copper

Twelve exceedances of the copper WQTL occurred in the French Camp Slough site subwatershed. None of the copper exceedances were associated with toxicity to *S. capricornutum*. No exceedances of the copper WQTL occurred during 2008 Assessment Monitoring, 2010 MPM or during 2011 Assessment Monitoring (Table VII-5). Samples collected from the upstream subwatersheds resulted in copper WQTL exceedances in 2010 (during May in Littlejohns Creek and during April in Unnamed Drain to Lone Tree Creek) and 2011 (during May in both Littlejohns Creek and Unnamed Drain to Lone Tree Creek).

Copper is an algaecide and fungicide often applied to orchards and vineyards. Copper is applied throughout the year but peak application periods are prior to and during the dormant season and early in the irrigation season. Often copper is applied via ground application, thus mismanaged irrigation tailwater is a more likely source than spray drift.

The PUR data were reviewed for the number of monthly copper applications, pounds of active ingredient applied, and acres treated (Table VII-12, Figure VII-4). Since 2005, there is a general decrease in the amount of copper applied and, although complete PUR data are only available through May 2011, it appears the trend will continue. The amount of copper used in 2005 was 97,478 lbs AI compared to 53,277 lbs AI in 2010. The greatest amount of copper use is consistently in the months of January, April and May. Not all exceedances occurred during months of the greatest amount of use.

The largest amount of copper applied from 2004 through 2010 was associated with walnuts (191,677 lbs AI) and almonds (123,920 lbs AI). The most common products containing copper used within this subwatershed is Kocide (Table VII-13).

Table VII-12. French Camp Slough @ Airport Way site subwatershed copper applications, lbs AI applied, and acres treated by month (2004-2011).

PUR data available through May 2011 for San Joaquin County and through November 2011 for Stanislaus County; all PUR data after May 2011 are preliminary. If a month is not included in the table, no applications were made.

Month/Year	Number of Copper Applications	Pounds of AI Applied	Acres Treated
November, 2004	1	92.4	18
December, 2004	21	3089.5	618.3
January, 2005	92	20428.7	3987.3
February, 2005	68	6093.1	2135.8
March, 2005	63	7048.9	1909.2
April, 2005	127	27359.6	5694.3
May, 2005	95	24234.0	4643.4
June, 2005	19	2856.9	1019.3
July, 2005	11	712.4	577.9
August, 2005	5	248.1	229
September, 2005	10	510.5	332
October, 2005	14	1059.6	709
December, 2005	30	6926.2	940.5
January, 2006	148	26973.0	5919.5
February, 2006	56	1479.1	1657.3
March, 2006	43	1653.7	1379
April, 2006	114	16796.3	4397.0
May, 2006	87	23055.6	3783.5
June, 2006	30	6062.6	1344
July, 2006	14	1070.7	741
August, 2006	9	416.3	284
September, 2006	11	758.3	515.5
October, 2006	14	946.7	631
November, 2006	2	116.2	40
December, 2006	22	1497.8	321.5
January, 2007	96	16975.4	4305.5
February, 2007	40	3325.9	1736.8
March, 2007	41	5495.7	1543.6
April, 2007	139	24183.9	5124.5
May, 2007	49	16994.1	2534.7
June, 2007	19	1351.7	940
July, 2007	17	322.7	581
August, 2007	4	154.4	75
September, 2007	6	95.9	126
October, 2007	5	19.7	14
November, 2007	12	433.2	138
December, 2007	14	447.6	83.45
January, 2008	59	9890.2	2442.3
February, 2008	33	3014.9	1529.3
March, 2008	35	4062.0	1048.6
April, 2008	86	15986.0	3424.3
May, 2008	31	14298.8	1296
June, 2008	5	464.2	117
July, 2008	6	52.3	145

Month/Year	Number of Copper Applications	Pounds of AI Applied	Acres Treated
August, 2008	4	3.6	4
September, 2008	6	163.5	46
October, 2008	4	3.6	4
November, 2008	5	773.6	104
December, 2008	8	2116.4	426
January, 2009	42	8938.1	1951.5
February, 2009	20	1551.6	998.2
March, 2009	17	4453.7	628.8
April, 2009	135	17967.1	6409.5
May, 2009	65	22765.9	2707.5
June, 2009	11	243.3	472
July, 2009	10	375.8	272
August, 2009	5	194.2	153.9
September, 2009	7	7.9	9
October, 2009	5	47.7	43.2
November, 2009	11	1526.1	391.1
December, 2009	26	3787.7	682.6
January, 2010	54	8669.8	2421
February, 2010	36	2252.0	1643.6
March, 2010	35	4451.2	1477.3
April, 2010	180	18813.8	7172.9
May, 2010	56	9279.9	2578.8
June, 2010	31	8705.4	1287
July, 2010	18	508.5	437.7
August, 2010	2	1.1	2
September, 2010	3	16.4	12
October, 2010	2	1.1	2
November, 2010	3	438.9	114
December, 2010	3	138.8	41
January, 2011	17	2463.8	615
February, 2011	25	1358.0	1407.8
March, 2011	18	1362.9	834.0
April, 2011	108	11638.3	4083.1
May, 2011	56	7709.2	2161.0
June, 2011	22	428.7	424.6
July, 2011	9	52.6	35.3
August, 2011	5	49.8	20.3
September, 2011	1	71.1	30.8
Summaries by Year			
2004 Total	22	3181.9	636.3
2005 Total	534	97478.0	22177.6
2006 Total	550	80826.4	21013.3
2007 Total	442	69800.4	17202.5

Month/Year	Number of Copper Applications	Pounds of AI Applied	Acres Treated
2008 Total	282	50829.1	10586.4
2009 Total	354	61859.0	14719.3
2010 Total	423	53276.9	17189.3
2011 Total	261	25134.4	9611.7
Total	**2868**	**442386.0**	**113136.3**

Figure VII-4. French Camp Slough @ Airport Way site subwatershed lbs copper applied by month (2004-2011).

PUR data available through May 2011 for San Joaquin County and through November 2011 for Stanislaus County; all PUR data after May 2011 are preliminary. Asterisk (*) denotes months with exceedances.

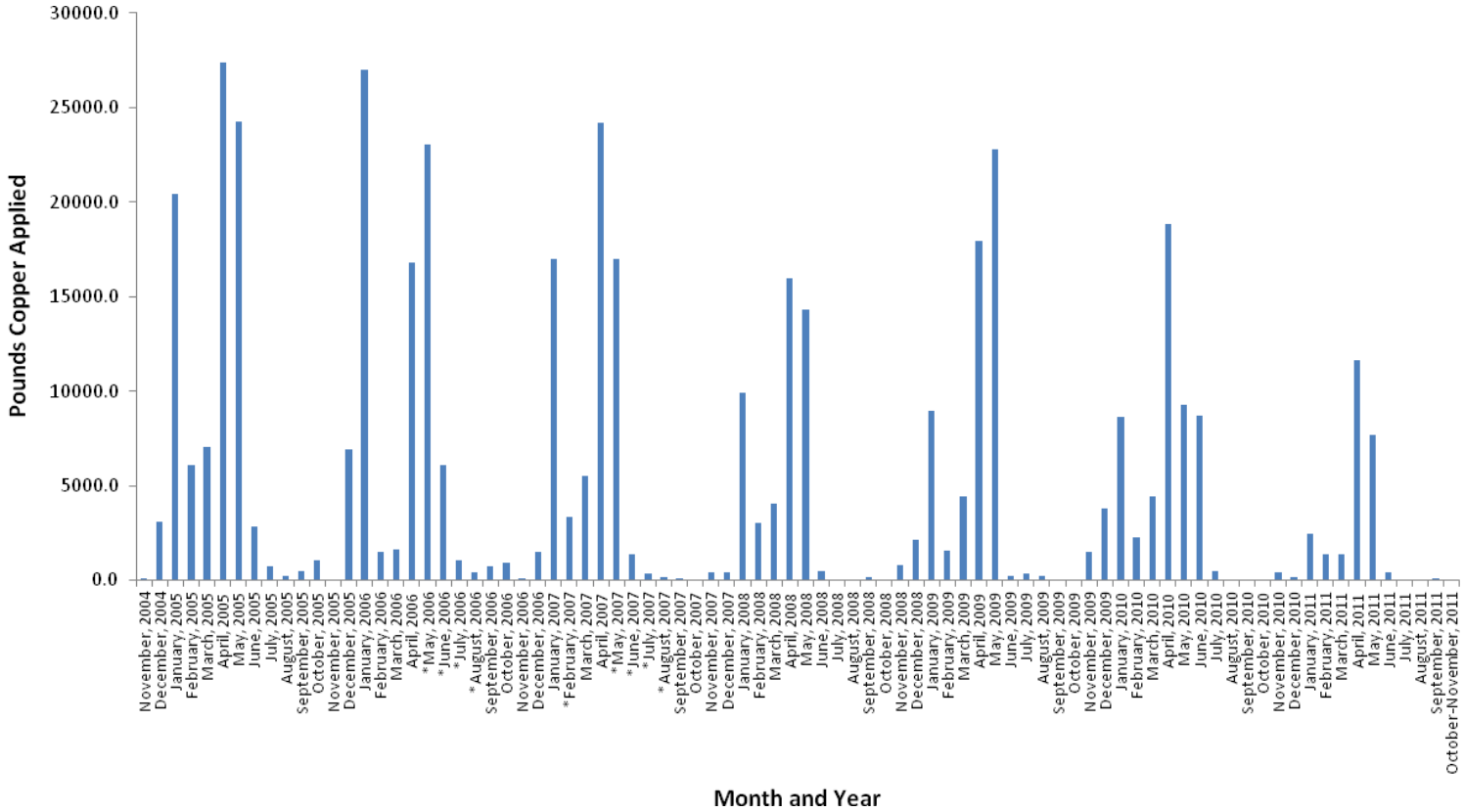


Table VII-13. French Camp Slough @ Airport Way site subwatershed copper PUR data (2004-2011).

PUR data available through May 2011 for San Joaquin County and through November 2011 for Stanislaus County; all PUR data after May 2011 are preliminary.

Chemical Name	Commodity	Product Name	Lbs AI Applied
COPPER	ALFALFA (FORAGE - FODDER) (ALFALFA HAY)	KOCIDE 101	15.4
		KOCIDE DF	1062.2
	ALMOND	BASIC COPPER 53	2211.1
		BASICOP	92.8
		BLUE SHIELD DF	220.2
		CHAMP FORMULA 2 FLOWABLE	261.9
		CHAMP FORMULA II DRY FLOWABLE	1226.9
		CHAMPION WETTABLE POWDER	1304.1
		COPPER POWER FLOWABLE	52.5
		CUPROFIX DISPERSS	678.0
		CUPROFIX ULTRA 40 DISPERSS	5590.2
		DUPONT GX-569 FUNGICIDE/BACTERICIDE	171.3
		DUPONT KOCIDE 2000 FUNGICIDE/BACTERICIDE	21108.8
		DUPONT KOCIDE 3000 FUNGICIDE/BACTERICIDE	219.7
		DUPONT KOCIDE DF FUNGICIDE/BACTERICIDE	82.0
		HYDROX	6902.3
		KOCIDE 101	7172.6
		KOCIDE 2000	11555.0
		KOCIDE DF	18585.4
		NORDOX	1066.8
		NORDOX 75 WG	23493.9
		NU-COP 50 WP	2336.2
		NU-COP 50DF	19588.8
	APPLE	KOCIDE 101	107.8
		KOCIDE DF	90.9
		NU-COP 50DF	329.2
	APRICOT	NORDOX 75 WG	26.0
		NU-COP 50DF	7.7
	CHERRY	CHAMPION WETTABLE POWDER	81.8
		CUPROFIX DISPERSS	208.1
		CUPROFIX ULTRA 40 DISPERSS	696.8
		DUPONT KOCIDE 2000 FUNGICIDE/BACTERICIDE	184.0
		DUPONT KOCIDE 3000 FUNGICIDE/BACTERICIDE	239.2
		DUPONT KOCIDE DF FUNGICIDE/BACTERICIDE	564.3
		HYDROX	158.8
		KOCIDE 101	1448.0
		KOCIDE DF	1048.2
		NORDOX	654.2
		NORDOX 75 WG	21.0
		NU-COP 50DF	1057.2
		TRIANGLE BRAND COPPER SULFATE INSTANT POWDER	2326.5
	GRAPES	CHAMP FLOWABLE	17.8
		CHAMP FORMULA 2 FLOWABLE	798.6
		CLEAN CROP C-O-C-S 15 SULFUR 25 DUST	30.0
		DUPONT KOCIDE 2000 FUNGICIDE/BACTERICIDE	508.9

Chemical Name	Commodity	Product Name	Lbs AI Applied
COPPER	GRAPES	HYDROX	92.4
		KENTAN DF	164.2
		KOCIDE 101	2585.9
		KOCIDE 2000	428.2
		KOCIDE DF	30.7
		NU-COP 50DF	327.9
		TENN-COP 5E	252.4
		TENN-COP 5E FUNGICIDE/BACTERICIDE	1061.3
		WIL-DRY	264.7
	GRAPES (WINE)	CHAMP FORMULA 2 FLOWABLE	600.1
		CLEAN CROP C-O-C-S 15 SULFUR 25 DUST	30.0
		COPPER-COUNT-N	1.9
		DUPONT GX-569 FUNGICIDE/BACTERICIDE	835.4
		DUPONT KOCIDE 2000 FUNGICIDE/BACTERICIDE	100.9
		DUPONT KOCIDE 3000 FUNGICIDE/BACTERICIDE	1587.8
		IAP COPPER SULFUR 15-25 DUST	112.5
		KENTAN DF	248.9
		KOCIDE 2000	39.8
		KOCIDE 606 FLOWABLE AGRICULTURAL FUNGICIDE	414.0
		KOCIDE DF	45.4
		NORDOX	645.2
		NU-COP 3L	456.9
		NU-COP 50 WP	57.0
		STRETCH FUNGICIDE	3.5
		TENN-COP 5E	152.5
		TENN-COP 5E FUNGICIDE/BACTERICIDE	36.6
		WIL-DRY	325.6
	NECTARINE	BLUE SHIELD DF	38.5
		HYDROX	77.0
		NORDOX 75 WG	295.1
		NU-COP 50DF	42.4
	N-OUTDR GRWN TRNSPLNT/PRPGTV MTRL	CHAMP FORMULA 2 FLOWABLE	198.3
		CHAMPION WETTABLE POWDER	71.1
		CLEAN CROP C-O-C-S WETTABLE	89.0
		CUPRO 2005 T/N/O	9.7
		KOCIDE 2000	16.7
		KOCIDE 2000 T/N/O	10.8
		NU-COP 3L	176.4
		PHYTON-27 BACTERICIDE & FUNGICIDE	3.2
		PHYTON-27 FUNGICIDE	1.3
		RIDOMIL GOLD COPPER	
	OLIVE (ALL OR UNSPEC)	DUPONT KOCIDE 2000 FUNGICIDE/BACTERICIDE	526.2
		NU-COP 50DF	4750.9
	ONION (DRY, SPANISH, WHITE, YELLOW, RED, ETC.)	CHAMP FORMULA 2 FLOWABLE	75.7
		DUPONT KOCIDE 2000 FUNGICIDE/BACTERICIDE	425.3
		DUPONT KOCIDE 3000 FUNGICIDE/BACTERICIDE	968.5
		DUPONT KOCIDE DF FUNGICIDE/BACTERICIDE	86.0
		KOCIDE 101	2210.7
		KOCIDE 2000	1124.2

Chemical Name	Commodity	Product Name	Lbs AI Applied
COPPER	ONION (DRY, SPANISH, WHITE, YELLOW, RED, ETC.)	KOCIDE DF	1842.5
		NU-COP 50DF	477.4
	PEACH	BLUE SHIELD DF	53.9
		DUPONT KOCIDE 3000 FUNGICIDE/BACTERICIDE	18.4
		HYDROX	130.9
		NORDOX 75 WG	722.1
		NU-COP 50DF	888.6
	PEAR	KOCIDE 101	35.5
		KOCIDE DF	13.8
	PEPPERS (FRUITING VEGETABLE), (BELL,CHILI, ETC.)	DUPONT KOCIDE 3000 FUNGICIDE/BACTERICIDE	77.8
		DUPONT KOCIDE 4.5LF FUNGICIDE/BACTERICIDE	9.1
		KOCIDE 2000	6.5
		KOCIDE DF	1422.6
		NU-COP 50DF	145.5
	PLUM (INCLUDES WILD PLUMS FOR HUMAN CONSUMPTION)	NORDOX 75 WG	26.0
	RICE (ALL OR UNSPEC)	BLUE VIKING COPPER SULFATE STAR SHINE CRYSTAL	2128.5
		CHIPCO COPPER SULFATE CRYSTALS	77096.3
		COPPER SULFATE CRYSTAL	2475.0
	TOMATOES (FOR PROCESSING/CANNING)	CHAMP 30 DP	10.7
		CHAMP FORMULA 2 FLOWABLE	0.8
		DUPONT GX-569 FUNGICIDE/BACTERICIDE	1.2
		DUPONT KOCIDE 3000 FUNGICIDE/BACTERICIDE	17.1
		DUPONT KOCIDE 4.5LF FUNGICIDE/BACTERICIDE	18.8
		DUPONT KOCIDE DF FUNGICIDE/BACTERICIDE	31.8
		HYDROX	101.6
		KENTAN DF	212.7
		KOCIDE 101	1101.0
		KOCIDE 2000	18.8
		KOCIDE 4.5 LF	178.1
		KOCIDE 606 FLOWABLE AGRICULTURAL FUNGICIDE	51.9
		KOCIDE DF	1788.0
		MANKOCIDE FUNGICIDE	4.5
		NU-COP 3L	65.6
		NU-COP 50DF	1231.7
		NU-COP 50WP	602.9
	WALNUT (ENGLISH WALNUT, PERSIAN WALNUT)	BADGE X2	152.0
		BASIC COPPER 53	2156.0
		BLUE SHIELD	485.9
		BLUE SHIELD DF	261.8
		CHAMP FORMULA 2 FLOWABLE	740.7
		CHAMPION WETTABLE POWDER	130.9
		COPPER SULFATE CRYSTALS	222.8
		CUPROFIX ULTRA 40 DISPERSS	674.0
		DUPONT GX-569 FUNGICIDE/BACTERICIDE	440.7
		DUPONT KOCIDE 101 FUNGICIDE/BACTERICIDE	492.8
		DUPONT KOCIDE 2000 FUNGICIDE/BACTERICIDE	11250.4
		DUPONT KOCIDE 3000 FUNGICIDE/BACTERICIDE	10272.5

Chemical Name	Commodity	Product Name	Lbs AI Applied
COPPER	WALNUT (ENGLISH WALNUT, PERSIAN WALNUT)	DUPONT KOCIDE DF FUNGICIDE/BACTERICIDE	5237.6
		HYDROX	5307.6
		HYDROX DF	61.6
		KENTAN DF	5243.6
		KOCIDE 101	41625.5
		KOCIDE 20/20	64.5
		KOCIDE 2000	6469.9
		KOCIDE DF	28982.5
		NORDOX	546.5
		NORDOX 75 WG	2242.8
		NU-COP 50 WP	5875.3
		NU-COP 50DF	59353.1
		NU-COP 50WP	69.3
		NUCOP DF	330.0
		NU-COP HB	2986.8

ALFALFA - Total Pounds Copper Applied	**1077.6**
ALMOND - Total Pounds Copper Applied	**123920.4**
APPLE - Total Pounds Copper Applied	**527.8**
APRICOT - Total Pounds Copper Applied	**33.7**
CHERRY - Total Pounds Copper Applied	**8688.0**
GRAPES - Total Pounds Copper Applied	**12257.1**
NECTARINE - Total Pounds Copper Applied	**453.0**
N-OUTDR GRWN TRNSPLNT - Total Pounds Copper Applied	**576.4**
OLIVE - Total Pounds Copper Applied	**5277.1**
ONION - Total Pounds Copper Applied	**7210.1**
PEACH - Total Pounds Copper Applied	**1813.9**
PEAR - Total Pounds Copper Applied	**49.3**
PEPPERS - Total Pounds Copper Applied	**1661.5**
PLUM - Total Pounds Copper Applied	**26.0**
RICE - Total Pounds Copper Applied	**81699.8**
TOMATOES - Total Pounds Copper Applied	**5437.2**
WALNUT - Total Pounds Copper Applied	**191677.1**
Total Pounds Copper Applied (2004-2011)	**442386.0**

The Coalition noted in the 2008 Management Plan that copper appears to be mobilized during winter storm water discharges and through early season irrigation return flows to French Camp Slough. As discussed above, copper is heavily used in this subwatershed; in addition, exceedances occurred at sites upstream of French Camp Slough. Therefore, the Coalition is determined to provide information on a subwatershed basis to growers to review their operations and determine if storm water runoff and irrigation return flows are managed properly, specifically to growers with the potential to drain to the creek and who have applied copper within the past two years. This is consistent with the strategy to address priority A/B constituent exceedances.

Diuron

Two exceedances of the diuron WQTL (2 µg/L) occurred in the French Camp Slough site subwatershed, in February 2007 and January 2008 (Table VII-5). During both the February 2007 and January 2008 monitoring events, diuron also exceeded the WQTL at the upstream locations Lone Tree Creek and Unnamed Drain to Lone Tree Creek. Monitoring for diuron did not occur at French Camp Slough during the 2009 and 2010 winter months, but was monitored during 2011 Assessment Monitoring and there were no exceedances. No diuron exceedances occurred during 2010 and 2011 MPM at Lone Tree Creek and Unnamed Drain to Lone Tree Creek.

Pesticide Use Report data were reviewed for the number of monthly diuron applications, pounds of active ingredient applied, and acres treated (Table VII-14, Figure VII-5). Overall, diuron use decreased since 2006, and although complete PUR data are only available through May 2011, the trend appears to continue in 2011. The amount of diuron used in 2006 was 5,860 lbs AI compared to 1,588 lbs AI in 2010. The months with the greatest amount of use are consistently between October and February.

The largest amounts of diuron applied from 2005 through 2011 is associated with alfalfa (5,465 lbs AI), grapes (5,083 lbs AI) and walnuts (4,549 lbs AI; Table VII-15).

Table VII-14. French Camp Slough @ Airport Way site subwatershed diuron applications, lbs AI applied, and acres treated by month (2005-2011).

PUR data available through May 2011 for San Joaquin County and through November 2011 for Stanislaus County; all PUR data after May 2011 are preliminary. If a month is not included in the tables, no applications were made.

Month/Year	Number of Diuron Applications	Pounds of AI Applied	Acres Treated
January, 2005	14	985.4	1397
February, 2005	11	153.3	135
March, 2005	2	49.4	73
April, 2005	8	149.8	195.5
May, 2005	1	2.9	6
June, 2005	2	131.3	180
July, 2005	2	37.7	27
September, 2005	3	75.5	170
October, 2005	8	171.0	264
November, 2005	4	191.4	104
December, 2005	14	696.2	583.2
January, 2006	14	828.1	656
February, 2006	32	1291.1	1607.9
March, 2006	3	94.3	93.3
April, 2006	6	93.1	107.9
May, 2006	10	274.1	269.4
June, 2006	2	23.1	47.5
July, 2006	3	40.0	69.7
August, 2006	2	69.2	65
September, 2006	2	102.9	165
October, 2006	11	446.5	499.3
November, 2006	15	1031.5	651.9
December, 2006	20	1566.1	1093
January, 2007	2	26.1	46
February, 2007	13	722.2	1400.3
March, 2007	16	359.9	510.7
April, 2007	6	88.6	129.5
May, 2007	10	230.0	327.7
June, 2007	2	36.1	59
August, 2007	1	14.6	15
September, 2007	1	80.0	100
October, 2007	2	57.1	55
November, 2007	10	281.4	381.2
December, 2007	15	1207.0	871.6
January, 2008	3	201.5	301
February, 2008	4	50.6	45.3
March, 2008	8	242.8	269.3
April, 2008	1	12.5	6.4
May, 2008	10	163.3	136.2
June, 2008	1	160.0	100
July, 2008	1	12.0	7.5
October, 2008	1	43.7	75
November, 2008	8	192.0	155.2
December, 2008	4	396.2	270
January, 2009	11	126.7	226.5

Month/Year	Number of Diuron Applications	Pounds of AI Applied	Acres Treated
February, 2009	3	147.0	105.2
March, 2009	6	230.3	156.3
April, 2009	4	213.9	137.8
May, 2009	5	110.6	174
June, 2009	1	57.3	39.2
July, 2009	3	171.9	125
October, 2009	2	169.6	124
November, 2009	8	245.9	180
December, 2009	10	653.3	547.6
January, 2010	6	325.7	272.4
February, 2010	15	623.3	491.9
March, 2010	6	101.5	239
May, 2010	7	69.0	86.8
June, 2010	2	32.1	90
July, 2010	1	12.0	7.5
August, 2010	1	5.1	10
November, 2010	8	244.0	381.5
December, 2010	4	175.0	106.2
January, 2011	15	849.7	742.3
February, 2011	6	464.3	230.7
April, 2011	1	12.2	12.3
September, 2011	1	1.5	5
Summaries by Year			
2005 Total	69	2644.1	3134.7
2006 Total	120	5860.0	5325.9
2007 Total	78	3103.1	3896.0
2008 Total	41	1474.6	1365.8
2009 Total	53	2126.5	1815.7
2010 Total	50	1587.7	1685.3
2011 Total	23	1327.7	990.2
Total	**434**	**18123.6**	**18213.7**

Figure VII-5. French Camp Slough @ Airport Way site subwatershed lbs diuron applied by month (2005-2011).

PUR data available through May 2011 for San Joaquin County and through November 2011 for Stanislaus County; all PUR data after May 2011 are preliminary. Asterisk (*) denotes months with exceedances.

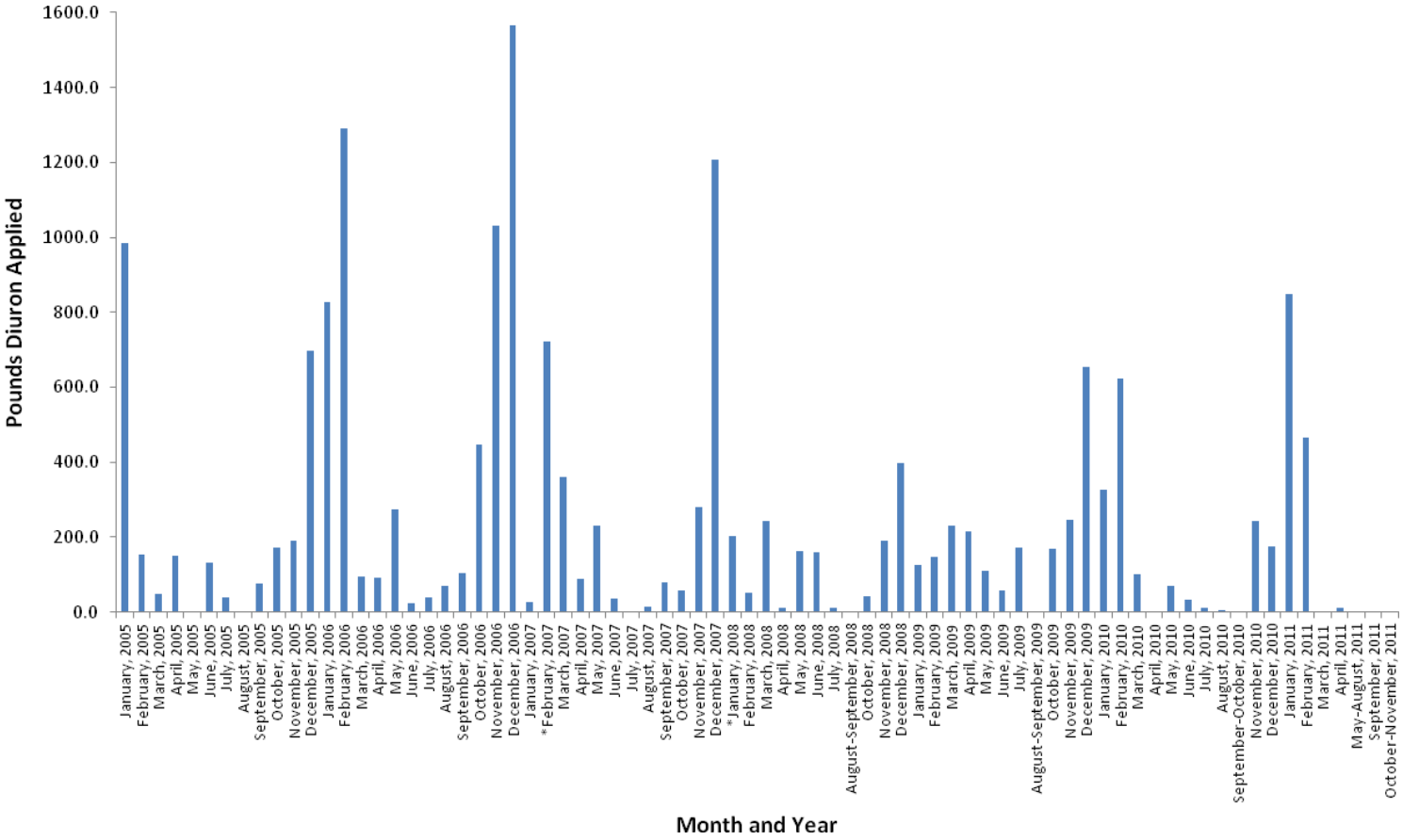


Table VII-15. French Camp Slough @ Airport Way site subwatershed diuron PUR data (2005-2011).

PUR data available through May 2011 for San Joaquin County and through November 2011 for Stanislaus County; all PUR data after May 2011 are preliminary.

Chemical Name	Commodity	Product Name	Lbs AI Applied
DIURON	ALFALFA (FORAGE - FODDER) (ALFALFA HAY)	DIREX 4L	4725.7
		DIURON 4L	144.3
		DUPONT DIREX 4L HERBICIDE	282.9
		KARMEX DF HERBICIDE	312.0
	ALMOND	DUPONT DIREX 4L HERBICIDE	0.4
	APPLE	DIREX 4L	290.4
		DUPONT DIREX 4L HERBICIDE	43.2
		KARMEX DF HERBICIDE	22.4
	CORN (FORAGE - FODDER)	DU PONT KARMEX DF HERBICIDE	2.3
	COTTON, GENERAL	GINSTAR EC COTTON DEFOLIANT	2.4
	GRAPES	DIREX 4L	1016.2
		DIURON 400 HERBICIDE	58.7
		DUPONT DIREX 4L HERBICIDE	10.4
		KARMEX XP HERBICIDE	842.3
	GRAPES (WINE)	DIREX 4L	501.3
		DIURON 4L HERBICIDE	636.0
		DREXEL DIURON 4L HERBICIDE	1144.6
		DUPONT DIREX 4L HERBICIDE	169.7
		KARMEX DF HERBICIDE	703.4
	OLIVE (ALL OR UNSPEC)	DUPONT DIREX 4L HERBICIDE	28.0
	PASTURES (ALL OR UNSPEC)	DIREX 4L	21.0
	PEAR	DIREX 4L	25.0
	SOIL APPLICATION, PREPLANT-OUTDOOR (SEEDBEDS,ETC.)	DIREX 4L	20.5
	UNCULTIVATED NON-AG AREAS (ALL OR UNSPEC)	DIREX 4L	766.9
		DIREX 80DF	1200.0
		DIURON 80 DF HERBICIDE	204.8
		DU PONT KROVAR I DF HERBICIDE	150.0
		DUPONT DIREX 4L HERBICIDE	10.0
		DUPONT KARMEX XP HERBICIDE	240.0
	WALNUT (ENGLISH WALNUT, PERSIAN WALNUT)	DIREX 4L	3290.2
		DIREX 80DF	61.0
		DIURON 400 HERBICIDE	141.7
		DIURON 4L	144.3
		DIURON 4L HERBICIDE	195.0
		DREXEL DIURON 4L HERBICIDE	97.8
		DU PONT KARMEX DF HERBICIDE	12.0
		DUPONT DIREX 4L HERBICIDE	293.8
		DUPONT KARMEX DF HERBICIDE	31.3
		KARMEX DF HERBICIDE	281.6

ALFALFA - Total Pounds Diuron Applied	**5464.9**
ALMOND - Total Pounds Diuron Applied	**0.4**
APPLE - Total Pounds Diuron Applied	**356.0**
CORN - Total Pounds Diuron Applied	**2.3**
COTTON - Total Pounds Diuron Applied	**2.4**
GRAPES - Total Pounds Diuron Applied	**5082.6**
OLIVE - Total Pounds Diuron Applied	**28.0**
PASTURES - Total Pounds Diuron Applied	**21.0**
PEAR - Total Pounds Diuron Applied	**25.0**
SOIL APPLICATION - Total Pounds Diuron Applied	**20.5**
UNCULTIVATED NON-AG AREAS - Total Pounds Diuron Applied	**2571.7**
WALNUT - Total Pounds Diuron Applied	**4548.7**
Total Pounds Diuron Applied (2005-2011)	**18123.6**

Diuron is most likely transported to French Camp Slough via storm water runoff from orchards. As discussed above, diuron applications decreased over the past five years and no exceedances have occurred in the subwatershed and at upstream sites since 2008. However, the Coalition provides information on a subwatershed basis to growers to review their operation and determine if storm water runoff is managed properly, specifically to growers with the potential to drain to the creek and who have applied diuron within the past two years. This is consistent with the strategy to address priority A/B constituent exceedances.

Priority D Constituents

The priority D constituents in the French Camp Slough subwatershed are water column toxicity to *C. dubia* toxicity and *S. capricornutum* and sediment toxicity to *H. azteca.*

***C. dubia* toxicity**

Toxicity to *C. dubia* occurred in March 2006 and February 2007 (Table VII-5). The TIE for the March toxicity indicated the cause of the toxicity was a non-organophosphate organic compound, most likely a pyrethroid; however, no exceedances of pyrethroids (that the Coalition monitored) occurred during that monitoring event. The TIE for the February2007 toxicity indicated that a metabolically activated pesticide was the cause of toxicity. Chlorpyrifos and diazinon both exceeded their respective WQTL during the February 2007 event and their concentrations accounted for the toxicity.

Controlling the movement of soluble pesticides to the slough, as discussed above under the chlorpyrifos section, will address the toxicity to *C. dubia*.

***S. capricornutum* toxicity**

S. capricornutum toxicity occurred at this site in February 2005 and April 2008 (Table VII-5). Neither one of the *S. capricornutum* toxicities were associated with an exceedance of any herbicides or copper.

The Coalition plans to discuss toxicity to *S. capricornutum* and associated pesticides during individual grower meetings in an effort to eliminate the occurrence of future toxicities.

***H. azteca* toxicity**

Toxicity to *H. azteca* occurred five times at this site (April 2006, August 2007, March 2008, September 2010, and October 2011, Table VII-5). Three of the toxicities were not considered ecologically significant (April 2006, March 2008, and October 2011). The August 2007 toxicity was not persistent in the resample. The September 2010 toxicity had a very high mortality rate (99% reduction in survival compared to control); resampling is not conducted under the current 2008 MRPP.

In 2010, the Coalition began analyzing for pyrethroids and chlorpyrifos in toxic sediment samples with 80% or less survival compared to the control. Sediment samples collected from French Camp Slough as part of MPM on September 7, 2010 tested toxic to *H. azteca* and chemical analysis indicated the samples contained sediment-bound pyrethroids and chlorpyrifos. Pyrethroids have a high affinity for sediment particles and can be carried to waterways by suspended particles in storm water runoff and

irrigation tailwater. The Coalition believes that addressing storm water and irrigation tailwater management during outreach, movement of pyrethroids to waterways will also be addressed.

Priority E Constituents

The priority E constituents listed under the French Camp Slough management plan are DO, *E. coli*, pH, and lead.

Dieldrin is also listed as a Priority E constituent for French Camp Slough. Dieldrin is an organochlorine pesticide that was banned from agricultural use in the United States in 1985. The Coalition believes the dieldrin exceedances in July 2007 and 2008 were the result of irrigation runoff to the slough that stirred up bottom sediment and allowed legacy dieldrin to be re-suspended in the water column. Dieldrin was monitored during July of 2009, 2010, and 2011 during which there were no exceedances. The Coalition believes its focus on irrigation tailwater management contributed to the decline of contaminated runoff to the slough during summer months.

Although these constituents remain low priority, the Coalition will continue to collect priority E constituent monitoring data as a part of Core, and/or Assessment Monitoring. Dissolved oxygen, *E. coli*, and pH are Core Monitoring constituents monitored monthly at the French Camp Slough site. Lead will be monitored again during Assessment Monitoring at this site in 2014. The priority E constituents are discussed during targeted outreach and will continue to be discussed at annual grower meetings. To address *E. coli* exceedances, the Coalition plans to participate in the focus group along with other Coalitions and Regional Board staff to develop a joint Work Plan to characterize the potential agricultural sources of *E. coli* and identify management practices to prevent discharges to surface waters.

Evaluation

French Camp Slough is a third priority site subwatershed within the SJCDWQC and is in its second year of focused outreach (2011-2013).

The Coalition's strategy for the French Camp Slough subwatershed is to focus on providing information on a subwatershed basis to growers to review their operation and determine if irrigation return flows are managed properly. In addition, growers are encouraged to review their operations prior to the dormant spray/storm season to address the potential for storm water runoff. Because land use with the potential to drain to the slough is predominately orchards, the Coalition believes outreach designed to encourage management practices relevant to orchards will target the largest audience and result in the greatest improvements in water quality. The Coalition also addresses management practices relevant to row crops when appropriate. Outreach efforts include grower notification, management practice outreach and education, tracking the implementation of management practices, and providing information on special studies of management practice efficacy.

All individual grower surveys documenting current management practice implementation and assessing planned implementations were completed and returned to the Coalition representing 100% of targeted growers. In addition, the Coalition initiated follow up with all targeted growers to assess the implementation of new management practices. The final stages of outreach include following up with growers to identify newly implemented practices and future monitoring to evaluate water quality improvement; the results of these actions will be reported in the 2013 MPUR. In 2012, MPM will continue to take place during months of past exceedances.

Monitoring for dieldrin resulted in zero exceedances 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 dieldrin from the French Camp Slough management plan.

VIII. MOKELUMNE RIVER @ BRUELLA RD

Management Plan Constituents

Priority C

- Copper

Priority D

- *Selenastrum capricornutum* water column toxicity

Priority E

- *Ceriodaphnia dubia* water column toxicity
- DO
- *E. coli*
- pH

Description of Mokelumne River @ Bruella Rd Site Subwatershed

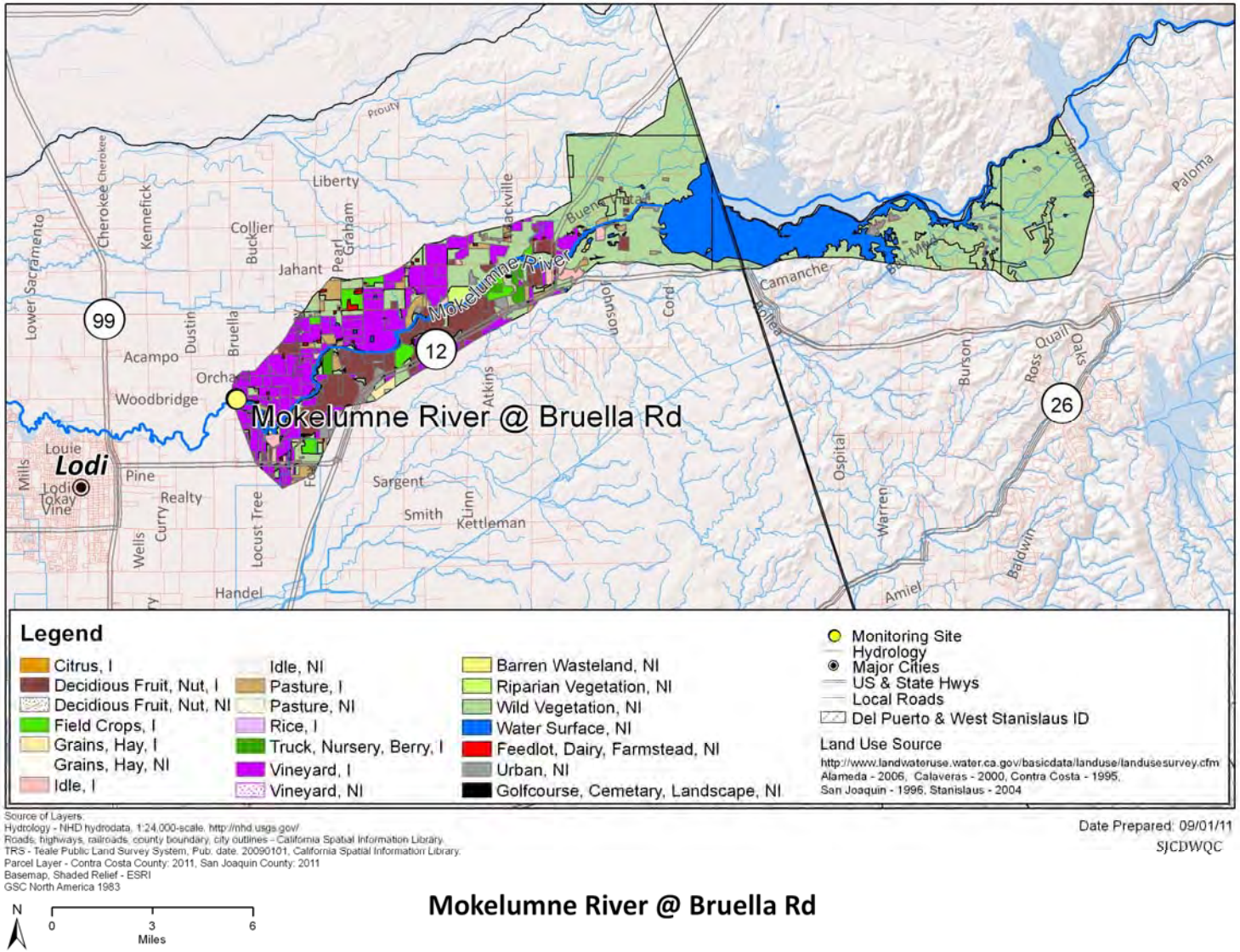
Mokelumne River @ Bruella Rd (9,966 irrigated acres) is the Core Monitoring location of the Mokelumne River @ Bruella Road Zone (Zone 1). The location coordinates for the Core Monitoring site and its upstream monitoring site are listed in Table VIII-1). Upstream agriculture to this site consists of vineyards that are primarily drip irrigated and orchards irrigated by microspray. There is also a small amount of field crops throughout the subwatershed (Figure VIII-1). Water released from Comanche Reservoir controls the flow at this site which integrates the signal from a relatively large upstream area.

Table VIII-1. Mokelumne River site subwatershed sampling locations coordinates.

Site Name	Station Code	Target Latitude	Target Longitude
Mokelumne River @ Bruella Rd*	531XMRABR	38.1602	-121.2051
Mokelumne River @ Fish Hatchery[u]	531XMRAFH	38.2264	-121.0264

[U] Upstream site
*Original SJCDWQC sampling site

Figure VIII-1. Mokelumne River @ Bruella Rd site subwatershed land use map.



Subwatershed Monitoring History

Monitoring at Mokelumne River @ Bruella Rd began in August 2004 during the first season of Coalition monitoring and continued through 2011 (Table VIII-2). The site is the Zone 1 Core Monitoring location under the 2008 MRPP and was monitored for only the Core suite of constituents during the fall of 2008, 2009 and 2010 (Table VIII-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.

To determine the contribution of sources from upstream of the Mokelumne River fish hatchery, an upstream sampling location (Mokelumne River @ Fish Hatchery) was monitored for one event in September 2005.

Management Plan Monitoring at Mokelumne River @ Bruella Rd occurred 2007 through 2008 and 2010 through 2011 (Table VIII-4). In 2007, additional MPM occurred for water column toxicity to *C. dubia* (June and September) and *S. capricornutum* (August). In 2008, additional MPM was conducted for copper (June, July and August), *C. dubia* toxicity (June and September) and *S. capricornutum* toxicity (May, July and August). The Mokelumne River is a high priority subwatershed 2011 through 2013, and Year 0 MPM occurred in 2010 for *S. capricornutum* toxicity (April, May, July and August) and for copper (June-August). During 2011, all constituents were monitored monthly as a part of Assessment Monitoring and the following constituents were noted as both Assessment Monitoring and MPM: copper (June-August), *C. dubia* toxicity (February, March, June, September), and *S. capricornutum* toxicity (March-May, and July and August).

Mokelumne River is currently on California's 2008-2010 303d List of Impaired Waterbodies for chlorpyrifos, copper, mercury, zinc, DO and unknown water column toxicity.

Table VIII-2. Mokelumne River @ Bruella Rd site subwatershed sampling events per season and year (including MPM).

Year	Season	Events Sampled	Events Not Sampled[1]	Total
2004	Irrigation	2	0	**2**
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	11	0	**11**
	Fall	2	0	**2**
2009	Winter	3	0	**3**
	Storm	0	0	**0**
	Irrigation	6	0	**6**
	Fall	3	0	**3**
2010	Winter	2	0	**2**
	Storm	1	0	**1**
	Irrigation	6	0	**6**
	Fall	3	0	**3**
2011	Winter	3	0	**3**
	Storm	1	0	**1**
	Irrigation	6	0	**6**
	Fall	2	0	**2**

[1] If an event was not sampled during scheduled monitoring, the site was dry.

Table VIII-3 Mokelumne River @ Bruella 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																							
NA	Dissolved Oxygen	3	3	7	3	5	3	10	3	12	2	3		6	3	2	1	6	3	4	1	8	2
NA	Specific Conductivity	3	3	7	3	5	3	10	3	12	2	3		6	3	2	1	6	3	4	1	8	2
NA	pH	3	3	7	3	5	3	10	3	12	2	3		6	3	2	1	6	3	4	1	8	2
EPA 110.2	Color	2	2	5	2	5	2	6	1	6													
EPA 160.1	Dissolved Solids	2	2	5	2	5	3	7	2	6	2	3		6	3	2	1	6	3	3	1	6	2
EPA 160.2	Suspended Solids								1		2	3		6	3	2	1	6	3	3	1	6	2
EPA 180.1	Turbidity	2	2	5	2	5	3	6	2	6	2	3		6	3	2	1	6	3	3	1	6	2
EPA 415.1	Total Organic Carbon	2	2	5	2	5	2	6	2	6	2	3		6	3	2	1	6	3	3	1	6	2
SM 9223	*E. coli*	2	2	5	2		2		2	6	2	3		6	3	2	1	6	3	3	1	6	2
Walkley-Black	Total Organic Carbon (sediment)																			1		1	
ASTM D422 or ASTM D4464	Grain size (sediment)																			1		1	
EPA 405.1	BOD					1	3	2															
Carbamates																							
EPA 8321A	Aldicarb					5	2	6	1	6										3	1	6	2
EPA 8321A	Carbaryl					5	2	6	1	6										3	1	6	2
EPA 8321A	Carbofuran					5	2	6	1	6										3	1	6	2
EPA 8321A	Diuron					5	2	6	1	6										3	1	6	2
EPA 8321A	Linuron					5	2	6	1	6										3	1	6	2
EPA 8321A	Methiocarb					5	2	6	1	6										3	1	6	2
EPA 8321A	Methomyl					5	2	6	1	6										3	1	6	2
EPA 8321A	Oxamyl					5	2	6	1	6										3	1	6	2
Organochlorines																							
EPA 8081A	DDD(p,p')					5	2	6	2	6	2	3		6	3					3	1	6	2
EPA 8081A	DDE(p,p')					5	2	6	2	6	2	3		6	3					3	1	6	2
EPA 8081A	DDT(p,p')					5	2	6	2	6	2	3		6	3					3	1	6	2
EPA 8081A	Dicofol					5	2	6	2	6	2	3		6	3					3	1	6	2
EPA 8081A	Dieldrin					5	2	6	2	6	2	3		6	3					3	1	6	2
EPA 8081A	Endrin					5	2	6	2	6	2	3		6	3					3	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 8081A	Methoxychlor					5	2	6	2	6	2	3		6	3					3	1	6	2
Group A Pesticides																							
EPA 8081A	Aldrin								1		2	3		6	3								
EPA 8081A	Chlordane								1		2	3		6	3								
EPA 8081A	Endosulfan I								1		2	3		6	3								
EPA 8081A	Endosulfan II								1		2	3		6	3								
EPA 8081A	HCH, alpha								1		2	3		6	3								
EPA 8081A	HCH, beta								1		2	3		6	3								
EPA 8081A	HCH, delta								1		2	3		6	3								
EPA 8081A	HCH, gamma								1		2	3		6	3								
EPA 8081A	Heptachlor								1		2	3		6	3								
EPA 8081A	Heptachlor epoxide								1		2	3		6	3								
EPA 8081A	Toxaphene								1		2	3		6	3								
Organophosphates																							
EPA 8141A	Azinphos methyl					5	2	6	1	6										3	1	6	2
EPA 8141A	Chlorpyrifos	2	2	5	2	5	2	6	1	6										3	1	6	2
EPA 8141A	Demeton-s																			3	1	6	2
EPA 8141A	Diazinon	2	2	5	2	5	2	6	1	6										3	1	6	2
EPA 8141A	Dichlorvos																			3	1	6	2
EPA 8141A	Dimethoate					5	2	6	1	6										3	1	6	2
EPA 8141A	Disulfoton					5	2	6	1	6										3	1	6	2
EPA 8141A	Malathion					5	2	6	1	6										3	1	6	2
EPA 8321A	Methamidophos					5	2	6	1	6													
EPA 8141A	Methidathion					5	2	6	1	6										3	1	6	2
EPA 8141A	Molinate					5	2	6	1	6													
EPA 8141A	Parathion, Methyl					5	2	6	1	6										3	1	6	2
EPA 8141A	Phorate					5	2	6	1	6										3	1	6	2
EPA 8141A	Phosmet					5	2	6	1	6										3	1	6	2
EPA 8141A	Thiobencarb					5	2	6	1	6													
EPA 8141A	Trifluralin																			3	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
Pyrethroids																							
EPA 8081A	Bifenthrin			1	2	5	2	6															
EPA 8081A	Cyfluthrin, total			1	2	5	2	6															
EPA 8081A	Cyhalothrin, lambda, total	2	2	5	2	5	2	6															
EPA 8081A	Cypermethrin, total	2	2	5	2	5	2	6															
EPA 8081A	Esfenvalerate/ Fenvalerate, total	2	2	5	2	5	2	6															
EPA 8081A	Permethrin, total	2	2	5	2	5	2	6															
Triazines																							
EPA 547M	Glyphosate					5	2	6	1	6										3	1	6	2
EPA 549.2M	Paraquat dichloride					5	2	6	1	6										3	1	6	2
EPA 619	Atrazine					5	2	6	1	6										3	1	6	2
EPA 619	Cyanazine					5	2	6	1	6										3	1	6	2
EPA 619	Simazine					5	2	6	1	6										3	1	6	2
Metals (Total)																							
EPA 200.8	Arsenic					5	2	6	1	6										3	1	6	2
EPA 200.8	Boron					5	2	6	1	6										3	1	6	2
EPA 200.8	Cadmium					5	2	6	1	6										3	1	6	2
EPA 200.8	Copper					5	2	6	1	9								3		3	1	6	2
EPA 200.8	Lead					5	2	6	1	6										3	1	6	2
EPA 200.8	Molybdenum																			3	1	6	2
EPA 200.8	Nickel					5	2	6	1	6										3	1	6	2
EPA 200.8	Selenium					5	2	6	1	6										3	1	6	2
EPA 200.8	Zinc					5	2	6	1	6										3	1	6	2
Metals (Dissolved)																							
EPA 200.8	Cadmium																			3	1	6	2
EPA 200.8	Copper																	3		3	1	6	2
EPA 200.8	Lead																			3	1	6	2
EPA 200.8	Nickel																			3	1	6	2
EPA 200.8	Zinc																			3	1	6	2
Nutrients																							
SM 2340 C	Hardness as CaCO3					5	2	6	1	9								3		3	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 300.0	Nitrate as N					5	2	6	1	6													
EPA 350.2	Ammonia as N					5	2	6	2	6	2	3		6	3	2	1	6	3	3	1	6	2
EPA 351.3	Nitrogen, Total Kjeldahl					5	2	6	2	6	2	3		6	3	2	1	6	3	3	1	6	2
EPA 354.1	Nitrite as N					5	2	6	1	6													
EPA 353.2	Nitrate + Nitrite as N								1		2	3		6	3	2	1	6	3	3	1	6	2
EPA 365.2	OrthoPhosphate as P					5	2	6	2	6	2	3		6	3	2	1	6	3	3	1	6	2
EPA 365.2	Phosphate as P					4	2	6	2	6	2	3		6	3	2	1	6	3	3	1	6	2
Toxicity																							
EPA 821/R-02-012	*Ceriodaphnia dubia*	3	4	6	3	5	3	8	1	8										3	1	6	2
EPA 821/R-02-012	*Pimephales promelas*	2	2	5	2	5	3	6												3	1	6	2
EPA 821/R-02-013	*Selenastrum capricornutum*	2	3	5	2	5	3	8	1	11								4		3	1	6	2
EPA 600/R-99-064	*Hyalella azteca*	2		5		1	1	1	1	1										1		1	

Table VIII-4. Mokelumne River site subwatershed Management Plan Monitoring schedule (2007-2011).

Site Name	Sample Date	Monitoring Type	Copper	*C. dubia*	*S. capricornutum*
Mokelumne River @ Bruella Rd	20-Jun-07	A		X	
Mokelumne River @ Bruella Rd	28-Aug-07	A			X
Mokelumne River @ Bruella Rd	25-Sep-07	A		X	
Mokelumne River @ Bruella Rd	7-May-08	A			X
Mokelumne River @ Bruella Rd	3-Jun-08	A	X	X	
Mokelumne River @ Bruella Rd	8-Jul-08	A	X		X
Mokelumne River @ Bruella Rd	5-Aug-08	A	X		X
Mokelumne River @ Bruella Rd	9-Sep-08	A		X	
Mokelumne River @ Bruella Rd	13-Apr-10	MPM			X
Mokelumne River @ Bruella Rd	11-May-10	MPM			X
Mokelumne River @ Bruella Rd	8-Jun-10	MPM	X		
Mokelumne River @ Bruella Rd	13-Jul-10	MPM	X		X
Mokelumne River @ Bruella Rd	10-Aug-10	MPM	X		X
Mokelumne River @ Bruella Rd	8-Feb-11	MPM		X	
Mokelumne River @ Bruella Rd	8-Mar-11	MPM		X	X
Mokelumne River @ Bruella Rd	12-Apr-11	MPM			X
Mokelumne River @ Bruella Rd	24-May-11	MPM			X
Mokelumne River @ Bruella Rd	28-Jun-11	MPM	X	X	
Mokelumne River @ Bruella Rd	26-Jul-11	MPM	X		X
Mokelumne River @ Bruella Rd	23-Aug-11	MPM	X		X
Mokelumne River @ Bruella Rd	20-Sep-11	MPM		X	

A – Additional sampling
X – Constituent sampled for Management Plan Monitoring (MPM).

Exceedance History

Samples collected from the Mokelumne River subwatershed (Mokelumne River @ Bruella Rd and Mokelumne River @ Fish Hatchery) from 2004 through 2011 exceeded the WQTLs for field parameters, *E. coli,* and metals as well as water column toxicity. Table VIII-5 includes exceedances of DO (6), pH (9), *E. coli* (4), copper (3), DDT (1), and toxicity to *C. dubia* (5) and *S. capricornutum* (10).

During 2011, exceedances included pH (3) and *E. coli* (2; Table VIII-5).

The highest priority constituents in the Mokelumne River @ Bruella Rd site subwatershed are copper (C) and *S. capricornutum* toxicity (D).

Table VIII-5. Mokelumne River site subwatershed exceedances (2004-2011).
The WQTLs are listed in the header after the analyte. Data sorted by season and date.
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[1], > 1,300 µg/L	DDT (p,p'), >0.00059 µg/L[2]	*C. dubia*, (% Control)	*S. capricornutum*, (% Control)
Mokelumne River @ Bruella Rd	Irrigation	8/24/2004							51
Mokelumne River @ Bruella Rd	Irrigation	9/23/2004						5	
Mokelumne River @ Bruella Rd	Storm	3/21/2005						37	84
Mokelumne River @ Bruella Rd	Irrigation	5/17/2005							92
Mokelumne River @ Bruella Rd	Irrigation	6/21/2005	5.10					37	
Mokelumne River @ Bruella Rd	Irrigation	7/19/2005	6.60						
Mokelumne River @ Fish Hatchery	*Irrigation*	*9/20/2005*	*5.50*						
Mokelumne River @ Bruella Rd	Storm	2/27/2006						5	
Mokelumne River @ Bruella Rd	Storm RS	3/10/2006						5	
Mokelumne River @ Bruella Rd	Irrigation	5/16/2006	6.90	6.48					
Mokelumne River @ Bruella Rd	Irrigation	6/20/2006	6.70						
Mokelumne River @ Bruella Rd	Irrigation	8/15/2006		6.33					
Mokelumne River @ Bruella Rd	Irrigation	4/10/2007		8.52					
Mokelumne River @ Bruella Rd	Irrigation	6/12/2007				1.8 (1.7)			
Mokelumne River @ Bruella Rd	Irrigation	7/10/2007				4.7 (1.9)			57
Mokelumne River @ Bruella Rd	Irrigation	8/7/2007				2.4 (1.9)			
Mokelumne River @ Bruella Rd	Irrigation	4/15/2008			390				44
Mokelumne River @ Bruella Rd	Irrigation RS	4/23/2008							19
Mokelumne River @ Bruella Rd	Irrigation	5/7/2008							10
Mokelumne River @ Bruella Rd	Irrigation RS	5/13/2008							27

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[1], > 1,300 µg/L	DDT (p,p'), >0.00059 µg/L[2]	*C. dubia*, (% Control)	*S. capricornutum*, (% Control)
Mokelumne River @ Bruella Rd	Irrigation RS	5/21/2008							73
Mokelumne River @ Bruella Rd	Irrigation	7/8/2008							82
Mokelumne River @ Bruella Rd	Irrigation	8/11/2009					0.015		
Mokelumne River @ Bruella Rd	Irrigation	9/15/2009	6.95	5.09					
Mokelumne River @ Bruella Rd	Fall	10/6/2009			1100				
Mokelumne River @ Bruella Rd	Fall	11/10/2009		6.06					
Mokelumne River @ Bruella Rd	Winter	2/9/2010		6.08					
Mokelumne River @ Bruella Rd	Irrigation	4/12/2011		8.80					
Mokelumne River @ Bruella Rd	Irrigation	5/24/2011		6.23					
Mokelumne River @ Bruella Rd	Irrigation	9/20/2011		6.17	240				
Mokelumne River @ Bruella Rd	Storm	10/6/2011			550				
Constituent Priority			**E**	**E**	**E**	**C**	**NP**	**E**	**D**

[1]Total metal WQTL variable based on hardness.
[2]A field blank exceedance of DDT on 6/20/2006 was incorrectly reported in previous MPURs, this table has been updated to exclude the field blank exceedance because it is not representative of the water quality in Mokelumne River.
NP – Not Prioritized; less than two exceedances within three consecutive monitoring years and currently no TMDL.
RS – Resample

2007-2011 Management Plan Monitoring Results

All monitoring results for high priority management plan constituents in the Mokelumne River @ Bruella Rd subwatershed are listed in Table VIII-6. These constituents include copper and water column toxicity to *C. dubia* and *S. capricornutum.*

Copper exceeded the WQTL (calculated from associated hardness values) three times during 2007 and was subsequently added to the Mokelumne River management plan. Normal Monitoring and additional MPM occurred for copper during 2008 (June-August) and resulted in no exceedances. Copper is not a Core Monitoring constituent and was not sampled during 2009 Core Monitoring at the site. Copper was sampled as a part of Year 0 MPM at the site during 2010 (June-August), and there were no exceedances. Assessment Monitoring occurred at Mokelumne River in 2011 and again there were no exceedances of the copper WQTL (Table VIII-6). Management Plan Monitoring will occur for copper in 2012 (June-August).

Toxicity to *C. dubia* occurred four times since 2004. The most recent toxicity was February 2006 (persistent in resample in March), and consequently *C. dubia* toxicity is a part of the Mokelumne River management plan. However, there were no exceedances of constituents associated with *C. dubia* toxicity in at the Mokelumne River @ Bruella Rd site; therefore, *C. dubia* toxicity is a priority E constituent, and MPM for *C. dubia* toxicity is optional. The Coalition conducted additional MPM 2007 and Assessment Monitoring 2008 (June and September) and no *C. dubia* toxicity occurred. *C. dubia* toxicity was not part of the MPM schedule in 2010, but was included in monthly Assessment Monitoring at the site in 2011; there was no toxicity. The Coalition will conduct 2012 MPM for *C. dubia* toxicity during months of past exceedances during 2012 MPM to collect data demonstrating two consecutive years of no toxicity (Table VIII-6).

Toxicity to *S. capricornutum* first occurred in August 2004. The second and third *S. capricornutum* toxicities occurred in 2005 (March and May), and additional MPM for *S. capricornutum* toxicity occurred in 2007 (August). Toxicity during July 2007 was associated with a copper WQTL exceedance. Additional MPM was scheduled for 2008 (May, July, and August) along with planned Normal Monitoring, and toxicities occurred in April (Normal Monitoring), May (Normal Monitoring and MPM), and July (MPM). Samples for *S. capricornutum* toxicity were not collected during 2009 at the site (Core Monitoring only in 2009), but Year 0 MPM began in 2010 (April, May, July, and August) during which there were no toxicities. In addition, no toxicity occurred at Mokelumne River @ Bruella Rd during 2011 Assessment Monitoring (Table VIII-6). *S. capricornutum* toxicity will be assessed during months of past exceedances as a part of 2012 MPM.

Table VIII-6. Mokelumne River 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 (@ Bruella Rd)	Date	NA	2/11/07	2/28/07	NA	4/10/07	5/22/07	6/12/07	7/10/07	8/07/07	9/04/07	NA	NA	NA
	C. dubia (% survival)	NA	100	150	NA	105	95	90	100	100	100	NA	NA	NA
	S. capricornutum (% Control)	NA	100	121	NA	132	141	186	**57**[1]	138	118	NA	NA	NA
2007 MPM (@ Bruella Rd)	Date	NA	NA		NA	NA	NA	6/20/07	NA	8/28/07	9/25/07	NA	NA	NA
	C. dubia (% Control)	NA	NA		NA	NA	NA	100	NA	NA	100	NA	NA	NA
	S. capricornutum (% Control)	NA	NA		NA	NA	NA	NA	NA	76	NA	NA	NA	NA
2008 NM (@ Bruella Rd)	Date	1/23/08	NA		NA	4/15/08	5/13/08	6/10/08	7/15/08	8/12/08	9/16/08	NA	NA	NA
	Copper, total (µg/L)	0.9	NA		NA	1.5	1.4	0.8	1.2	0.9	1.1	NA	NA	NA
	C. dubia (% Control)	100	NA		NA	100	100	100	100	100	100	NA	NA	NA
	S. capricornutum (% Control)	120	NA		NA	**44**	**27**	110	116	87	98	NA	NA	NA
2008 MPM (@ Bruella Rd)	Date	NA	NA		NA	NA	5/07/08	6/03/08	7/08/08	8/05/08	9/09/08	NA	NA	NA
	Copper, total (µg/L)	NA	NA		NA	NA	NA	1.4	1.2	1.1	NA	NA	NA	NA
	C. dubia (% Control)	NA	NA		NA	NA	NA	100	NA	NA	100	NA	NA	NA
	S. capricornutum (% Control)	NA	NA		NA	NA	**10**	NA	**82**[1]	314	NA	NA	NA	NA
2010 MPM (@ Bruella Rd)	Date	NA	NA		NA	4/13/10	5/11/10	6/08/10	7/13/10	8/10/10	9/07/10	NA	NA	NA
	Copper, dissolved (µg/L)	NA	NA		NA	NA	NA	0.68	0.27	0.47	NA	NA	NA	NA
	Copper, total (µg/L)	NA	NA		NA	NA	NA	1	0.56	0.73	NA	NA	NA	NA
	S. capricornutum (% Control)	NA	NA		NA	189	444	NA	327	871	NA	NA	NA	NA
2011 NM & MPM (@ Bruella Rd)	Date	1/11/11	2/8/11		3/8/11	4/12/11	5/24/11	6/28/11	7/26/11	8/23/11	9/20/11	10/6/11	11/15/11	12/13/11
	Copper, dissolved (µg/L)	0.72	0.56		0.66	0.66	0.42	0.27*	0.36*	0.50*	0.62	0.41	0.51	0.51
	Copper, total (µg/L)	1.5	0.74		1.1	1.8	1.2	0.86*	0.80*	0.83*	1.2	1.2	1.4	0.84
	C. dubia (% Control)	100	100*		100*	100	100	105*	100	95	100*	100	100	100
	S. capricornutum (% Control)	211	470		590*	813*	419*	215	530*	371*	117	581	303	362

[1]*S. capricornutum* toxicity was resampled the following week. Toxicity was not persistent.
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 sampling occurred during this date for this constituent.

Load Calculations

The Mokelumne River @ Bruella Rd site is often too deep to take discharge; hence, only one load calculation is available for copper. The single load calculated for the copper detection (Table VIII-7) is based on the following formula:

Load = Discharge (cfs) X 28.317L/ft^3 X Concentration (µg/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.

Table VIII-7. Mokelumne River site subwatershed instantaneous load calculations for copper.
Sorted by analyte and date.

Site Name	Analyte Name	Sample Date	Discharge cfs	Concentration µg/L	Loading Rate µg/sec
Mokelumne River @ Bruella Rd	Copper	09/16/08	206.25	1.1	6424.42

Source Identification and Outreach

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. During 2007 and 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 Mokelumne River in 2010 during the months when past exceedances occurred and 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 developed an outreach strategy, which is detailed in the following sections.

Mokelumne River @ Bruella Rd subwatershed is one of the Coalitions third high priority subwatersheds for 2011 through 2013. The Coalition will actively engage in grower outreach and education to address the Mokelumne River 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 during the winter 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 is occurring during the winter of 2012 to determine if additional management practices were implemented and if any are planned to be implemented in the 2012 irrigation season. Management Plan Monitoring will continue through 2013 as necessary to assess the effect of outreach on water quality.

Priority C Constituents

Copper is the only priority C constituent under the Mokelumne River management plan.

Copper

Three exceedances of the copper WQTL occurred in the Mokelumne River site subwatershed in June, July, and August 2007. The July exceedance was associated with *S. capricornutum* water column toxicity.

To best determine the outreach strategy, the Coalition reviews PUR data for the number of monthly copper applications, pounds of active ingredient applied, and acres treated (Table VIII-8, Figure VIII-2). The greatest amounts of copper use typically occur in the late winter to early irrigation season (March-May) in this subwatershed, and, of note, this use pattern does not correlate with exceedances in the subwatershed. The greatest amount of copper applied was in 2005 (15,920 lbs AI) and the lowest amount applied in 2009 (1,970 lbs AI; complete PUR data are only available through May 2011). Since 2007, there was significantly less use compared to previous years, and it appears this trend continued in 2011 (complete PUR data are only available through May 2011).

The Coalition also uses PUR data to assess which crops received the most applications of copper from 2004 to 2010 (Table VIII-9). Copper is heavily used in this subwatershed with applications being made across numerous parcels. The largest amount of copper applied from 2004 through 2011 was to walnuts (61,355 lbs AI) followed by grapes (12,299 lbs AI). The most common product used within this subwatershed containing copper was Kocide.

Table VIII-8. Mokelumne River @ Bruella Rd site subwatershed copper applications, lbs AI applied, and acres treated by month (2004-2011).

PUR data available through May 2011 for San Joaquin County. If a month is not included in the table, no applications were made.

Month/Year	Number of Copper Applications	Pounds of AI Applied	Acres Treated
February, 2004	4	1510.3	79
March, 2004	22	3901.8	881
April, 2004	37	3977.7	1223.3
May, 2004	10	556.7	268.5
June, 2004	7	188.4	173
July, 2004	3	124.1	105
October, 2004	2	193.4	105
November, 2004	3	506.6	32
December, 2004	7	1382.7	118.5
January, 2005	1	24.6	5
February, 2005	4	3125.2	233.5
March, 2005	21	1554.7	670
April, 2005	54	4454.5	1850.5
May, 2005	21	4251.3	996
June, 2005	6	570.7	265
July, 2005	3	123.0	43.5
October, 2005	1	147.4	20
December, 2005	7	1668.3	109.5
February, 2006	2	2298.0	117
March, 2006	2	194.0	14
April, 2006	36	5267.8	1343.4
May, 2006	40	6142.0	1466.5
June, 2006	2	49.2	19
July, 2006	3	395.8	42.2
August, 2006	3	246.1	82
November, 2006	3	604.8	46
December, 2006	2	408.2	25
March, 2007	12	3877.5	471.5
April, 2007	34	8380.5	2040.4
May, 2007	13	1927.2	529
July, 2007	1	90.0	40
November, 2007	1	562.1	73
December, 2007	6	691.1	86
January, 2008	1	92.4	27
February, 2008	3	3885.2	266
March, 2008	1	57.6	25
April, 2008	37	7337.2	1627
May, 2008	1	69.7	60
June, 2008	4	270.0	72
December, 2008	5	482.1	64
February, 2009	1	35.5	11
April, 2009	17	1022.4	563
May, 2009	6	412.1	235
June, 2009	1	4.2	4
December, 2009	4	495.6	94

Month/Year	Number of Copper Applications	Pounds of AI Applied	Acres Treated
January, 2010	1	23.5	5.5
February, 2010	6	111.2	82
March, 2010	7	991.9	170
April, 2010	30	4035.3	1685
May, 2010	11	961.3	330
June, 2010	1	9.2	20
August, 2010	2	88.5	100
September, 2010	3	269.5	150
February, 2011	1	1.2	1
March, 2011	4	150.6	67
April, 2011	9	152.4	256
May, 2011	11	1543.1	717.5

Summaries by Year			
2004 Total	95	12341.8	2985.3
2005 Total	118	15919.7	4193
2006 Total	93	15605.9	3155.1
2007 Total	67	15528.4	3239.9
2008 Total	52	12194.3	2141
2009 Total	29	1969.7	907
2010 Total	61	6490.5	2542.5
2011 Total	25	1847.3	1041.5
Total	**540**	**81897.6**	**20205.3**

Figure VIII-2. Mokelumne River @ Bruella Rd site subwatershed lbs copper applied by month (2004-2011).

PUR data available through May 2011 for San Joaquin County. Asterisk (*) denotes months with exceedances.

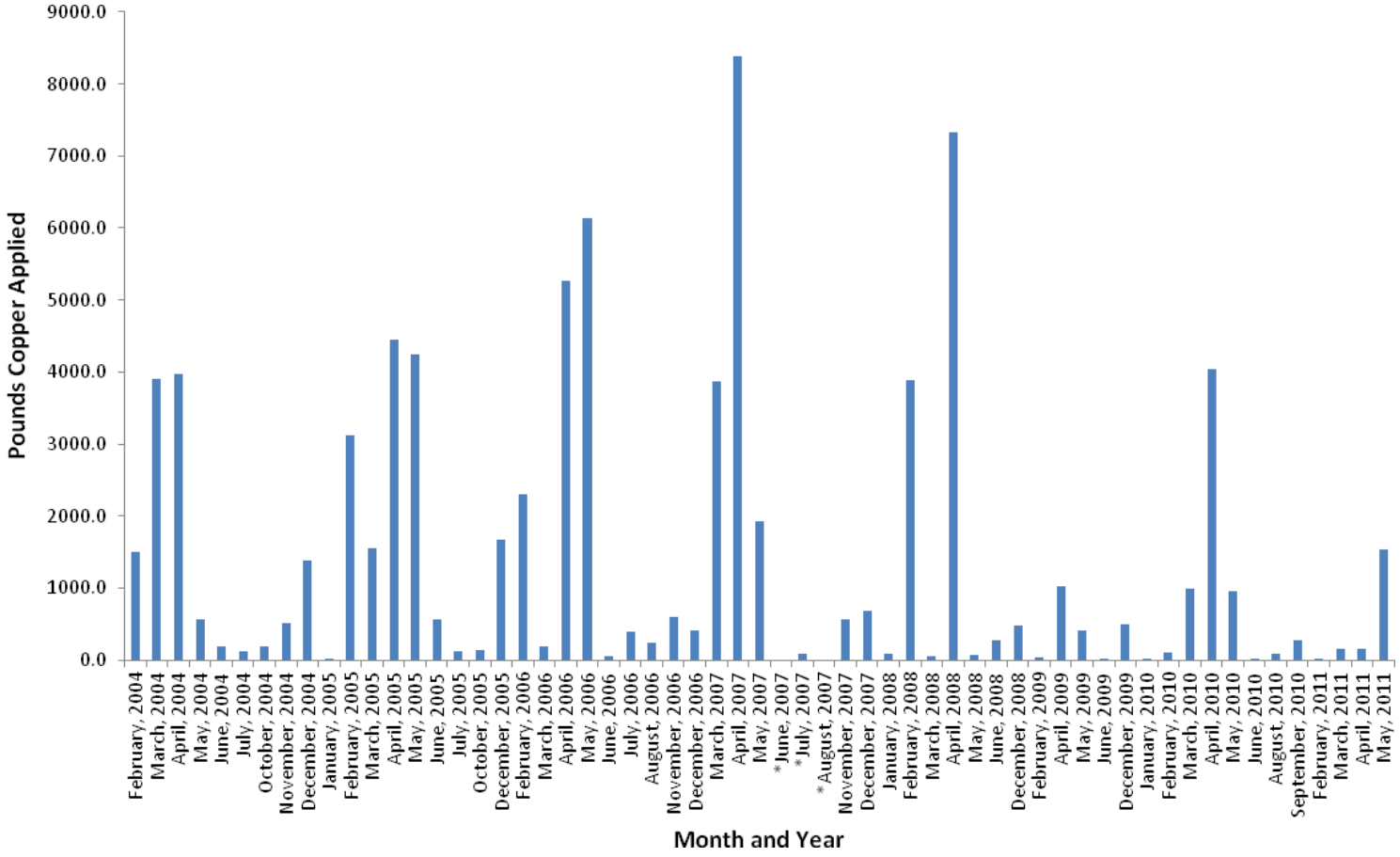


Table VIII-9. Mokelumne River @ Bruella Rd site subwatershed copper PUR data (2004-2011).

PUR data available through May 2011 for San Joaquin County.

Chemical Name	Commodity	Product Name	Lbs AI Applied
COPPER	ALMOND	KOCIDE DF	15.4
	APPLE	KOCIDE DF	1482.8
	CHERRY	CUPROFIX ULTRA 40 DISPERSS	753.7
		DUPONT KOCIDE 2000 FUNGICIDE/BACTERICIDE	185.6
		HYDROX	148.6
		KOCIDE 101	379.6
		KOCIDE 2000	35.5
		KOCIDE DF	981.2
		NU-COP 50 WP	562.1
		NU-COP 50DF	342.7
		TRIANGLE BRAND COPPER SULFATE	594.0
		TRIANGLE BRAND COPPER SULFATE INSTANT POWDER	2103.8
	GRAPES	BLUE SHIELD DF	47.7
		CHAMP DP	8.6
		CHAMP FLOWABLE	432.7
		CHAMP FORMULA 2 FLOWABLE	1878.4
		CLEAN CROP C-O-C-S 15 SULFUR 25 DUST	499.9
		FIRST CHOICE COPPER SULFUR 15-25 DUST	60.0
		HYDROX	140.1
		KOCIDE 101	135.5
		KOCIDE 2000	9.9
		KOCIDE 2000 T/N/O	6.5
		KOCIDE 4.5 LF	38.4
		KOCIDE 606 FLOWABLE AGRICULTURAL FUNGICIDE	53.4
		KOCIDE DF	277.5
		NORDOX	375.6
		NORDOX 75 WG	8.4
		NU-COP 3L	182.8
		NU-COP 50DF	100.7
		TENN-COP 5E	73.2
		TRIANGLE BRAND COPPER SULFATE	297.0
		ZINC COPOSIL SULFUR DUST	33.0
	GRAPES (WINE)	BLUE SHIELD DF	257.2
		CHAMP FORMULA 2 FLOWABLE	1001.6
		CHAMPION WETTABLE POWDER	1489.0
		CLEAN CROP C-O-C-S 15 SULFUR 25 DUST	505.5
		C-O-C-S 15 SULPHUR 25 DUST	48.0
		CSC COPPER SULFUR DUST	48.8
		DUPONT KOCIDE 2000 FUNGICIDE/BACTERICIDE	120.5
		DUPONT KOCIDE 3000 FUNGICIDE/BACTERICIDE	53.5
		DUPONT KOCIDE 4.5LF FUNGICIDE/BACTERICIDE	41.8
		FIRST CHOICE COPPER SULFUR 15-25 DUST	682.5
		HYDROX	429.7
		KOCIDE 101	15.4
		KOCIDE 2000	6.5
		KOCIDE 4.5 LF	370.0
		KOCIDE 606 FLOWABLE AGRICULTURAL FUNGICIDE	26.7

Chemical Name	Commodity	Product Name	Lbs AI Applied
COPPER	GRAPES (WINE)	KOCIDE DF	1707.2
		NORDOX 75 WG	353.0
		NU-COP 3L	194.6
		NU-COP 50DF	42.4
		ZINC COPOSIL SULFUR DUST	246.1
	OLIVE	NORDOX 75 WG	107.4
	ONION (DRY, SPANISH, WHITE, YELLOW, RED, ETC.)	CHAMP FORMULA 2 FLOWABLE	56.8
		DUPONT KOCIDE 3000 FUNGICIDE/BACTERICIDE	43.8
		HYDROX	45.8
		NU-COP 50DF	45.8
	PEPPERS (FRUITING VEGETABLE), (BELL,CHILI, ETC.)	DUPONT KOCIDE 3000 FUNGICIDE/BACTERICIDE	11.5
		HYDROX	346.5
	STONE FRUIT	KOCIDE DF	1.2
	WALNUT (ENGLISH WALNUT, PERSIAN WALNUT)	BADGE X2	34.2
		BLUE SHIELD DF	3227.8
		BLUE VIKING COPPER SULFATE STAR GLOW POWDER	10177.2
		CHAMPION WETTABLE POWDER	184.8
		DUPONT GX-569 FUNGICIDE/BACTERICIDE	368.8
		DUPONT KOCIDE 2000 FUNGICIDE/BACTERICIDE	226.0
		DUPONT KOCIDE 3000 FUNGICIDE/BACTERICIDE	2784.4
		HYDROX	1255.1
		KOCIDE 101	5500.9
		KOCIDE 2000	1383.7
		KOCIDE 606 FLOWABLE AGRICULTURAL FUNGICIDE	170.9
		KOCIDE DF	10953.8
		NU-COP 50 WP	7114.8
		NU-COP 50DF	7992.6
		NU-COP 50WP	1540.0
		NUCOP DF	2105.5
		NU-COP HB	12.7
		NUCOP WP	1500.0
		TRIANGLE BRAND COPPER SULFATE	623.7
		TRIANGLE BRAND COPPER SULFATE INSTANT POWDER	4197.6

ALMOND -Total Pounds Copper Applied	**15.4**
APPLE - Total Pounds Copper Applied	**1482.8**
CHERRY - Total Pounds Copper Applied	**6086.7**
GRAPES - Total Pounds Copper Applied	**12299.3**
OLIVE - Total Pounds Copper Applied	**107.4**
ONION - Total Pounds Copper Applied	**192.2**
PEPPERS - Total Pounds Copper Applied	**358.0**
STONE FRUIT - Total Pounds Copper Applied	**1.2**
WALNUT - Total Pounds Copper Applied	**61354.6**
Total Pounds Copper Applied (2004-2011)	**81897.6**

Monitoring results and PUR data indicate that management of copper in this subwatershed should focus on copper applications during the summer months. The Coalition reported in the 2008 Management Plan that copper appears to move to the river by sediments mobilized during the irrigation season. As discussed above, copper is heavily used in the subwatershed with numerous applications being made across numerous sections. In addition, copper is typically applied via ground application, thus mismanaged irrigation tailwater is a more likely source than spray drift. Therefore, the Coalition is determined to provide information on a subwatershed basis to growers to review their operations and determine if storm water runoff and irrigation return flows are managed properly, specifically to growers with the potential to drain to the creek and who applied copper within the past two years. Vineyard and orchard operators are advised of methods to improve irrigation and to better manage irrigation tailwater and storm water runoff. Coalition representatives 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. Therefore, the Coalition provides 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 that occurred in high priority subwatersheds during 2011 is provided in the Performance Goals and Schedules section of this report. Focused outreach is directed at growers who have parcels in the direct drainage area of the subwatershed and who used copper within the last two years. From these criteria, the Coalition compiled a targeted list of growers which consists almost entirely of orchard and vineyard operators and a couple growers farming row crops.

The Coalition began conducting individual contact meetings with targeted growers during the winter of 2011. Although meetings focused mainly on copper exceedances and related *S. capricornutum* toxicities, all water quality results were reviewed and discussed including exceedances of DO, pH, *E. coli,* and *C. dubia* toxicity. The Coalition contacted 12 targeted growers accounting for 937 acres of direct drainage within the subwatershed. To date, the Coalition achieved 100% of initial contacts for targeted growers in the Mokelumne River @ Bruella Rd subwatershed.

Grower surveys completed at the meetings, documenting members' current practices and indicating which recommended practices growers anticipated implementing in the upcoming years, have been compiled and are assessed by the Coalition in the Third Priority Summary of Management Practices section of this report. The Coalition is in the process of conducting follow up with targeted growers during 2012 to determine what additional management practices were implemented in 2011 and if additional practices are planned for 2012.

Assessment Monitoring occurred during 2011 at Mokelumne River @ Bruella Rd and there were no copper exceedances. The site is scheduled for Core Monitoring in 2012, and the Coalition plans to

conduct MPM in 2012 and 2013 during the months of previous exceedances to evaluate water quality as recommended management practice implementation occurs.

Priority D Constituents

Water column toxicity to *S. capricornutum* is the only priority D constituent under the Mokelumne River @ Bruella Rd management plan.

***S. capricornutum* toxicity**

Toxicity to *S. capricornutum* occurred eight times from 2004 through 2010 during the months of March, April, May, July, and August (Table VIII-5). Toxicity during July 2007 was associated with a copper WQTL exceedance. The Coalition did not analyze for metals prior to 2006, so it is unknown if copper was present in samples associated with the toxic samples before that time. No TIEs were performed for any of the exceedances and it is unclear what might have contributed to toxicity.

Regardless of the cause, the Coalition believes that improved management of storm water and irrigation return flows would be the most effective way to eliminate *S. capricornutum* toxicity. The Coalition focused on copper and soluble constituents during targeted outreach as well as management practices applicable to retention of storm and irrigation water. If the Coalition finds that copper exceedances are eliminated but *S. capricornutum* toxicity persists, then additional herbicides will need to be targeted for outreach and management.

Priority E Constituents

The priority E constituents listed under the Mokelumne River management plan are *C. dubia* water column toxicity, pH, DO, and *E. coli*.

In the previous years' MPURs, the Coalition incorrectly listed DDT as a priority E in the Mokelumne River management plan. The second exceedance of DDT on June 20, 2006 that obligated the Coalition to include the constituent in the management plan was actually not an exceedance (DDT was not detected in either the environmental sample nor field duplicate collected from Mokelumne River during the sampling event). The DDT concentration previously reported was actually detected in the field blank sample. Therefore, the sample is not representative of water quality in the Mokelumne River, and DDT should not have been listed on the Mokelumne River management plan. Exceedances of DDT in the Coalition region are usually the result of sediment becoming re-suspended in the water column and typical outreach includes encouraging growers to implement practices to avoid causing sediment discharge to the waterways. This strategy is consistent with outreach designed to address the other priority constituents in the Mokelumne River management plan.

Toxicity to *C. dubia* has occurred four times in the Mokelumne River @ Bruella Rd subwatershed (September 2004, March and June 2005, and February 2006). Resamples were collected for all four samples; only the February 2006 sample had persistent toxicity in its resample. Toxicity Identification

Evaluations were also conducted on all four samples; all toxicity was lost in three of the samples, but pyrethroids were determined to be the cause of the September 2004 toxicity. Data collected from Normal Monitoring during 2007 and 2008 resulted in two consecutive years of no toxicities, and there was no toxicity during Assessment Monitoring in 2011. Although the Coalition is unable to pinpoint the cause of all toxicities, it believes that improved management of storm water and irrigation return flows would be the most effective way to eliminate *C. dubia* toxicity. The Coalition discussed management of agricultural constituents that may relate to *C. dubia* toxicity during outreach and encouraged growers to implement management practices to reduce the offsite movement of constituents.

Although theses constituents will remain low priority, the Coalition will continue to collect monitoring data on priority E constituents as a part of Core and/or Assessment Monitoring. Dissolved oxygen, *E. coli* and pH are Core constituents monitored monthly at the Mokelumne River site. *C. dubia* toxicity is an Assessment constituent that will be monitored every third year during Assessment Monitoring at the Mokelumne River site. The priority E constituents have been discussed during targeted outreach and will continue to be discussed at annual grower meetings.

The Coalition plans to participate in the focus group along with other Coalitions and Regional Board staff to develop a joint Work Plan to address *E. coli* exceedances by characterizing the potential agricultural sources of *E. coli* and identifying management practices to prevent discharges to surface waters.

Evaluation

Mokelumne River @ Bruella Rd is a third priority site subwatershed within the SJCDWQC and is in its second year of focused outreach (2011-2013).

The Coalition's strategy for the Mokelumne River subwatershed is to focus on providing information to growers to review their operation and determine if irrigation return flows are managed properly, specifically to growers with parcels with the potential to drain to the waterway. Targeting growers with vineyards and orchards for outreach prior to the irrigation season will reach the greatest number of growers because land use in this subwatershed is predominately vineyards and orchards. During outreach and education, the Coalition promotes management practice implementation that will result in the greatest improvement of water quality for the Mokelumne River subwatershed. Outreach efforts include grower notification, management practice outreach and education, tracking of management practices implementation, and providing information on special studies of management practice efficacy.

All individual grower surveys documenting current management practice implementation and assessing planned implementations have been completed and returned to the Coalition representing 100% of targeted growers. The Third Priority Summary of Management Practices section of this report summarizes the results of these contacts. In addition, the Coalition is scheduling follow up contacts with all targeted growers to assess the implementation of new management practices. The final stages of

outreach include following up with growers to identify newly implemented practices and future monitoring to evaluate water quality improvement. In 2012, MPM will continue to take place during months of past exceedances.

There have been no exceedances of the copper and DO WQTLs 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 these constituents from the Mokelumne River management plan.

IX. TERMINOUS TRACT DRAIN @ HWY 12

Management Plan Constituents

Priority A/B

- Chlorpyrifos

Priority D

- *Hyalella azteca* sediment toxicity

Priority E

- Arsenic
- Dissolved Oxygen
- *E. coli*
- *Pimephales promelas* water column toxicity
- Specific Conductivity
- *Selenastrum capricornutum* water column toxicity
- Total Dissolved Solids

Description of Terminous Tract Drain Site Subwatershed

Terminous Tract Drain @ Highway 12 (9,728 irrigated acres) – This site subwatershed drains all of the acreage north of State Highway 12 and most acreage south of Highway 12 on Terminous Tract. The sampling site is located near the confluence of White Slough/Potato Slough and the Mokelumne River (Table IX-1). Primary agricultural crops are field crops, turf, grains, and hay (Figure IX-1). This site subwatershed includes two upstream locations (Terminous Tract @ field drain off Glascock Rd and Terminous Tract on Hwy 12 west of Glascock Rd) which were sampled in 2005 and 2006.

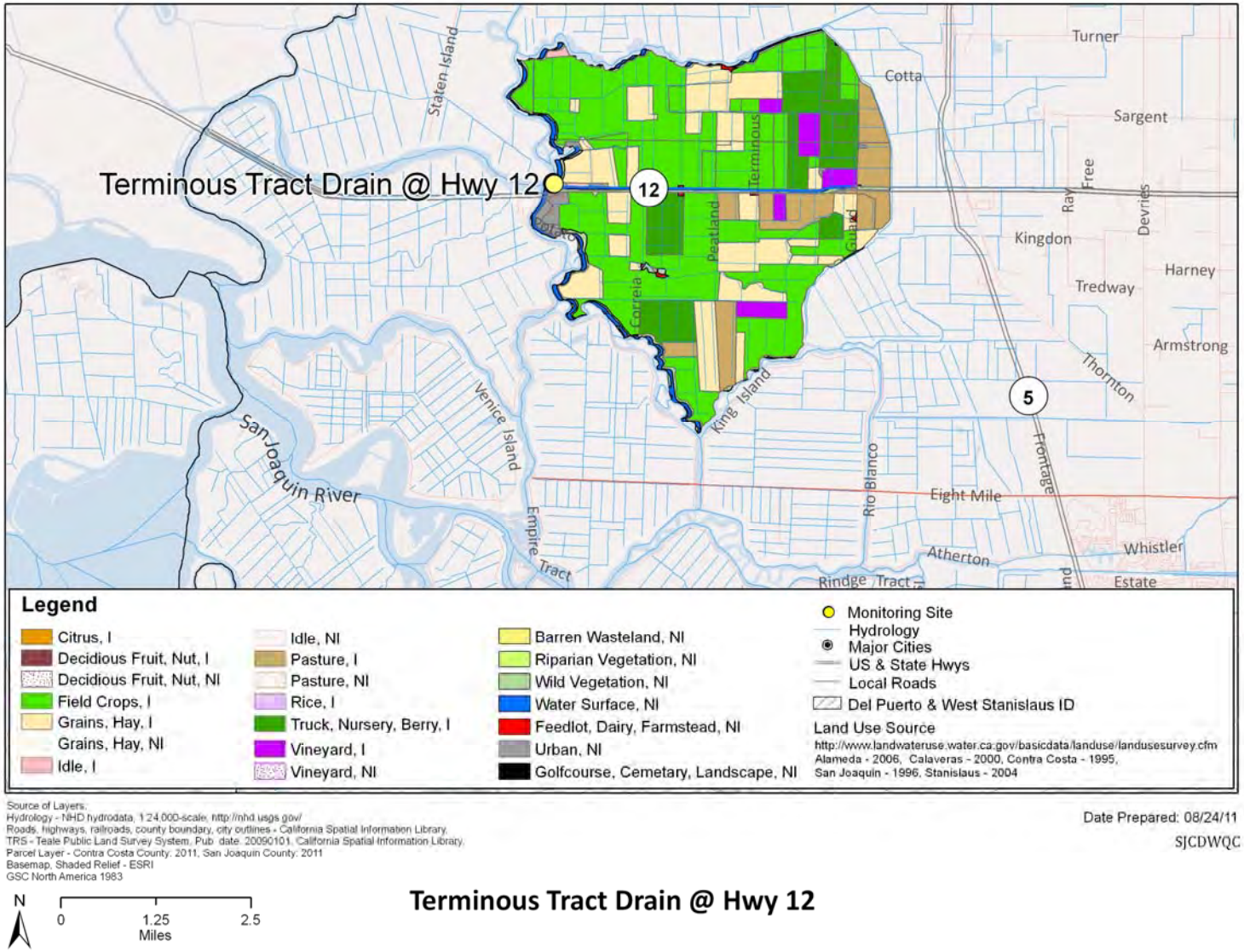
Delta Drain-Terminous Tract off Glasscock Rd (1,471 irrigated acres) – This site is north of Terminous Tract Drain @ Hwy 12, drains a small watershed on the Terminous Tract, and primary crops are field crops, grains, and hay. Monitoring occurred 2005 through 2006.

Delta Drain-Terminous Tract off Guard Rd (1,324 irrigated acres) – This site is located east of the Terminous Tract Drain @ Highway 12 site, drains a relatively small area, primary crops are field, truck and nursery crops, and a relatively large percentage of pasture land. Monitoring occurred 2005 through irrigation 2006.

Table IX-1. Terminous Tract Drain site subwatershed sampling locations coordinates.

Site Name	Station Code	Target Latitude	Target Longitude
Terminous Tract Drain @ Hwy 12	544XTTHWT	38.1166	-121.4937
Terminous Tract off Glascock Rd	544XTTGLR	38.1255	-121.4894
Terminous Tract off Guard Rd	544XTTGUR	38.1167	-121.4211

Figure IX-1. Terminous Tract Drain @ Hwy 12 site subwatershed land use map.



Subwatershed Monitoring History

Monitoring was initiated at the Terminous Tract Drain @ Hwy 12 site subwatershed in the storm season of 2005 and continued through 2011 (Table IX-2). Under the 2008 MRPP, Terminous Tract Drain @ Hwy 12 is the Core site in Zone 3 and was monitored for only Core Monitoring constituents during the fall of 2008, 2009 and 2011 (Table IX-3). Assessment Monitoring occurred at the site during 2010 and is scheduled to occur every third year (2013, 2016, etc.). The site returns to Core Monitoring in 2012.

Sampling was initiated at the Delta Drain-Terminous Tract off Glasscock Rd and Delta Drain-Terminous Tract off Guard Rd sites within the Terminous Tract Drain subwatershed in 2005. After a year of monitoring, it was determined that downstream monitoring location at Terminous Tract Drain @ Hwy 12 was representative of all of the irrigation drainage on Terminous Tract, and, consequently, monitoring at the two upstream locations was no longer necessary.

Management Plan Monitoring did not occur at Terminous Tract until the site entered Year 0 of management plan high priority (Table IX-4). In 2010, chlorpyrifos (August and September) and *S. capricornutum* toxicity (April and May) were assessed. In 2011, chlorpyrifos (August and September), *S. capricornutum* toxicity (January, February, April, and May), and *H. azteca* toxicity (September) were monitored.

Terminous Tract is not considered an impaired waterbody on California's 2008-2010 303d List of Impaired Waterbodies. However, the Sacramento/San Joaquin River Delta, to which Terminous Tract eventually drains, is listed for a number of constituents. These include chlorpyrifos, DDE, DDT, electrical conductivity, diuron, group A pesticides, mercury, toxaphene, water temperature and unknown water column toxicity.

Table IX-2. Terminous Tract Drain @ Highway 12 site subwatershed sampling events per season and year (including MPM).

Year	Season	Events Sampled	Events Not Sampled[1]	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	6	0	**6**
	Fall	2	0	**2**
2009	Winter	3	0	**3**
	Storm	0	0	**0**
	Irrigation	6	0	**6**
	Fall	3	0	**3**
2010	Winter	2	0	**2**
	Storm	1	0	**1**
	Irrigation	6	0	**6**
	Fall	3	0	**3**
2011	Winter	3	0	**3**
	Storm	1	0	**1**
	Irrigation	6	0	**6**
	Fall	2	0	**2**

[1]If an event was not sampled during scheduled monitoring, the site was dry.

Table IX-3. Terminous Tract Drain @ Hwy 12 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																						
NA	Dissolved Oxygen	4	6	3	5	3	7	3	8	2	3		6	3	2	1	6	3	3	1	8	2
NA	Specific Conductivity	4	6	3	5	3	7	3	8	2	3		6	3	2	1	6	3	3	1	8	2
NA	pH	4	6	3	5	3	7	3	8	2	3		6	3	2	1	6	3	3	1	8	2
EPA 110.2	Color	2	5	2	5	3	7	1	6													
EPA 160.1	Dissolved Solids	2	5	2	5	2	6	2	6	2	3		6	3	2	1	6	3	3	1	6	2
EPA 160.2	Suspended Solids							1		2	3		6	3	2	1	6	3	3	1	6	2
EPA 180.1	Turbidity	2	5	2	5	3	6	2	6	2	3		6	3	2	1	6	3	3	1	6	2
EPA 415.1	Total Organic Carbon	2	5	2	6	2	6	2	6	2	3		6	3	2	1	6	3	3	1	6	2
SM 9223	*E. coli*	2	5	2	6	2	6	2	6	2	3		6	3	2	1	6	3	3	1	6	2
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	1	6						2	1	6	3				
EPA 8321A	Carbaryl				5	2	6	1	6						2	1	6	3				
EPA 8321A	Carbofuran				5	2	6	1	6						2	1	6	3				
EPA 8321A	Diuron				5	2	6	1	6						2	1	6	3				
EPA 8321A	Linuron				5	2	6	1	6						2	1	6	3				
EPA 8321A	Methamidophos																3	3				
EPA 8321A	Methiocarb				5	2	6	1	6						2	1	6	3				
EPA 8321A	Methomyl				5	2	6	1	6						2	1	6	3				
EPA 8321A	Oxamyl				5	2	6	1	6						2	1	6	3				
Organochlorines																						
EPA 8081A	DDD(p,p')				5	2	6	1	6				5	3	2	1	6	3				
EPA 8081A	DDE(p,p')				5	2	6	1	6				5	3	2	1	6	3				
EPA 8081A	DDT(p,p')				5	2	6	1	6				5	3	2	1	6	3				
EPA 8081A	Dicofol				5	2	6	1	6				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 8081A	Dieldrin				5	2	6	1	6				5	3	2	1	6	3				
EPA 8081A	Endrin				5	2	6	1	6				5	3	2	1	6	3				
EPA 8081A	Methoxychlor				5	2	6	1	6				5	3	2	1	6	3				
Group A Pesticides																						
EPA 8081A	Aldrin												5	3								
EPA 8081A	Chlordane												5	3								
EPA 8081A	Endosulfan I												5	3								
EPA 8081A	Endosulfan II												5	3								
EPA 8081A	HCH, alpha												5	3								
EPA 8081A	HCH, beta												5	3								
EPA 8081A	HCH, delta												5	3								
EPA 8081A	HCH, gamma												5	3								
EPA 8081A	Heptachlor												5	3								
EPA 8081A	Heptachlor epoxide												5	3								
EPA 8081A	Toxaphene												5	3								
Organophosphates																						
EPA 8141A	Azinphos methyl				5	2	6	1	6						2	1	6	3				
EPA 8141A	Chlorpyrifos	2	5	2	5	2	6	1	6						2	1	6	3			2	
EPA 8141A	Demeton-s														2	1	6	3				
EPA 8141A	Diazinon	2	5	2	5	2	6	1	6						2	1	6	3				
EPA 8141A	Dichlorvos														2	1	6	3				
EPA 8141A	Dimethoate				5	2	6	1	6						2	1	6	3				
EPA 8141A	Disulfoton				5	2	6	1	6						2	1	6	3				
EPA 8141A	Malathion				5	2	6	1	6						2	1	6	3				
EPA 8141A	Methamidophos				5	2	6	1	6						2	1	3					
EPA 8141A	Methidathion				5	2	6	1	6						2	1	6	3				
EPA 8141A	Molinate				5	2	6	1	6													
EPA 8141A	Parathion, Methyl				5	2	6	1	6						2	1	6	3				
EPA 8141A	Phorate				5	2	6	1	6						2	1	6	3				
EPA 8141A	Phosmet				5	2	6	1	6						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 8141A	Thiobencarb				5	2	6	1	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															
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	1	6						2	1	6	3				
EPA 549.2M	Paraquat dichloride				5	2	6	1	6						2	1	6	3				
EPA 619	Atrazine				5	2	6	1	6						2	1	6	3				
EPA 619	Cyanazine				5	2	6	1	6						2	1	6	3				
EPA 619	Simazine				5	2	6	1	6						2	1	6	3				
Metals (Total)																						
EPA 200.8	Arsenic				5	2	6	1	6						2	1	6	3				
EPA 200.8	Boron				5	2	6	1	6						2	1	6	3				
EPA 200.8	Cadmium				5	2	6	1	6						2	1	6	3				
EPA 200.8	Copper				5	2	6	1	6						2	1	6	3				
EPA 200.8	Lead				5	2	6	1	6						2	1	6	3				
EPA 200.8	Molybdenum														2	1	6	3				
EPA 200.8	Nickel				5	2	6	1	6						2	1	6	3				
EPA 200.8	Selenium				5	2	2	1	6						2	1	6	3				
EPA 200.8	Zinc				5	2	6	1	6						2	1	6	3				
Metals (Dissolved)																						
EPA 200.8	Cadmium														2	1	6	3				
EPA 200.8	Copper														2	1	6	3				
EPA 200.8	Lead														2	1	6	3				
EPA 200.8	Nickel														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 200.8	Zinc														2	1	6	3				
Nutrients																						
SM 2340 C	Hardness as CaCO3				6	2	6	1	6						2	1	6	3				
EPA 300.0	Nitrate as N				5	2	6	1	6													
EPA 350.2	Ammonia as N				5	2	6	2	6	2	3		6	3	2	1	6	3	3	1	6	2
EPA 351.3	Nitrogen, Total Kjeldahl				5	2	6	2	6	2	3		6	3	2	1	6	3	3	1	6	2
EPA 354.1	Nitrite as N				5	2	6	1	6													
EPA 353.2	Nitrate + Nitrite as N							1		2	3		6	3	2	1	6	3	3	1	6	2
EPA 365.2	OrthoPhosphate as P				5	2	6	2	6	2	3		6	3	2	1	6	3	3	1	6	2
EPA 365.2	Phosphate as P				5	2	6	2	6	2	3		6	3	2	1	6	3	3	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*	2	5	2	5	2	6	1	6						2	1	6	3				
EPA 821/R-02-012	*Pimephales promelas*	4	6	2	5	2	6	1	6						2	1	6	3				
EPA 821/R-02-013	*Selenastrum capricornutum*	4	5	2	5	2	6	2	8						2	1	6	3	2		2	
EPA 600/R-99-064	*Hyalella azteca*		5	1	1	1	1								1		1				1	

Table IX-4. Terminous Tract Drain site subwatershed Management Plan Monitoring schedule (2010-2011).

Site Name	Sample Date	Monitoring Type	Chlorpyrifos	*S. capricornutum*	*H. azteca*
Terminous Tract Drain @ Hwy 12	13-Apr-10	MPM		X	
Terminous Tract Drain @ Hwy 12	11-May-10	MPM		X	
Terminous Tract Drain @ Hwy 12	10-Aug-10	MPM	X		
Terminous Tract Drain @ Hwy 12	7-Sep-10	MPM	X		
Terminous Tract Drain @ Hwy 12	11-Jan-11	MPM		X	
Terminous Tract Drain @ Hwy 12	8-Feb-11	MPM		X	
Terminous Tract Drain @ Hwy 12	12-Apr-11	MPM		X	
Terminous Tract Drain @ Hwy 12	24-May-11	MPM		X	
Terminous Tract Drain @ Hwy 12	23-Aug-11	MPM	X		
Terminous Tract Drain @ Hwy 12	20-Sep-11	MPM	X		
Terminous Tract Drain @ Hwy 12	14-Oct-11	MPM			X

X – Constituent sampled for Management Plan Monitoring (MPM).

Exceedance History

Samples collected from the Terminous Tract Drain subwatershed (Terminous Tract Drain @ Hwy 12, delta Drain-Terminous Tract off Glasscock Rd and Delta Drain-Terminous Tract off Guard Rd) from 2005 through 2011 exceeded the WQTLs for field, physical parameters, bacteria, metals, pesticides as well as water column and sediment toxicity. Table IX-5 includes exceedances for DO (59), pH (1), SC (54), TDS (42), *E. coli* (18), arsenic (7), DDT, (1), chlorpyrifos (3), and malathion (1). Toxicity to *P. promelas* (2), *S. capricornutum* (5), and *H. azteca* sediment (4) occurred (Table IX-5).

During 2011, exceedances of DO (9), SC (8), TDS (7), *E. coli* (2) and chlorpyrifos (1) occurred (Table IX-5).

The highest priority constituents in the Terminous Tract Drain site subwatershed are chlorpyrifos (A/B) and *H. azteca* toxicity (D).

Table IX-5. Terminous Tract Drain site subwatershed exceedances (2005-2011).

The WQTLs are listed in the header after the analyte. Data sorted by season and date. Upstream sites are 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	Arsenic, >10 µg/L	Chlorpyrifos, >0.015 µg/L	DDT >0.00059 µg/L	Malathion, ND	*P. promelas*, (% Control)	*S. capricornutum*, (% Control)	*H. azteca*, (% Control)
Delta Drain- Terminous Tract off Glasscock Rd	*Storm*	*2/16/2005*	*5.1*			*470*	*1600*							
Delta Drain- Terminous Tract off Guard Rd	*Storm*	*2/16/2005*	*6.8*		*1189*	*670*	*900*							
Terminous Tract Drain @ Hwy 12	Storm	2/16/2005			950	580	1600						19	
Terminous Tract Drain @ Hwy 12	Storm	2/23/2005			1868									
Delta Drain- Terminous Tract off Glasscock Rd	*Storm*	*3/21/2005*	*6*		*848*	*540*								
Delta Drain- Terminous Tract off Guard Rd	*Storm*	*3/21/2005*			*1408*	*830*								
Terminous Tract Drain @ Hwy 12	Storm	3/21/2005	6.3		1705	1000								
Terminous Tract Drain @ Hwy 12	Storm	4/4/2005			1742									
Delta Drain- Terminous Tract off Glasscock Rd	*Irrigation*	*5/17/2005*	*5.4*				*240*							
Delta Drain- Terminous Tract off Guard Rd	*Irrigation*	*5/17/2005*	*5.3*		*1088*	*660*								
Terminous Tract Drain @ Hwy 12	Irrigation	5/17/2005					240							
Delta Drain- Terminous Tract off Guard Rd	*Irrigation*	*6/21/2005*	*4.6*		*1099*	*610*								
Terminous Tract Drain @ Hwy 12	Irrigation	6/21/2005	5.2											
Delta Drain- Terminous Tract off Glasscock Rd	*Irrigation*	*7/19/2005*	*3.4*											
Delta Drain- Terminous Tract off Guard Rd	*Irrigation*	*7/19/2005*	*2.7*		*809*	*480*								
Terminous Tract Drain @ Hwy 12	Irrigation	7/19/2005	3.7											
Delta Drain- Terminous Tract off Glasscock Rd	*Irrigation*	*8/16/2005*	*6*				*280*							
Delta Drain- Terminous Tract off Guard Rd	*Irrigation*	*8/16/2005*	*4.7*		*701*									
Terminous Tract Drain @ Hwy 12	Irrigation	8/16/2005	4.9											

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	Arsenic, >10 µg/L	Chlorpyrifos, >0.015 µg/L	DDT >0.00059 µg/L	Malathion, ND	*P. promelas*, (% Control)	*S. capricornutum*, (% Control)	*H. azteca*, (% Control)
Delta Drain- Terminous Tract off Glasscock Rd	*Irrigation*	*9/20/2005*	*4.8*									*90*		*90*
Terminous Tract Drain @ Hwy 12	Irrigation	9/20/2005										88		
Delta Drain- Terminous Tract off Glasscock Rd	*Storm*	*2/27/2006*			*1030*	*620*	*500*							
Delta Drain- Terminous Tract off Guard Rd	*Storm*	*2/27/2006*	*6.2*		*1126*	*670*	*240*						*14*	
Terminous Tract Drain @ Hwy 12	Storm	2/27/2006			1781	950	1600							
Delta Drain- Terminous Tract off Guard Rd	*Storm*	*3/10/2006*			*1090*									
Delta Drain- Terminous Tract off Glasscock Rd	*Storm*	*3/15/2006*			*1091*	*650*								
Delta Drain- Terminous Tract off Guard Rd	*Storm*	*3/15/2006*			*1119*	*650*								
Terminous Tract Drain @ Hwy 12	Storm	3/15/2006			1720	970								
Delta Drain- Terminous Tract off Glasscock Rd	*Storm*	*4/27/2006*	*5.9*		*754*									*94*
Delta Drain- Terminous Tract off Guard Rd	*Storm*	*4/27/2006*	*5.2*		*1236*									*93*
Terminous Tract Drain @ Hwy 12	Storm	4/27/2006	6.7		1325									
Terminous Tract Drain @ Hwy 12	Irrigation	5/16/2006	4.6				690	11						
Terminous Tract Drain @ Hwy 12	Irrigation	6/20/2006	4.26			1200	580							
Terminous Tract Drain @ Hwy 12	Irrigation	7/18/2006	2.7											
Terminous Tract Drain @ Hwy 12	Irrigation	8/15/2006	3.6											
Terminous Tract Drain @ Hwy 12	Irrigation	9/19/2006	4.1											
Terminous Tract Drain @ Hwy 12	Storm	2/11/2007	5.24		873	570	370	11			0.05			
Terminous Tract Drain @ Hwy 12	Storm	2/28/2007			1469	840		12						
Terminous Tract Drain @ Hwy 12	Storm	3/6/2007	6.66		1665									
Terminous Tract Drain @ Hwy 12	Irrigation	5/22/2007	6.58											

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	Arsenic, >10 µg/L	Chlorpyrifos, >0.015 µg/L	DDT >0.00059 µg/L	Malathion, ND	*P. promelas*, (% Control)	*S. capricornutum*, (% Control)	*H. azteca*, (% Control)
Terminous Tract Drain @ Hwy 12	Irrigation	6/12/2007	5.55											
Terminous Tract Drain @ Hwy 12	Irrigation	7/10/2007	4.58											
Terminous Tract Drain @ Hwy 12	Irrigation	8/7/2007	5.58				240							
Terminous Tract Drain @ Hwy 12	Irrigation	8/9/2007	4.8											
Terminous Tract Drain @ Hwy 12	Irrigation	9/4/2007	6.7				330							
Terminous Tract Drain @ Hwy 12	Storm	1/23/2008			1454	940		11					8	
Terminous Tract Drain @ Hwy 12	Storm RS	1/30/2008			1479									
Terminous Tract Drain @ Hwy 12	Irrigation	4/15/2008			727								51	
Terminous Tract Drain @ Hwy 12	Irrigation RS	4/23/2008			737									
Terminous Tract Drain @ Hwy 12	Irrigation	5/13/2008	6.96		1003	550							50	
Terminous Tract Drain @ Hwy 12	Irrigation RS	5/21/2008			1010									
Terminous Tract Drain @ Hwy 12	Irrigation	6/10/2008	5.08		751	470								
Terminous Tract Drain @ Hwy 12	Irrigation	7/15/2008	4.45							0.008				
Terminous Tract Drain @ Hwy 12	Irrigation	8/12/2008	2.56						0.021					
Terminous Tract Drain @ Hwy 12	Irrigation	9/16/2008	4.71		858	540		11	0.02					
Terminous Tract Drain @ Hwy 12	Fall	10/14/2008			1047	620								
Terminous Tract Drain @ Hwy 12	Fall	11/4/2008			1103	700								
Terminous Tract Drain @ Hwy 12	Winter	1/13/2009			1010	600								
Terminous Tract Drain @ Hwy 12	Winter	2/10/2009			1701	990								
Terminous Tract Drain @ Hwy 12	Winter	3/10/2009		6.31	1898	1200								
Terminous Tract Drain @ Hwy 12	Irrigation	4/14/2009	6.16		878	510								

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	Arsenic, >10 µg/L	Chlorpyrifos, >0.015 µg/L	DDT >0.00059 µg/L	Malathion, ND	*P. promelas*, (% Control)	*S. capricornutum*, (% Control)	*H. azteca*, (% Control)
Terminous Tract Drain @ Hwy 12	Irrigation	5/12/2009	6.55											
Terminous Tract Drain @ Hwy 12	Irrigation	6/9/2009	6.34											
Terminous Tract Drain @ Hwy 12	Irrigation	7/14/2009	4.49											
Terminous Tract Drain @ Hwy 12	Irrigation	8/11/2009	4.49				290							
Terminous Tract Drain @ Hwy 12	Fall	10/6/2009	6.94											
Terminous Tract Drain @ Hwy 12	Fall	11/10/2009			753									
Terminous Tract Drain @ Hwy 12	Fall	12/8/2009			1378	770								
Terminous Tract Drain @ Hwy 12	Storm	1/13/2010	6.69		1242	710								
Terminous Tract Drain @ Hwy 12	Winter	2/9/2010			1434	800								
Terminous Tract Drain @ Hwy 12	Winter	3/16/2010			1960	1100								
Terminous Tract Drain @ Hwy 12	Irrigation	4/13/2010	6.45		1590	850		13						
Terminous Tract Drain @ Hwy 12	Irrigation	6/8/2010	6.7											
Terminous Tract Drain @ Hwy 12	Irrigation	7/13/2010	5.83											
Terminous Tract Drain @ Hwy 12	Irrigation	8/10/2010	5.52											
Terminous Tract Drain @ Hwy 12	Irrigation	9/7/2010	5.55				2000	11						45
Terminous Tract Drain @ Hwy 12	Fall	11/9/2010			991	540								
Terminous Tract Drain @ Hwy 12	Fall	12/7/2010	6.21		1151	730								
Terminous Tract Drain @ Hwy 12	Winter	1/11/2011			1963	1100								
Terminous Tract Drain @ Hwy 12	Winter	2/8/2011			1345	840								
Terminous Tract Drain @ Hwy 12	Winter	3/8/2011	6.85		1836	1000								
Terminous Tract Drain @ Hwy 12	Irrigation	4/12/2011			1172	630								

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	Arsenic, >10 µg/L	Chlorpyrifos, >0.015 µg/L	DDT >0.00059 µg/L	Malathion, ND	*P. promelas*, (% Control)	*S. capricornutum*, (% Control)	*H. azteca*, (% Control)
Terminous Tract Drain @ Hwy 12	Irrigation	5/24/2011	6.94		842	460								
Terminous Tract Drain @ Hwy 12	Irrigation	6/28/2011	4.68											
Terminous Tract Drain @ Hwy 12	Irrigation	7/26/2011	4.42											
Terminous Tract Drain @ Hwy 12	Irrigation	7/28/2011	4.92											
Terminous Tract Drain @ Hwy 12	Irrigation	8/23/2011	4.77				290							
Terminous Tract Drain @ Hwy 12	Irrigation	9/20/2011	3.59				270		0.082					
Terminous Tract Drain @ Hwy 12	Storm	10/6/2011	6.70		854	510								
Terminous Tract Drain @ Hwy 12	Irrigation	10/14/2011	6.14		757									
Terminous Tract Drain @ Hwy 12	Fall	11/15/2011				650								
Terminous Tract Drain @ Hwy 12	Fall	12/13/2011			705.5									
	Constituent Priority		**E**	**NP**	**E**	**E**	**E**	**E**	**A/B**	**NP**	**NP**	**E**	**E**	**D**

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

2007-2011 Management Plan Monitoring Results

All monitoring results for high priority management plan constituents in the Terminous Tract Drain @ Highway 12 subwatershed are listed in Table IX-6. These constituents are chlorpyrifos, water column toxicity to *S. capricornutum* and *H. azteca* sediment toxicity.

Chlorpyrifos exceeded its WQTL in August and September of 2008 and was added to the Terminous Tract Drain management plan. Since the site was not scheduled for high priority status until 2011, MPM did not occur at the site in 2009. Only Core Monitoring occurred at the site in 2009 per the approved MRPP Assessment and Core Monitoring Schedule. Assessment Monitoring occurred at Terminous Tract Drain @ Hwy 12 in 2010 and there were no exceedances. However, chlorpyrifos exceeded the WQTL in samples collected during 2011 MPM (September) at Terminous Tract Drain @ Hwy 12 (Table IX-6).

Sediment toxicity to *H. azteca* first occurred at the smaller, upstream monitoring locations (September 2005 off Glasscock Rd, April 2006 off Glasscock Rd and off Guard Rd); Terminous Tract Drain @ Hwy 12 was also monitored during these events, but no toxicity was detected (Table IX-5). Although no MPM occurred for the subwatershed in 2007 and 2008, Normal Monitoring during 2007 of Terminous Tract Drain @ Hwy 12 resulted in no toxicity (the site was not sampled for sediment toxicity in 2008). However, sediment toxicity did occur in 2010 (September) during Assessment Monitoring. Year 1 of MPM occurred during 2011 at the Terminous Tract Drain @ Hwy 12 site; however the Coalition did not conduct MPM for sediment during the 2011 storm season because the storm sediment toxicity only occurred at the upstream sites and never at the Terminous Tract Drain @ Hwy 12 site. The Coalition since decided to include monitoring results of the entire subwatershed when determining months of past exceedances, and will conduct storm sediment MPM in 2012. Management Plan Monitoring in October 2011 at Terminous Tract Drain @ Hwy 12 resulted in no toxicity (Table IX-6).

S. capricornutum toxicity occurred in February 2005 at the Terminous Tract Drain @ Hwy 12 site and again in February 2006 at the Terminous Tract off Guard Rd site. However, no MPM was scheduled during 2007 and 2008 in the subwatershed. Normal Monitoring during 2007 resulted in no toxicity, but *S. capricornutum* toxicity occurred three times during Normal Monitoring in 2008 (January, April, and May). Only Core Monitoring constituents were collected in 2009, but Assessment Monitoring occurred in 2010 and there was no toxicity to *S. capricornutum*. Although there are no exceedances of prioritized A/B or C constituents in the Terminous Tract Drain subwatershed that were associated with *S. capricornutum* toxicity, MPM took place during 2011 (January, February, April, and May) and no toxicity occurred (Table XI-6).

Table IX-6. Terminous Tract 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 (@ Hwy 12)	Date:	NA	NA	3/6/2007	4/10/07	5/22/07	6/12/07	7/10/07	8/07/07	8/9/07	9/04/07	NA	NA	NA
	S. capricornutum toxicity (% Control)	NA	NA	NA	181	190	811	205	286	NA	301	NA	NA	NA
	H. azteca toxicity (% Control)	NA	NA	95	NA	NA	NA	NA	NA	94	NA	NA	NA	NA
2008 NM (@ Hwy 12)	Date:	NA	NA	NA	4/15/08	5/13/08	6/10/08	7/15/08	8/12/08		9/16/08	NA	NA	NA
	S. capricornutum toxicity (% Control)	NA	NA	NA	**51**	**0.50**	256	285	246		454	NA	NA	NA
2010 NM (@ Hwy 12)	Date:	1/13/10	2/09/10	3/16/10	4/13/10	5/11/10	6/08/10	7/13/10	8/10/10		9/07/10	10/12/10	11/09/10	12/07/10
	Chlorpyrifos µg/L	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	NA		NA	<0.003	<0.003	<0.003
	S. capricornutum toxicity (% Control)	231	339	985	NA	NA	352	687	1092		369	445	569	171
	H. azteca toxicity (% Control)	NA	NA	101	NA	NA	NA	NA	NA		**45**	NA	NA	NA
2010 MPM (@ Hwy 12)	Date:	NA	NA	NA	4/13/10	5/11/10	NA	NA	8/10/10		9/07/10	NA	NA	NA
	Chlorpyrifos µg/L	NA	NA	NA	NA	NA	NA	NA	<0.003		0.011	NA	NA	NA
	S. capricornutum toxicity (% Control)	NA	NA	NA	1480	1121	NA	NA	NA		NA	NA	NA	NA
2011 MPM (@ Hwy 12)	Date:	1/11/11	2/08/11	NA	4/12/11	5/24/11	NA	NA	8/23/11		9/20/11	10/14/11	NA	NA
	Chlorpyrifos µg/L	NA	NA	NA	NA	NA	NA	NA	<0.003		**0.082**	NA	NA	NA
	S. capricornutum toxicity (% Control)	207	836	NA	1509	1138	NA	NA	NA		NA	NA	NA	NA
	H. azteca toxicity (% Control)	NA	NA	NA	NA	NA	NA	NA	NA		NA	109	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 were calculated for the chlorpyrifos detections (Table IX-7) based on the following formula:

Load = Discharge (cfs) X 28.317L/ft^3 X Concentration (mg/L X 1000 or µg/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.

Table IX-7. Terminous Tract Drain site subwatershed instantaneous load calculations for chlorpyrifos.
Sorted by analyte and date.

Site Name	Analyte Name	Sample Date	Discharge cfs	Concentration µg/L	Loading Rate µg/sec
Terminous Tract Drain @ Hwy 12	Chlorpyrifos	03/21/05	9.06	0.012	3.08
Terminous Tract Drain @ Hwy 12	Chlorpyrifos	01/23/08	33.93	0.0047	4.52
Terminous Tract Drain @ Hwy 12	Chlorpyrifos	09/16/08	18.58	0.02	10.52
Terminous Tract Drain @ Hwy 12	Chlorpyrifos	09/07/10	4.07	0.011	1.27
Terminous Tract Drain @ Hwy 12	Chlorpyrifos	09/20/11	22.89	0.082	53.15

Source Identification and Outreach

To address source identification and determine an outreach strategy, the Coalition uses past monitoring results and associated PUR data to focus its efforts on appropriate pesticides. During 2005 and the first half of 2006, the Coalition sampled at two upstream sites—Glasscock Rd and Guard Rd—but determined that the Terminous Tract Drain @ Hwy 12 site was representative of all irrigation drainage on Terminous Tract, and upstream monitoring was no longer necessary. The Coalition did not conduct additional or upstream MPM during 2007 and 2008, and MPM did not begin monitoring at the site until 2010. Assessment Monitoring occurred during 2011 and these results, coupled with PUR data on the most frequent crop type and timing associated with pesticide applications, provided the Coalition with enough data to derive an outreach strategy, which is detailed in the following sections.

In the Coalition's approved Management Plan, the Terminous Tract Drain @ Hwy 12 subwatershed is a third 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 Terminous Tract Drain 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 during the winter 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 occurred during the winter of 2012 to determine if additional management practices were implemented and if any are planned to be implemented in the

2012 irrigation season. 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 listed for the Terminous Tract Drain subwatershed.

Chlorpyrifos

Chlorpyrifos exceeded the WQTL of 0.015 µg/L three times in the Terminous Tract Drain subwatershed—in 2008 (August and September) and during MPM in 2011 (September). No toxicity was associated with the 2008 chlorpyrifos exceedances.

The Terminous Tract Drain subwatershed is comprised primarily of row crops. Chlorpyrifos may be applied to various row crops in the summer months, in particular to alfalfa. To assess the potential sources of the pesticide, the Coalition examines associated PUR data and past monitoring results to determine sourcing and, consequently, the most appropriate strategy for outreach.

The Coalition reviews PUR data from the subwatershed for the number of applications of chlorpyrifos, amount of active ingredient applied (pounds applied), and acres treated (Table IX-8, Figure IX-2). Chlorpyrifos applications in the Terminous Tract Drain subwatershed occur most often during the irrigation months (April-September), and peak during the late summer months (e.g. August and September). However, during 2010, five applications of 390 lbs AI occurred during March, which is almost three times the pounds AI applied during March in previous years. The greatest chlorpyrifos use in the subwatershed was in 2010 (823 lbs AI), in part because of the heavy use in March (Table IX-8). Yet no exceedances occurred during 2010 Assessment Monitoring at Terminous Tract Drain @ Hwy 12. Pesticide Use Report data available to date indicates that total use during 2011 will most likely be less compared to 2010, but chlorpyrifos exceeded the WQTL on September 20, 2011, which coincided with the greatest pounds applied (Figure IX-2; complete PUR only available through May 2011). Eight applications of chlorpyrifos occurred on September 15, 2011, and all eight were applied by the same permittee, indicating all eight applications were for various parcels within a single operation according to incomplete PUR data available at the time of this report (Table IX-8). In addition, the only applications that occurred prior to the August and September 2008 exceedances were two applications of 322 lbs AI in July 2008 to the same TRS, and therefore potentially also by a single operation (no Permittee Name with the associated PUR records). These data suggest only a few growers are responsible for movement of chlorpyrifos to the waterway.

The Coalition also uses PUR data to assess which crops receive the most applications of chlorpyrifos (Table IX-9). The largest amount of chlorpyrifos was applied to asparagus (1,602 lbs AI), followed by alfalfa (820lbs AI). The most common product containing chlorpyrifos used within this subwatershed was Lorsban.

Table IX-8. Terminous Tract Drain @ Hwy 12 site subwatershed chlorpyrifos applications, lbs AI applied, and acres treated by month (2005-2011).

PUR data available through May 2011 for San Joaquin County; all PUR data after May 2011 are preliminary. If a month is not included in the table, no applications were made.

Month/Year	Number of Chlorpyrifos Applications	Pounds of AI Applied	Acres Treated
March, 2005	3	69.5	139
September, 2005	3	337.6	355.6
March, 2006	3	97.7	98
April, 2006	2	23.4	67
May, 2006	2	44.6	144
June, 2006	1	49.4	99
March, 2007	3	91.7	92
September, 2007	9	384.7	400.5
October, 2007	1	74.3	40
July, 2008	2	321.6	315.4
March, 2009	2	67.0	134
April, 2009	2	88.9	83
August, 2009	1	109.7	110
September, 2009	2	98.1	98
March, 2010	5	389.7	166
August, 2010	8	256.9	254.4
October, 2010	6	176.1	174.4
March, 2011	4	80.6	213
September, 2011	8	238.6	254.4
Summaries by Year			
2005 Total	6	407.1	494.6
2006 Total	8	215.0	408
2007 Total	13	550.8	532.5
2008 Total	2	321.6	315.4
2009 Total	7	363.6	425
2010 Total	19	822.6	594.8
2011 Total	12	319.2	467.4
Total	**67**	**3000.0**	**3237.7**

Figure IX-2. Terminous Tract Drain @ Hwy 12 site subwatershed lbs chlorpyrifos applied by month (2005-2011).

PUR data available through May 2011 for San Joaquin County; all PUR data after May 2011 are preliminary. Asterisk (*) denotes months with exceedances.

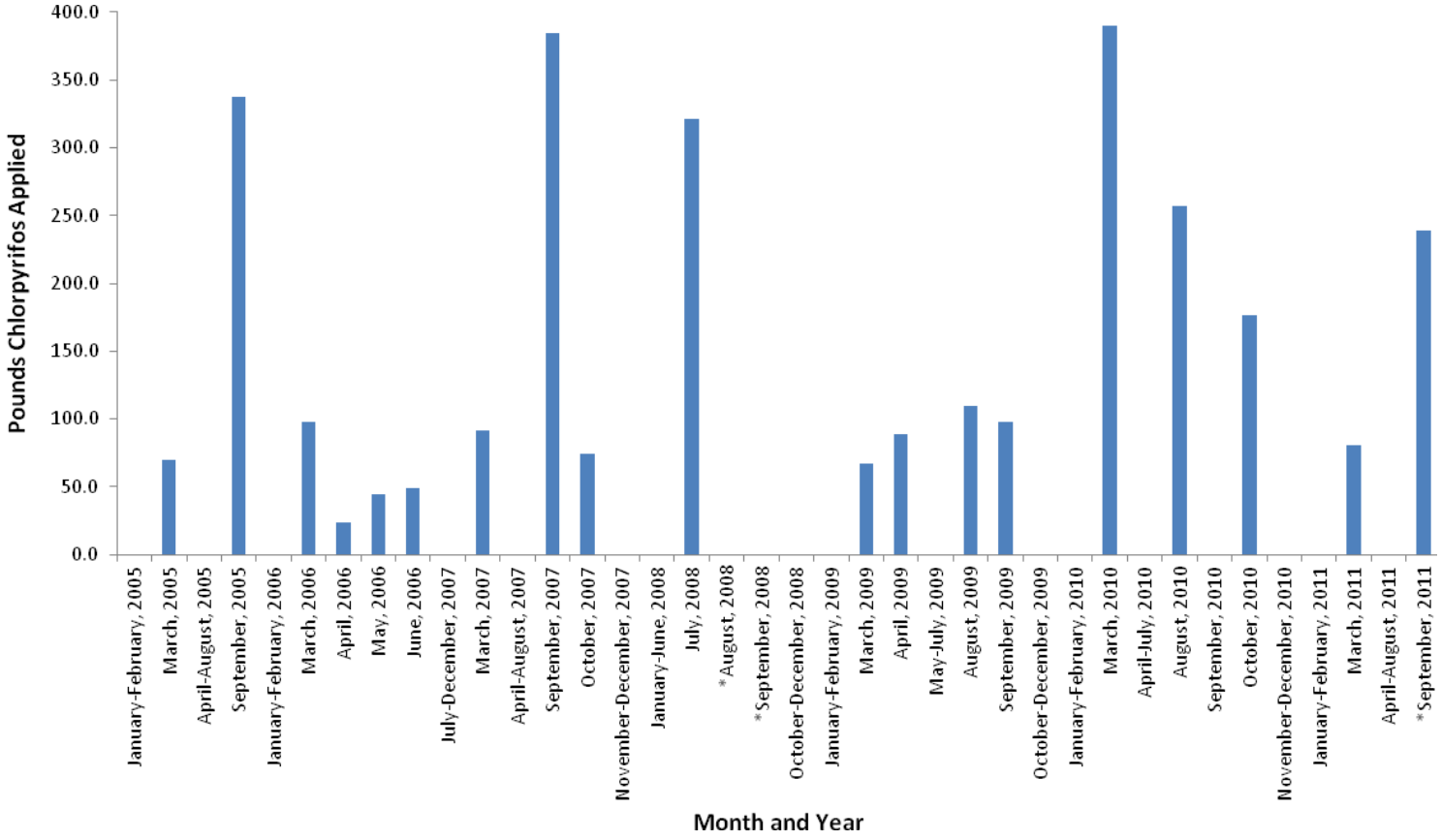


Table IX-9. Terminous Tract Drain @ Hwy 12 site subwatershed chlorpyrifos PUR data (2005-2011).

PUR data available through May 2011 for San Joaquin County; all PUR data after May 2011 are preliminary.

Chemical Name	Commodity	Product Name	Lbs AI Applied
CHLORPYRIFOS	ALFALFA (FORAGE - FODDER) (ALFALFA HAY)	LORSBAN 4E-HF	189.4
		LORSBAN ADVANCED	470.3
		LORSBAN-4E	159.9
	ASPARAGUS (SPEARS, FERNS, ETC.)	CHLORPYRIFOS 4E AG	238.6
		GOVERN 4E INSECTICIDE	432.9
		LORSBAN 4E-HF	611.8
		LORSBAN-4E	318.3
	CORN (FORAGE - FODDER)	GOVERN 4E INSECTICIDE	321.6
		NUFOS 4E	88.9
	GRAPES, WINE	LORSBAN-4E	74.3
	SUGARBEET, GENERAL	LORSBAN 4E-HF	49.4
		LORSBAN-4E	44.6

ALFALFA - Total Pounds Chlorpyrifos Applied	**819.7**
ASPARAGUS - Total Pounds Chlorpyrifos Applied	**1601.6**
CORN - Total Pounds Chlorpyrifos Applied	**410.5**
GRAPES - Total Pounds Chlorpyrifos Applied	**74.3**
SUGARBEET - Total Pounds Chlorpyrifos Applied	**94.0**
Total Pounds Chlorpyrifos Applied (2005-2011)	**3000.0**

Monitoring results and PUR data indicate that management of chlorpyrifos in this subwatershed should focus on irrigation season applications to row crops. As discussed above, the PUR data suggest that only a few growers are responsible for movement of chlorpyrifos to the waterway ,and hence the Coalition's strategy is to focus on growers with the potential to drain (including spray drift) to Terminous Tract Drain.

Since 2007, Coalition outreach involves grower meetings and the mailing/distribution of information to all members in the subwatershed. A complete list of Coalition outreach that occurred in high priority subwatersheds during 2011 is provided in the Performance Goals and Schedules section of this report. Focused outreach is directed at growers who have parcels in the direct drainage area of the subwatershed and who used chlorpyrifos within the last two years. From these criteria, the Coalition compiled a targeted list of growers (all farming row crops).

The Coalition began conducting individual contact meetings with targeted growers during the winter of 2011. Although meetings focused mainly on chlorpyrifos exceedances, all water quality results were reviewed and discussed including exceedances of arsenic, DO, *E. coli,* SC, and TDS, and toxicity to *H. azteca, P. promelas,* and *S. capricornutum*. The Coalition encouraged implementation of practices to improve management of irrigation and storm water runoff as well as to reduce spray drift. The Coalition contacted four targeted growers accounting for 1,778 acres of direct drainage within the subwatershed. To date, the Coalition achieved 100% of the initial contacts for targeted growers in the Terminous Tract Drain subwatershed.

Grower surveys completed at the meetings, documenting members' current practices and indicating which recommended practices growers anticipated implementing in the upcoming years, were compiled and assessed by the Coalition in the Third Priority Summary of Management Practices section of this report. Follow up with targeted growers is planned for 2012 to determine what additional management practices were implemented in 2011 and if additional practices are planned for 2012.

Management Plan Monitoring during months of past exceedances occurred during 2011 and is scheduled for 2012 at Terminous Tract Drain @ Hwy 12. In 2013, this site is scheduled to return to Assessment Monitoring. These data will allow the Coalition to evaluate improvements in water quality as recommended management practice implementation occurs.

Priority D Constituents

The priority D constituent in Terminous Tract Drain @ Hwy 12 is sediment toxicity to *H. azteca*.

***H. azteca* toxicity**

Toxicity to *H. azteca* occurred three times at the upstream sites: in September 2005 (off Glasscock Rd) and in April 2006 (both off Glasscock Rd and off Guard Rd; Table IX-5). All three toxicities, however, were not considered ecologically significant. In addition, samples collected from Terminous Tract Drain @ Hwy 12 during both events did not result in toxicity.

Assessment Monitoring resulted in the first ecologically significant sediment toxicity at Terminous Tract Drain @ Hwy 12 in 2010 (September). Additional sediment chemistry analyses determined chlorpyrifos and pyrethroids were present in the sediment.

The Coalition believes that constituents contributing to sediment toxicity are most likely carried to the waterway via irrigation tailwater and/or sediment runoff. The Coalition believes that sediment toxicity will be eliminated by addressing irrigation and storm water management, which coincides with its strategy for alleviating chlorpyrifos impairments.

Priority E Constituents

The priority E constituents listed under the Terminous Tract Drain management plan are arsenic, DO, *E. coli, P. promelas* toxicity, SC, *S. capricornutum* toxicity and TDS.

P. promelas toxicity occurred twice in the Terminous Tract Drain subwatershed in samples collected on September 20, 2005 from Terminous Tract Drain @ Hwy 12 (88% compared to the control) and Delta Drain-Terminous Tract off Glasscock Rd (90% compared to the control). Although both samples were statistically different from the control, there was less than a 20% reduction in survival compared to the control, and therefore the toxicities are not considered ecologically significant. In addition, samples collected a week later did not indicate persistent toxicity in either waterway. Exceedances of constituents associated with *P. promelas* toxicity never occurred in the Terminous Tract Drain

subwatershed, and the Coalition has monitored *P. promelas* in 2006, 2007, 2008, and 2010 with no instances of toxicity.

Toxicity to *S. capricornutum* occurred in this subwatershed five times during 2005 (February), 2006 (February at off Guard Rd site), and 2008 (January, April and May). No herbicides or copper exceedances occurred at any of the Terminous Tract Drain monitoring sites. Data collected from Assessment Monitoring during 2010 and MPM during 2011 resulted in two consecutive years of no toxicity.

Although these constituents at this site will remain low priority, the Coalition will continue to collect monitoring data as a part of Core and/or Assessment Monitoring. Dissolved oxygen, *E. coli*, SC, and TDS are Core Monitoring constituents collected monthly. Arsenic and toxicity *P. promelas* are monitored during Assessment Monitoring. Priority E constituents are discussed during targeted outreach and will continue to be discussed at annual grower meetings. To address *E. coli* exceedances, the Coalition plans to participate in the focus group along with other Coalitions and Regional Board staff to develop a joint Work Plan to characterize the potential agricultural sources of *E. coli* and identify management practices to prevent discharges to surface waters.

Evaluation

Terminous Tract Drain @ Hwy 12 is a third priority site subwatershed within the SJCDWQC and is in its second year of focused outreach (2011-2013).

The Coalition's strategy for the Terminous Tract Drain subwatershed is to focus on providing information on a targeted grower basis to encourage members to review their irrigation and storm water management, specifically growers with the potential to drain to the waterway. Outreach includes grower notification, management practice outreach and education, tracking of management practice implementation, providing information on special studies of management practice efficacy and focus on management practices relevant to row crops. Since the majority of land use in the subwatershed is row crops, the Coalition believes this strategy targets the largest audience and result in the greatest improvement of water quality.

All individual grower surveys documenting current management practice implementation and assessing planned implementations were completed and returned to the Coalition representing 100% of targeted growers. The Third Priority Summary of Management Practices section of this report summarizes the results of these contacts. In addition, the Coalition is scheduling follow up contacts with all targeted growers to assess the implementation of new management practices. The final stages of outreach include following up with growers to identify newly implemented practices, and future monitoring to evaluate water quality improvement. In 2012, MPM will continue to take place during months of past exceedances.

Monitoring for *P. promelas* and *S. capricornutum* toxicity resulted in no toxicity for two or more consecutive years of monitoring in months of past toxicity. A letter was submitted to the Regional Board on January 6, 2012, petitioning to remove these constituents from the Lone Tree Creek management plan.

HIGH PRIORITY SITE SUBWATERSHEDS (2012 – 2014)

X. KELLOGG CREEK ALONG HOFFMAN LN

Management Plan Constituents

Priority A/B

- Chlorpyrifos

Priority C

- Copper

Priority D

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

Priority E

- DDE
- DDT
- Dissolved Oxygen
- *E. coli*
- pH
- *Pimephales promelas* water column toxicity
- Specific Conductivity
- Total Dissolved Solids

Description of Kellogg Creek Site Subwatershed

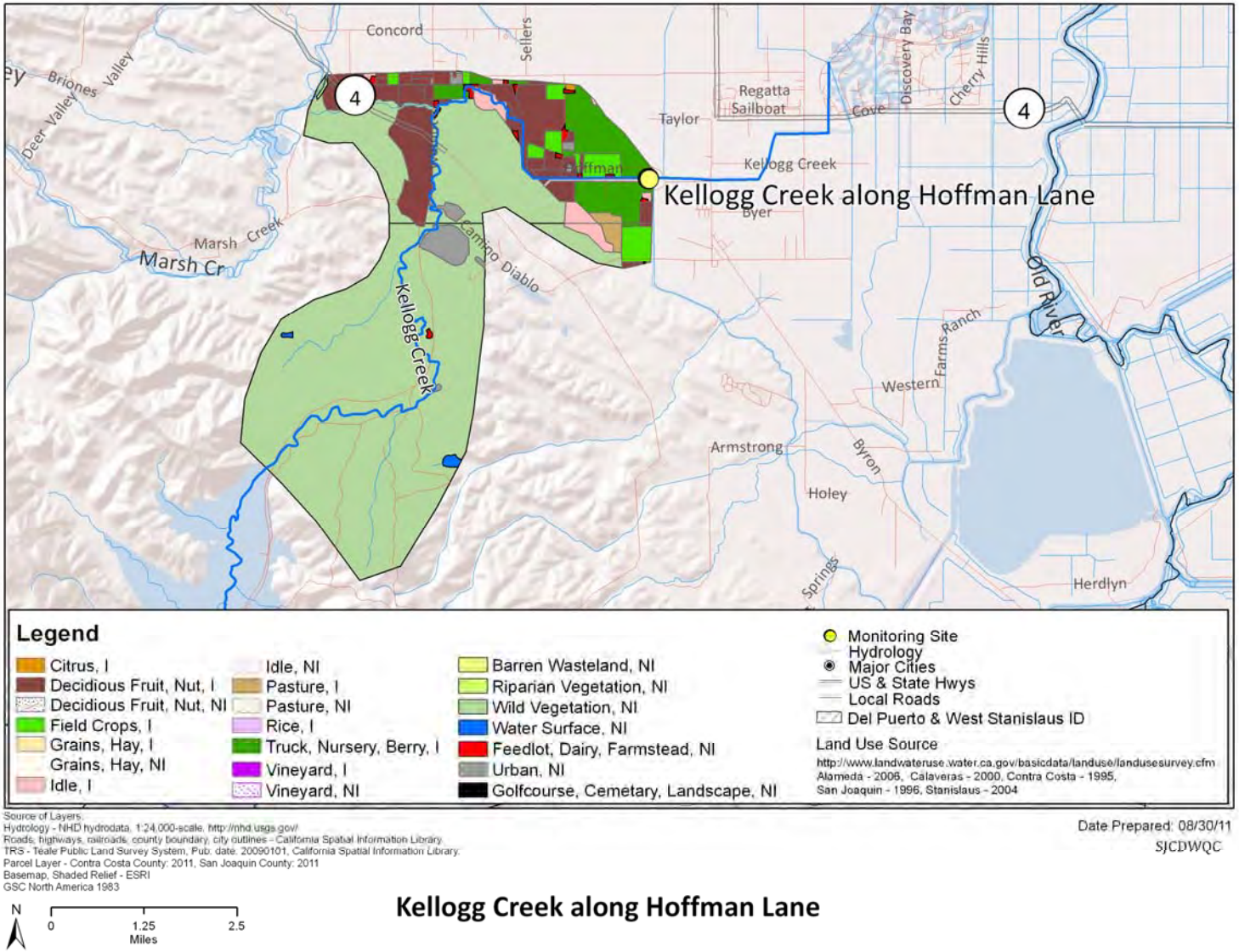
Kellogg Creek along Hoffman Ln (1,831 irrigated acres) – This site is located just southwest of Discovery Bay and drains field crops immediately upstream. The headwaters originate in the Black Hills north of Livermore. Kellogg Creek runs through Discovery Bay and drains into Indian Slough in the western Delta. Kellogg Creek @ Hwy 4 (which is downstream of the Kellogg Creek along Hoffman Ln) was sampled in 2004/2005 but is no longer sampled because of large urban inputs. The Kellogg Creek along Hoffman Ln location was established during an upstream sampling event in September 2005 to isolate the source of toxicity from agriculture. Table X-1 includes the station name (site name), station code and target latitude/longitudes for sites sampled within this subwatershed. The irrigated agricultural in this subwatershed is primarily deciduous orchards, truck crops and field crops (Figure X-1).

Table X-1. Kellogg Creek site subwatershed sampling locations coordinates.

Site Name	Station Code	Target Latitude	Target Longitude
Kellogg Creek along Hoffman Ln [U]	544XKCAHL	37.8819	-121.6522
Kellogg Creek @ Hwy 4*	544XKCHWF	37.8892	-121.6190

[U] Upstream sites
*Original SJCDWQC sampling site

Figure X-1. Kellogg Creek along Hoffman Ln site subwatershed land use map.



Subwatershed Monitoring History

Monitoring was initiated at Kellogg Creek @ Hwy 4 in the storm season of 2005 and was carried out for three seasons, ending with the storm season of 2006. Kellogg Creek @ Hwy 4 (which is downstream of the Kellogg Creek along Hoffman Ln) is no longer sampled because of large urban inputs. The Kellogg Creek along Hoffman Ln subwatershed monitoring location was established during an upstream sampling event in September 2005 to isolate the source of toxicity from agriculture (Table X-2). Monitoring constituents are listed in Table X-3.

Management Plan Monitoring occurred during the irrigation season in 2007 for *P. promelas* toxicity (June and September) and in 2008 for *C. dubia* toxicity (April) and copper (July, Table X-4). No MPM occurred at this location between 2008 and 2010. In 2011, MPM occurred for water toxicity to *S. capricornutum* (April, May and August), water toxicity to *C. dubia* (February-April), chlorpyrifos (February), copper (February and July), and sediment toxicity to *H. azteca* (March and September). MPM is scheduled to continue at Kellogg Creek along Hoffman Ln in 2012.

Kellogg Creek along Hoffman Ln is within the Roberts Island Drain @ Holt Rd Zone (Zone 4) and is scheduled for Assessment Monitoring to occur after 2031.

Kellogg Creek is currently on California's 2008-2010 303d List of Impaired Waterbodies for *E. coli*, DO, salinity, sediment toxicity and unknown water column toxicity.

Table X-2. Kellogg Creek along Hoffman Ln site subwatershed sampling events per season and year (including MPM).

Year	Season	Events Sampled	Events Not Sampled[1]	Total
2005	Storm	NA	NA	**NA**
	Irrigation	1	4	**5**
2006	Storm	2	0	**2**
	Irrigation	5	0	**5**
2007	Storm	2	0	**2**
	Irrigation	8	0	**8**
2008	Storm	1	1	**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	NA	NA	**NA**
	Fall	NA	NA	**NA**
2011	Winter	1	1	**2**
	Storm	NA	NA	**NA**
	Irrigation	5	0	**5**
	Fall	NA	NA	**NA**

[1]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. Kellogg Creek along Hoffman Ln 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 - Fall*	Winter	Storm*	Irrigation	Fall*
Field and Physical Parameters																
NA	Dissolved Oxygen		1	4	5	3	10	3	11				2		6	
NA	Specific Conductivity		1	4	5	3	10	3	11				2		6	
NA	pH		1	4	5	3	10	3	11				2		6	
EPA 110.2	Color		1	2	5	2	6		6							
EPA 160.1	Dissolved Solids		1	2	5	2	6		6							
EPA 160.2	Suspended Solids															
EPA 180.1	Turbidity		1	2	5	2	6		6							
EPA 415.1	Total Organic Carbon		1	2	5	2	6		6							
SM 9223	*E. coli*		1		5	2	6		6							
Walkley-Black	Total Organic Carbon (sediment)												1		1	
ASTM D422 or ASTM D4464	Grain size (sediment)												1		1	
EPA 405.1	BOD				1	2	6									
Carbamates																
EPA 8321A	Aldicarb				5	2	6		6							
EPA 8321A	Carbaryl				5	2	6		6							
EPA 8321A	Carbofuran				5	2	6		6							
EPA 8321A	Diuron				5	2	6		6							
EPA 8321A	Linuron				5	2	6		6							
EPA 8321A	Methiocarb				5	2	6		6							
EPA 8321A	Methomyl				5	2	6		6							
EPA 8321A	Oxamyl				5	2	6		6							
Organochlorines																
EPA 8081A	DDD(p,p')				5	2	6		6							
EPA 8081A	DDE(p,p')				5	2	6		6							
EPA 8081A	DDT(p,p')				5	2	6		6							
EPA 8081A	Dicofol				5	2	6		6							
EPA 8081A	Dieldrin				5	2	6		6							

Method	Analyte	2005		2006		2007		2008			2009	2010	2011			
		Storm*	Irrigation	Storm	Irrigation	Storm	Irrigation	Storm	Irrigation	Fall*	Winter - Fall*	Winter - Fall*	Winter	Storm*	Irrigation	Fall*
EPA 8081A	Endrin				5	2	6		6							
EPA 8081A	Methoxychlor				5	2	6		6							
Organophosphates																
EPA 8141A	Azinphos methyl				5	2	6		6							
EPA 8141A	Chlorpyrifos		1	2	5	2	6		6							
EPA 8141A	Demeton-s															
EPA 8141A	Diazinon		1	2	5	2	6		6							
EPA 8141A	Dichlorvos															
EPA 8141A	Dimethoate				5	2	6		6							
EPA 8141A	Disulfoton				5	2	6		6							
EPA 8141A	Malathion				5	2	6		6							
EPA 8321A	Methamidophos				5	2	6		6							
EPA 8141A	Methidathion				5	2	6		6							
EPA 8141A	Molinate				5	2	6		6							
EPA 8141A	Parathion, Methyl				5	2	6		6							
EPA 8141A	Phorate				5	2	6		6							
EPA 8141A	Phosmet				5	2	6		6							
EPA 8141A	Thiobencarb				5	2	6		6							
EPA 8141A	Trifluralin															
Pyrethroids																
EPA 8081A	Bifenthrin		1	2	5	2	6		6							
EPA 8081A	Cyfluthrin, total		1	2	5	2	6		6							
EPA 8081A	Cyhalothrin, lambda, total		1	2	5	2	6		6							
EPA 8081A	Cypermethrin, total		1	2	5	2	6		6							
EPA 8081A	Esfenvalerate/ Fenvalerate, total		1	2	5	2	6		6							
EPA 8081A	Permethrin, total		1	2	5	2	6		6							
Triazines																
EPA 547M	Glyphosate				5	2	6		6							
EPA 549.2M	Paraquat dichloride				5	2	6		6							
EPA 619	Atrazine				5	2	6		6							

Method	Analyte	2005		2006		2007		2008			2009	2010	2011			
		Storm*	Irrigation	Storm	Irrigation	Storm	Irrigation	Storm	Irrigation	Fall*	Winter - Fall*	Winter - Fall*	Winter	Storm*	Irrigation	Fall*
EPA 619	Cyanazine				5	2	6		6							
EPA 619	Simazine				5	2	6		6							
Metals (Total)																
EPA 200.8	Arsenic				5	2	6		6							
EPA 200.8	Boron				5	2	6		6							
EPA 200.8	Cadmium				5	2	6		6							
EPA 200.8	Copper				5	2	6		7						1	
EPA 200.8	Lead				5	2	6		6							
EPA 200.8	Molybdenum															
EPA 200.8	Nickel				5	2	6		6							
EPA 200.8	Selenium				5	2	2		6							
EPA 200.8	Zinc				5	2	6		6							
Metals (Dissolved)																
EPA 200.8	Cadmium															
EPA 200.8	Copper														1	
EPA 200.8	Lead															
EPA 200.8	Nickel															
EPA 200.8	Zinc															
Nutrients																
SM 2340 C	Hardness as CaCO3				5	2	6		7						1	
EPA 300.0	Nitrate as N				5	2	6		6							
EPA 350.2	Ammonia as N				5	2	6		6							
EPA 351.3	Nitrogen, Total Kjeldahl				5	2	6		6							
EPA 354.1	Nitrite as N				5	2	6		6							
EPA 353.2	Nitrate + Nitrite as N															
EPA 365.2	OrthoPhosphate as P				5	2	6		6							
EPA 365.2	Phosphate as P				5	2	6		6							
Sediment Pesticides																
EPA 8270M_NCI	Bifenthrin												1		1	
EPA 8270M_NCI	Chlorpyrifos												1		1	

Method	Analyte	2005		2006		2007		2008			2009	2010	2011			
		Storm*	Irrigation	Storm	Irrigation	Storm	Irrigation	Storm	Irrigation	Fall*	Winter - Fall*	Winter - Fall*	Winter	Storm*	Irrigation	Fall*
EPA 8270M_NCI	Cyfluthrin												1		1	
EPA 8270M_NCI	Cyhalothrin, lambda												1		1	
EPA 8270M_NCI	Cypermethrin												1		1	
EPA 8270M_NCI	Deltamethrin: Tralomethrin												1		1	
EPA 8270M_NCI	Esfenvalerate/ Fenvalerate												1		1	
EPA 8270M_NCI	Fenpropathrin												1		1	
EPA 8270M_NCI	Permethrin												1		1	
Toxicity																
EPA 821/R-02-012	*Ceriodaphnia dubia*		1	3	5	2	7		7				1		1	
EPA 821/R-02-012	*Pimephales promelas*		1	2	5	2	8		6							
EPA 821/R-02-013	*Selenastrum capricornutum*		1	2	5	2	6		8						3	
EPA 600/R-99-064	*Hyalella azteca*			1			2	2	1				1		1	

*Site not sampled during the 2005 storm season, 2008 fall season, 2009 and 2010 sampling years, and 2011 storm and fall seasons.

Table X-4. Kellogg Creek site subwatershed Management Plan Monitoring schedule (2007-2011).

Site Name	Sample Date	Monitoring Type	Copper	Chlorpyrifos	*C. dubia*	*P. promelas*	*S. capricornutum*	*H. azteca*
Kellogg Creek along Hoffman Ln	20-Jun-07	A				X		
Kellogg Creek along Hoffman Ln	25-Sep-07	A				X		
Kellogg Creek along Hoffman Ln	30-Apr-08	A			X			
Kellogg Creek along Hoffman Ln	8-Jul-08	A	X					
Kellogg Creek along Hoffman Ln	8-Feb-11	MPM	X	X	X			
Kellogg Creek along Hoffman Ln	8-Mar-11	MPM			X			X
Kellogg Creek along Hoffman Ln	12-Apr-11	MPM			X		X	
Kellogg Creek along Hoffman Ln	24-May-11	MPM					X	
Kellogg Creek along Hoffman Ln	26-Jul-11	MPM	X					
Kellogg Creek along Hoffman Ln	23-Aug-11	MPM					X	
Kellogg Creek along Hoffman Ln	14-Oct-11	MPM						X

A – Additional sampling
X – Constituent sampled for Management Plan Monitoring (MPM)

Exceedance History

Samples collected from 2005 through 2006 in the Kellogg Creek @ Hwy 4 subwatershed and from the Kellogg Creek along Hoffman Ln from 2005 through 2008 and 2011, exceeded the WQTL for field parameters, *E. coli*, TDS, nitrate, pesticides and metals (Table X-5). Water column toxicity to *C. dubia*, *P. promelas*, *S. capricornutum* and sediment toxicity to *H. azteca* also occurred. Constituents that exceeded their respective WQTLs in this subwatershed are DO (11), pH (9), SC (12), TDS (8), *E. coli* (9), nitrate (1), total copper (3), chlorpyrifos (1), DDE (3), DDT (2) and permethrin (1). Toxicity to *C. dubia* (3), *P. promelas* (2), *S. capricornutum* (5) and *H. azteca* (9) occurred (Table X-5).

During 2011, exceedances of pH (4), SC (1) and sediment toxicity (2) occurred (Table X-5).

The highest priority constituents in the Kellogg Creek subwatershed are chlorpyrifos (A/B), copper (C), and toxicity to *C. dubia, S. capricornutum* and *H. azteca* (D).

Table X-5. Kellogg Creek site subwatershed exceedances (2005-2011).

The WQTLs are listed in the header after the analyte. Original downstream sample site is italicized. Data sorted by season and date.

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	Nitrate as N, >10 mg/L	*E. coli*, >235 MPN/100 mL	Copper, Total[1], > 1,300 µg/L	Chlorpyrifos, >0.015 µg/L	DDE (p,p'), >0.00059 µg/L	DDT (p,p'), >0.00059 µg/L	Permethrin, total, µg/L	*C. dubia*, (% Control)	*P. promelas*, (% Control)	*S. capricornutum*, (% Control)	*H. azteca*, (% Control)
Kellogg Creek @ Hwy 4	*Storm*	*2/16/2005*						*1600*		*0.180*				*0*			
Kellogg Creek @ Hwy 4	*Storm*	*2/23/2005*			*990*												
Kellogg Creek @ Hwy 4	*Storm*	*3/21/2005*			*1136*	*680*											
Kellogg Creek @ Hwy 4	*Irrigation*	*5/17/2005*	*5.80*										*0.036*				*94*
Kellogg Creek @ Hwy 4	*Irrigation*	*6/21/2005*						*300*							*21*		
Kellogg Creek @ Hwy 4	*Irrigation*	*7/19/2005*		*8.66*	*1485*	*890*											*0*
Kellogg Creek @ Hwy 4	*Irrigation*	*8/16/2005*	*6.60*		*1447*	*950*										*44*	
Kellogg Creek @ Hwy 4	*Irrigation*	*8/23/2005*			*885*												
Kellogg Creek @ Hwy 4	*Irrigation*	*9/20/2005*						*900*							*87*		*59*
Kellogg Creek along Hoffman Ln	Irrigation	9/20/2005		8.72				1600									
Kellogg Creek @ Hwy 4	*Storm*	*2/27/2006*			*1512*	*890*		*1600*									
Kellogg Creek along Hoffman Ln	Storm	2/27/2006			1761	990											
Kellogg Creek @ Hwy 4	*Storm*	*3/15/2006*			*1097*	*670*		*1600*									
Kellogg Creek along Hoffman Ln	Storm	3/15/2006			1207	770		900						11			
Kellogg Creek @ Hwy 4	*Storm*	*4/27/2006*	*6.00*		*1112*												
Kellogg Creek along Hoffman Ln	Storm	4/27/2006			1030												
Kellogg Creek along Hoffman Ln	Irrigation	5/16/2006															

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	Nitrate as N, >10 mg/L	*E. coli*, >235 MPN/100 mL	Copper, Total[1], > 1,300 µg/L	Chlorpyrifos, >0.015 µg/L	DDE (p,p'), >0.00059 µg/L	DDT (p,p'), >0.00059 µg/L	Permethrin, total, µg/L	*C. dubia*, (% Control)	*P. promelas*, (% Control)	*S. capricornutum*, (% Control)	*H. azteca*, (% Control)
Kellogg Creek along Hoffman Ln	Irrigation	6/20/2006															
Kellogg Creek along Hoffman Ln	Irrigation	7/18/2006	6.80					250			0.036	0.02					
Kellogg Creek along Hoffman Ln	Irrigation	8/15/2006	6.40														
Kellogg Creek along Hoffman Ln	Irrigation	9/19/2006	3.40														
Kellogg Creek along Hoffman Ln	Storm	2/11/2007				720	13										
Kellogg Creek along Hoffman Ln	Storm	2/28/2007						920	17 (15.4)		0.018						
Kellogg Creek along Hoffman Ln	Storm	3/7/2007	3.03														
Kellogg Creek along Hoffman Ln	Irrigation	4/11/2007												50			
Kellogg Creek along Hoffman Ln	Irrigation	7/10/2007							7 (6.9)		0.022	0.018					
Kellogg Creek along Hoffman Ln	Irrigation	8/7/2007		8.52													
Kellogg Creek along Hoffman Ln	Irrigation	8/9/2007															0
Kellogg Creek along Hoffman Ln	Irrigation	8/31/2007															0
Kellogg Creek along Hoffman Ln	Irrigation	9/25/2007	6.87	8.75													
Kellogg Creek along Hoffman Ln	Sediment	3/18/2008		9.26													29
Kellogg Creek along Hoffman Ln	Sediment	4/9/2008															72
Kellogg Creek along Hoffman Ln	Irrigation	4/15/2008														17	
Kellogg Creek along Hoffman Ln	Irrigation	4/23/2008														38	
Kellogg Creek along Hoffman Ln	Irrigation	5/13/2008														5	
Kellogg Creek along Hoffman Ln	Irrigation	5/21/2008														63	

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	Nitrate as N, >10 mg/L	*E. coli*, >235 MPN/100 mL	Copper, Total[1], > 1,300 µg/L	Chlorpyrifos, >0.015 µg/L	DDE (p,p'), >0.00059 µg/L	DDT (p,p'), >0.00059 µg/L	Permethrin, total, µg/L	*C. dubia*, (% Control)	*P. promelas*, (% Control)	*S. capricornutum*, (% Control)	*H. azteca*, (% Control)
Kellogg Creek along Hoffman Ln	Irrigation	6/10/2008															
Kellogg Creek along Hoffman Ln	Irrigation	7/8/2008	6.54						98 (8.5)								
Kellogg Creek along Hoffman Ln	Irrigation	7/15/2008	6.59														
Kellogg Creek along Hoffman Ln	Irrigation	8/12/2008															
Kellogg Creek along Hoffman Ln	Sediment	8/13/2008	6.89														
Kellogg Creek along Hoffman Ln	Winter	3/8/2011			740												78
Kellogg Creek along Hoffman Ln	Irrigation	4/12/2011		8.81													
Kellogg Creek along Hoffman Ln	Irrigation	8/23/2011		8.84													
Kellogg Creek along Hoffman Ln	Irrigation	9/20/2011		8.96													
Kellogg Creek along Hoffman Ln	Irrigation	10/14/2011		9.04													62
		Constituent Priority	**E**	**E**	**E**	**E**	**NP**	**E**	**C**	**A/B**	**E**	**E**	**NP**	**D**	**E**	**D**	**D**

[1]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

All monitoring results for high priority management plan constituents in the Kellogg Creek subwatershed are listed in Table X-6, which includes chlorpyrifos, copper, water column toxicity to *C. dubia* and *S. capricornutum*, and sediment toxicity to *H. azteca*. In the Kellogg Creek subwatershed, MPM occurred in 2007, 2008 and 2011. Kellogg Creek along Hoffman Ln was not sampled during 2009 and 2010.

The only time chlorpyrifos exceeded the WQTL was during February 2007 at the downstream Kellogg Creek @ Hwy 4 site. Chlorpyrifos did not exceed the WQTL during the remainder of 2007 or 2008 Normal Monitoring. MPM for chlorpyrifos began in 2011 and is scheduled to continue in 2012 (February).

Copper exceeded the WQTL twice during 2007 (February and July) and was added to the Kellogg Creek management plan in 2008. Copper did not exceed the WQTL during 2008 Normal Monitoring, but additional MPM for copper in 2008 resulted in a single exceedance. There were no exceedances of copper during 2011 MPM. Management Plan Monitoring for copper is scheduled to continue in 2012 (February and July).

Toxicity to *C. dubia* first occurred in February 2005 at Kellogg Creek @ Hwy 4 and coincided with an exceedance of the chlorpyrifos WQTL. The second and third toxicities occurred in March 2006 and April 2007 at Kellogg Creek along Hoffman Ln. *C. dubia* was added to the Kellogg Creek management plan and additional MPM occurred during 2008 (April). Toxicity to *C. dubia* did not occur during 2008 MPM or Normal Monitoring, or 2011 MPM. Management Plan Monitoring for toxicity to *C. dubia* is scheduled for 2012 (February, March and April).

Toxicity to *S. capricornutum* occurred in August 2005 at Kellogg Creek @ Hwy 4 and twice in April 2008 (including resample) and May 2008 (including resample) at Kellogg Creek along Hoffman Ln. Consequently, *S. capricornutum* toxicity was added to the Kellogg Creek management plan. No toxicity to *S. capricornutum* occurred during the 2011 MPM. Management Plan Monitoring is scheduled to occur during 2012 (April, May and August).

Toxicities to *H. azteca* first occurred in Kellogg Creek @ Hwy 4 during May, July and September 2005. The May 2005 exceedance coincided with a permethrin exceedance. There was no toxicity during 2006 Normal Monitoring. In 2007, toxicity to *H. azteca* occurred twice during September (Normal Monitoring and resample). Toxicity to *H. azteca* also occurred twice in March and April 2008 (Normal Monitoring and resample), and once during March 2011 MPM. Management Plan Monitoring is scheduled to continue in 2012 (March and September).

Table X-6. Kellogg 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:	Feb		Mar	Apr	May	Jun	Jul	Aug		Sep	Oct
2007 NM (Hoffman Ln.)	Date:	2/11/07	2/28/07	NA	4/11/07	5/22/07	6/12/07	7/10/07	8/7/07	8/9/07	9/4/07	NA
	Chlorpyrifos (µg/L)	<0.003	<0.003	NA	<0.003	<0.003	<0.003	<0.003	<0.003	NA	<0.003	NA
	C. dubia (% Control)	100	105	NA	**50**	100	100	95	100	NA	100	NA
	P. promelas (% Control)	95	100	NA	100	100	103	103	100	NA	103	NA
	H. azteca (% Control)	NA	NA	NA	NA	NA	NA	NA	NA	**0**	NA	NA
2007 MPM A (Hoffman Ln.)	Date:	NA		NA	NA	NA	6/20/07	NA	NA		9/25/07	NA
	P. promelas (% Control)	NA		NA	NA	NA	NA	100	NA		100	NA
2008 NM (Hoffman Ln.)	Date:	NA		3/18/08	4/15/08	5/13/08	6/10/08	7/15/08	8/12/08	8/13/08	9/16/08	NA
	Copper (µg/L)	NA		NA	3.1	4.3	4.4	2.5	2.1	NA	2.6	NA
	Chlorpyrifos (µg/L)	NA		NA	<0.003	<0.003	<0.003	<0.003	<0.003	NA	<0.003	NA
	C. dubia (% Control)	NA		NA	95	100	100	100	100	NA	100	NA
	P. promelas (% Control)	NA		NA	103	103	98	100	105	NA	100	NA
	H. azteca (% Control)	NA		**29**	NA	NA	NA	NA	NA	102	NA	NA
2008 MPM A (Hoffman Ln.)	Date:	NA		NA	4/30/08	NA	NA	7/8/08	NA		NA	NA
	Copper (µg/L)	NA		NA	NA	NA	NA	98	NA		NA	NA
	C. dubia (% Control)	NA		NA	100	NA	NA	NA	NA		NA	NA
2011 MPM (Hoffman Ln.)	Date:	2/8/11		3/8/11	4/12/11	5/24/11	NA	7/26/11	8/23/11		9/20/11	10/14/11
	Copper, dissolved (µg/L)	Dry Site		NA	NA	NA	NA	1.1	NA		NA	NA
	Copper, total (µg/L)	Dry Site		NA	NA	NA	NA	7.2	NA		NA	NA
	Chlorpyrifos (µg/L)	Dry Site		NA	NA	NA	NA	NA	NA		NA	NA
	C. dubia (% Control)	Dry Site		100	100	NA	NA	NA	NA		NA	NA
	S. capricornutum (% Control)	NA		NA	1351	710	NA	NA	690		NA	NA
	H. azteca (% Control)	NA		**78**	NA	NA	NA	NA	NA		NA	**62**

A – Additional monitoring conducted in 2007 and 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

Load Calculations

Load calculations are not relevant to the management of priority constituents in this site subwatershed.

Loads were calculated for the chlorpyrifos detections (Table X-7) based on the following formula:

Load = Discharge (cfs) X 28.317L/ft^3 X Concentration (µg/L).

Table X-7. Kellogg Creek site subwatershed instantaneous load calculations for chlorpyrifos and copper.
Sorted by analyte and date.

Site Name	Analyte Name	Sample Date	Discharge cfs	Concentration µg/L	Loading Rate µg/sec
Kellogg Creek along Hoffman Ln	Copper	08/15/06	16.22	2.1	964.53
Kellogg Creek along Hoffman Ln	Copper	09/19/06	0	4.5	0
Kellogg Creek along Hoffman Ln	Copper	02/11/07	0.04	4	4.53
Kellogg Creek along Hoffman Ln	Copper	02/28/07	0	17	0
Kellogg Creek along Hoffman Ln	Copper	04/15/08	29.54	3.1	2593.10
Kellogg Creek along Hoffman Ln	Copper	05/13/08	31.98	4.3	3893.98
Kellogg Creek along Hoffman Ln	Copper	06/10/08	34.15	4.4	4254.91
Kellogg Creek along Hoffman Ln	Copper	07/08/08	18.41	98	51088.97
Kellogg Creek along Hoffman Ln	Copper	07/15/08	28.77	2.5	2036.70
Kellogg Creek along Hoffman Ln	Copper	08/12/08	21.44	2.1	1274.94
Kellogg Creek along Hoffman Ln	Copper	09/16/08	14.91	2.6	1097.74
Kellogg Creek along Hoffman Ln	Copper	07/26/11	13.89	7.2	2831.93
Kellogg Creek along Hoffman Ln	Copper (D)	07/26/11	13.89	1.1	432.66

Source Identification and Outreach

To address source identification and determine an outreach strategy, the Coalition considers past monitoring results and associated PUR data and focuses its efforts on applied pesticides. During 2007, 2008 and 2011, the Coalition conducted MPM during 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 developed an outreach strategy, which is detailed in the following sections.

The Kellogg Creek along Hoffman Ln 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 Kellogg 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. 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 Kellogg Creek site subwatershed.

Chlorpyrifos

The WQTL for chlorpyrifos (0.015 µg/L) was exceeded in the Kellogg Creek subwatershed during February 2005. The exceedance coincided with *C. dubia* toxicity. Since February 2005, no detections of chlorpyrifos occurred in the Kellogg Creek subwatershed.

PUR data were reviewed for the number of monthly chlorpyrifos applications, pounds of active ingredient applied, and acres treated (Table X-8). Chlorpyrifos use decreased in the subwatershed since every year since 2008. The greatest amount of chlorpyrifos applied was in 2008 (571 lbs AI) with the lowest amount applied in 2010 (185 lbs AI), and no chlorpyrifos application reported through May 2011. Over the years, the greatest amount of chlorpyrifos use in this subwatershed is during the irrigation months; however, the February 2005 exceedance results did correlate with the month of greatest use in that year (Table X-8, Figure X-2).

The Coalition also uses PUR data to assess which crops received the most applications of chlorpyrifos from 2005 to 2011 (Table X-9). The largest amount of chlorpyrifos was applied from 2005 through 2011 was to walnut orchards (1,602 lbs AI) followed by corn (146 lbs AI). The most common product used within this subwatershed containing chlorpyrifos was Lorsban (Table X-9).

Table X-8. Kellogg Creek along Hoffman Ln site subwatershed chlorpyrifos applications, lbs AI applied, and acres treated by month (2005-2011).

PUR data available through May 2011 for Contra Costa County. If a month is not included in the table, no applications were made.

Month/Year	Number of Chlorpyrifos Applications	Pounds of AI Applied	Acres Treated
February, 2005	3	146.1	123
March, 2005	1	44.9	90
July, 2005	1	10.0	5
September, 2005	1	33.5	18
January, 2006	4	17.7	10
June, 2006	1	22.3	12
July, 2006	4	184.0	108
September, 2006	2	52.0	38
May, 2007	1	89.2	48
July, 2007	3	61.3	33
August, 2007	3	87.3	56
September, 2007	1	33.5	18
February, 2008	1	3.7	2
May, 2008	3	128.2	69
June, 2008	10	355.6	200.5
July, 2008	2	13.7	12
August, 2008	1	33.5	18
September, 2008	1	36.0	18

Month/Year	Number of Chlorpyrifos Applications	Pounds of AI Applied	Acres Treated
June, 2009	6	160.6	114
July, 2009	5	140.9	90.5
August, 2009	1	19.9	10
March, 2010	2	44.0	44
July, 2010	2	15.0	15.5
August, 2010	1	18.8	10
September, 2010	2	107.0	57
Summaries by Year			
2005 Total	6	234.4	236
2006 Total	11	276.0	168
2007 Total	8	271.3	155
2008 Total	18	570.7	319.5
2009 Total	12	321.4	214.5
2010 Total	7	184.8	126.5
Total	**62**	**1858.6**	**1219.5**

Figure X-2. Kellogg Creek along Hoffman Ln site subwatershed lbs chlorpyrifos applied by month (2005-2011).

PUR data available through May 2011 for Contra Costa County. Asterisk (*) denotes months with exceedances.

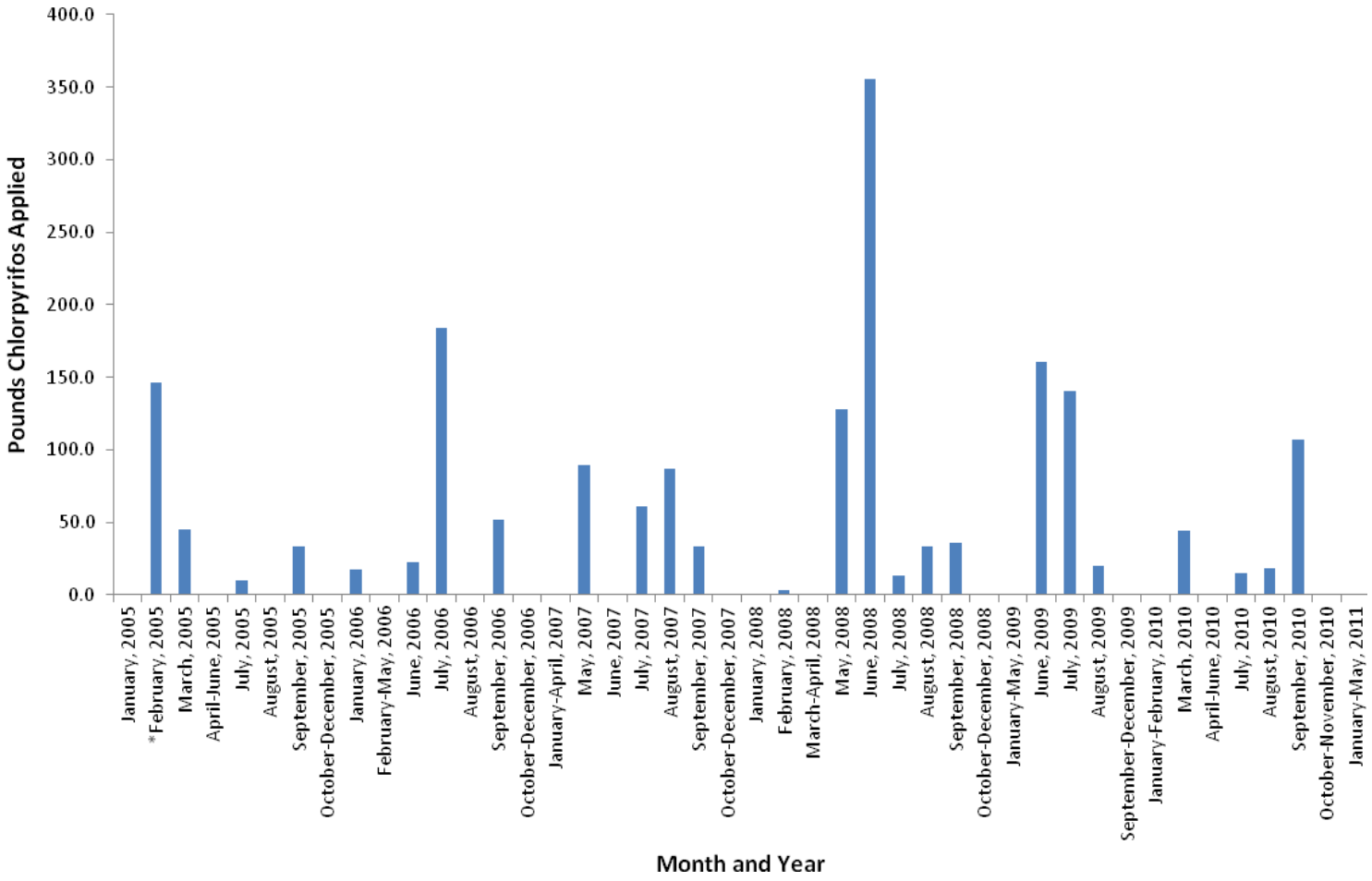


Table X-9. Kellogg Creek along Hoffman Ln site subwatershed chlorpyrifos PUR data (2005-2011).
PUR data available through May 2011 for Contra Costa County.

Chemical Name	Commodity	Product Name	Lbs AI Applied
CHLORPYRIFOS	ALFALFA (FORAGE - FODDER) (ALFALFA HAY)	LORSBAN 4E-HF	62.8
		LORSBAN-4E	26.0
	APPLE	LORSBAN-4E	3.7
	CHERRY	LORSBAN-4E	11.2
	CORN, HUMAN CONSUMPTION	LORSBAN 15G GRANULAR INSECTICIDE	146.1
	NECTARINE	LORSBAN-4E	1.9
	PEACH	LORSBAN-4E	3.7
	PLUM (INCLUDES WILD PLUMS FOR HUMAN CONSUMPTION)	LORSBAN-4E	0.9
	WALNUT (ENGLISH WALNUT, PERSIAN WALNUT)	LORSBAN 4E-HF	39.9
		LORSBAN ADVANCED	418.8
		LORSBAN-4E	1143.7

ALFALFA - Total Pounds Chlorpyrifos Applied	**88.8**
APPLE - Total Pounds Chlorpyrifos Applied	**3.7**
CHERRY - Total Pounds Chlorpyrifos Applied	**11.2**
CORN - Total Pounds Chlorpyrifos Applied	**146.1**
NECTARINE - Total Pounds Chlorpyrifos Applied	**1.9**
PEACH - Total Pounds Chlorpyrifos Applied	**3.7**
PLUM - Total Pounds Chlorpyrifos Applied	**0.9**
WALNUT - Total Pounds Chlorpyrifos Applied	**1602.3**
Total Pounds Chlorpyrifos Applied (2005-2011)	**1858.6**

The chlorpyrifos found in Kellogg Creek is most likely the result of storm water runoff transporting chlorpyrifos to the creek and/or spray drift. Due to the chlorpyrifos concentration being well above the WQTL and the exceedance coinciding with a peak application month, it is possible that the exceedance was the result of spray drift, and since the application occurred during a winter month it is possible that storm water runoff played a role in transporting chlorpyrifos to Kellogg Creek.

Since 2007, general Coalition outreach included grower meetings and the mailing/distribution of information. A complete list of Coalition outreach in high priority subwatersheds during 2011 is provided in the Performance Goals and Schedules section of this report.

The Coalition began conducting individual meetings with targeted growers in the fourth priority subwatersheds during the winter of 2012. The Coalition targeted growers who have property with the potential to drain to Kellogg Creek and have applied chlorpyrifos in the past. Although meetings focus mainly on chlorpyrifos exceedances, all water quality results are reviewed and discussed including toxicity to *C. dubia*, *S. capricornutum*, *H. azteca* and *P. promelas*, as well as exceedances of copper, DDE, DDT, DO, *E. coli*, pH, SC and TDS. The Coalition contacted 11 growers accounting for 419 acres of direct drainage within the Kellogg Creek subwatershed. The Coalition achieved 100% of its initial contacts for targeted growers.

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 in the winter of 2013 to determine what additional management practices were implemented in 2012 and if additional practices are planned for 2013.

In 2012, MPM for chlorpyrifos will occur during the month of the past exceedance. 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 for the Kellogg Creek subwatershed.

Copper

Copper exceeded the WQTL three times in the subwatershed (February 2007, July 2007 and July 2008). None of the exceedances coincided with toxicity to *S. capricornutum.* Normal Monitoring in 2008 and MPM in 2011 did not result in any additional copper exceedances.

Pesticide Use Report data were reviewed for the number of monthly copper applications, pounds of active ingredient applied, and acres treated (Table X-10). Copper use decreased in the subwatershed from 2005 through 2009, but increased again in 2010 with the greatest amount of copper use (3,878 lbs AI) occurring in 2010. Over the years, the greatest amount of copper use in this subwatershed has been in April through May; however, this does not correlate to the copper exceedances in February and July (Figure X-3).

The Coalition also uses PUR data to assess which crops received the most applications of copper from 2005 to 2011 (Table X-11). The largest amount of copper from 2005 through 2011 was applied to walnuts, tomatoes, cherries and apricots. The largest amount of copper was applied to walnuts (4,495 lbs AI) followed by closely by tomatoes (4,268 lbs AI). The most common products used within this subwatershed were DuPont Kocide and Cuprofix (Table X-11).

Table X-10. Kellogg Creek along Hoffman Ln site subwatershed copper applications, lbs AI applied, and acres treated by month (2005-2011).

PUR data available through May 2011 for Contra Costa County. If a month is not included in the table, no applications were made.

Month/Year	Number of Copper Applications	Pounds of AI Applied	Acres Treated
January, 2005	3	67.5	12
February, 2005	16	686.6	225
March, 2005	5	433.6	186
April, 2005	22	922.0	591.6
May, 2005	16	904.5	445
August, 2005	1	3.0	2
December, 2005	3	18.5	5
January, 2006	14	189.0	43.9
February, 2006	9	511.3	124.3
March, 2006	12	943.1	421
April, 2006	11	1003.5	326
May, 2006	1	46.5	30
June, 2006	4	124.0	126
July, 2006	1	20.9	17
December, 2006	6	106.3	21
January, 2007	3	529.0	93
February, 2007	9	149.0	32
March, 2007	3	371.1	87
April, 2007	25	1167.7	780
May, 2007	4	72.7	23
December, 2007	1	22.1	6.5
January, 2008	13	798.9	133
February, 2008	16	1223.1	226.3
March, 2008	1	355.5	50
April, 2008	3	405.3	78
May, 2008	1	0.4	1
December, 2008	7	125.1	21
January, 2009	4	54.9	17
February, 2009	13	32.4	17.5
April, 2009	4	274.6	67
May, 2009	2	93.7	21
December, 2009	5	140.1	26
January, 2010	1	19.4	6
February, 2010	23	1229.2	228
March, 2010	6	202.2	156.3
April, 2010	20	1542.1	613.5
May, 2010	22	884.4	913.5
July, 2010	1	0.7	1
January, 2011	18	674.4	119
February, 2011	12	304.1	64.5
March, 2011	1	21.3	5
April, 2011	2	386.4	48
May, 2011	2	209.3	26

Month/Year	Number of Copper Applications	Pounds of AI Applied	Acres Treated
Summaries by Year			
2005 Total	66	3035.7	1466.6
2006 Total	58	2944.5	1109.1
2007 Total	45	2311.7	1021.5
2008 Total	41	2908.2	509.3
2009 Total	28	595.6	148.5
2010 Total	73	3878.0	1918.3
2011 Total	35	1595.5	262.5
Total	**346**	**17269.3**	**6435.7**

Figure X-3. Kellogg Creek along Hoffman Ln site subwatershed lbs copper applied by month (2005-2011).

PUR data available through May 2011 for Contra Costa County. Asterisk (*) denotes months with exceedances.

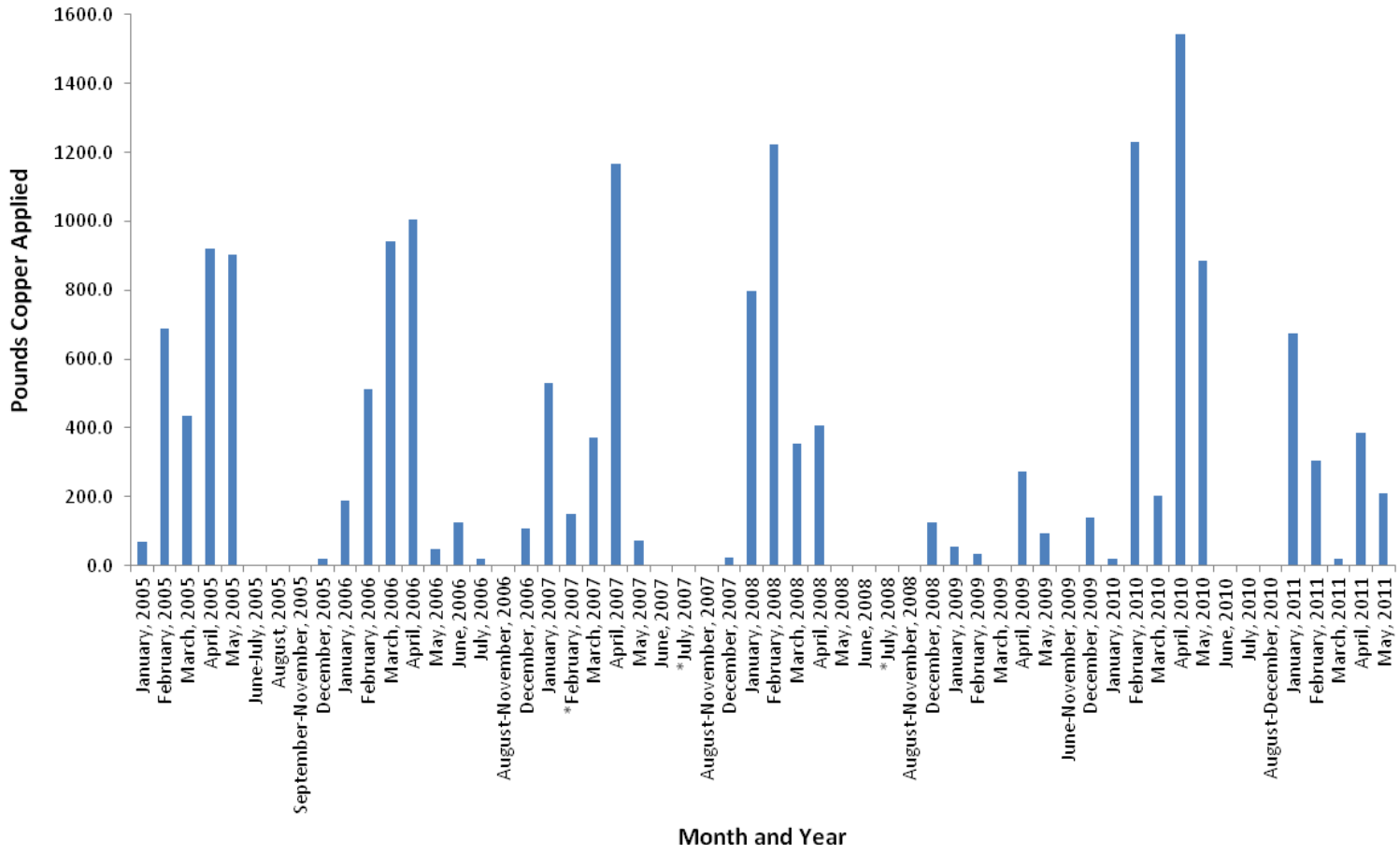


Table X-11. Kellogg Creek along Hoffman Ln site subwatershed copper PUR data (2005-2011).

PUR data available through May 2011 for Contra Costa County.

Chemical Name	Commodity	Product Name	Lbs AI Applied
COPPER	ALMOND	CUPROFIX DISPERSS	7.38
	APPLE	CUPROFIX DISPERSS	18.3578
	APRICOT	CUPROFIX DISPERSS	1422.0799
		CUPROFIX ULTRA 40 DISPERSS	1221.498
		DUPONT KOCIDE 2000 FUNGICIDE/BACTERICIDE	44.116
		DUPONT KOCIDE 3000 FUNGICIDE/BACTERICIDE	7.376
		NORDOX 75 WG	82.222
	CHERRY	CUPROFIX DISPERSS	396.8595
		CUPROFIX ULTRA 40 DISPERSS	3129.9997
		DUPONT KOCIDE 2000 FUNGICIDE/BACTERICIDE	67.788
		DUPONT KOCIDE 3000 FUNGICIDE/BACTERICIDE	12.908
		NORDOX 75 WG	208.911
	GRAPES (WINE)	CHAMP FORMULA 2 FLOWABLE	877.0106
		KOCIDE DF	6.447
		TENN-COP 5E	6.6831
		TENN-COP 5E FUNGICIDE/BACTERICIDE	0.1159
	NECTARINE	CUPROFIX DISPERSS	23.247
		CUPROFIX ULTRA 40 DISPERSS	53.325
		DUPONT KOCIDE 2000 FUNGICIDE/BACTERICIDE	39.812
		DUPONT KOCIDE 3000 FUNGICIDE/BACTERICIDE	2.766
		NORDOX	21.996
		NORDOX 75 WG	33.56
	ONION (DRY, SPANISH, WHITE, YELLOW, RED, ETC.)	KOCIDE DF	36.84
	PEACH	CUPROFIX DISPERSS	147.3233
		CUPROFIX ULTRA 40 DISPERSS	337.014
		DUPONT KOCIDE 2000 FUNGICIDE/BACTERICIDE	69.2675
		DUPONT KOCIDE 3000 FUNGICIDE/BACTERICIDE	4.61
		KOCIDE DF	67.54
		NORDOX	36.66
		NORDOX 75 WG	57.052
	PLUM (INCLUDES WILD PLUMS FOR HUMAN CONSUMPTION)	CUPROFIX DISPERSS	9.594
		CUPROFIX ULTRA 40 DISPERSS	22.5742
		DUPONT KOCIDE 2000 FUNGICIDE/BACTERICIDE	12.912
		DUPONT KOCIDE 3000 FUNGICIDE/BACTERICIDE	3.688
		NORDOX 75 WG	13.424
	TOMATOES, FOR PROCESSING/CANNING	CHAMP FORMULA 2 FLOWABLE	760.1702
		CUPROFIX DISPERSS	1.476
		DUPONT KOCIDE 3000 FUNGICIDE/BACTERICIDE	354.97
		KOCIDE 2000	900.881

Chemical Name	Commodity	Product Name	Lbs AI Applied
COPPER	TOMATOES, FOR PROCESSING/CANNING	KOCIDE 4.5 LF	347.8729
		KOCIDE DF	1453.338
		NU-COP 50 WP	449.68
	VEGETABLES (ALL OR UNSPEC)	CUPROFIX DISPERSS	2.7675
	WALNUT (ENGLISH WALNUT, PERSIAN WALNUT)	BADGE SC	595.7391
		CHAMP FORMULA 2 FLOWABLE	139.4442
		CUPROFIX DISPERSS	838.368
		CUPROFIX ULTRA 40 DISPERSS	2263.824
		DUPONT KOCIDE 2000 FUNGICIDE/BACTERICIDE	116.208
		KOCIDE DF	426.116
		NU-COP 50DF	115.5

ALMOND - Total Pounds Copper Applied	**7.38**
APPLE - Total Pounds Copper Applied	**18.3578**
APRICOT - Total Pounds Copper Applied	**2777.2919**
CHERRY - Total Pounds Copper Applied	**3816.4662**
GRAPES - Total Pounds Copper Applied	**890.2566**
NECTARINE - Total Pounds Copper Applied	**174.706**
ONION - Total Pounds Copper Applied	**36.84**
PEACH - Total Pounds Copper Applied	**719.4668**
PLUM - Total Pounds Copper Applied	**62.1922**
TOMATOES - Total Pounds Copper Applied	**4268.3881**
VEGETABLES - Total Pounds Copper Applied	**2.7675**
WALNUT - Total Pounds Copper Applied	**4495.1993**
Total Pounds Copper Applied (2005-2011)	**17269.3124**

The Coalition indicated in the 2008 Management Plan that a single TRS was most likely the source of the February 2007 exceedance, and five TRSs applied copper prior to the July 2007 exceedance (page 252-253, Table VII-9). In addition it was also noted that copper was applied during the winter and spring months and appears to be mobilized during winter storm water discharges and in the summer probably as a result of furrow or flood irrigation. The Coalition will target growers with potential to drain who applied or are applying copper and encourage them to review their operations to improve irrigation and storm water management and eliminate spray drift.

Priority D Constituents

Water column toxicity to *C. dubia* and *S. capricornutum* and sediment toxicity to *H. azteca* are the priority D constituents in the Kellogg Creek subwatershed.

C. dubia toxicity

Toxicity to *C. dubia* occurred three times in the Kellogg Creek subwatershed (during the months of February, March and April). The February toxicity coincided with a chlorpyrifos exceedance and the concentration of chlorpyrifos accounted for the toxicity in the sample (Table X-5). Toxicity Identification Evaluations were performed on the March 2006 and April 2007 toxicities, however the toxicity was not persistent throughout the TIE and the source could not be determined. Resampling events were

conducted, but neither sample exhibited toxicity. The Coalition will continue with outreach as explained under the chlorpyrifos priority A/B section above to address the toxicity.

H. azteca toxicity

Sediment toxicity to *H. azteca* toxicity occurred eight times in the Kellogg Creek subwatershed (during the months of March, April, May, July, August and September); two were persistent in the resamples collected one week later (Table X-5). Toxicity Identification Evaluations were not performed on any of the toxic samples, and no chemical analyses were performed on the sediment so the cause of the toxicity remains unknown. The first *H. azteca* toxicity coincided with a pyrethroid water column exceedance. In the 2008 Management Plan the Coalition noted that pyrethroid pesticides were associated with sediment toxicity in other studies, and pyrethroids have been applied in Kellogg Creek subwatershed. Applications were made aerially, and furrow and flood irrigation are common, allowing the possibility that sediments containing pyrethroids or other constituents toxic to *Hyalella* resulted in the toxicity. The Coalition will conduct MPM for sediment toxicity during 2012 and if appropriate, 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 Kellogg Creek 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 Kellogg Creek subwatershed in 2005 (August) and 2008 (April and May; Table X-5). Two of these were persistent in the resamples one week later. Toxicity Identification Evaluations were performed on the original April and May 2008 samples and metals were determined to be the cause of the toxicities; though no associated exceedances of any metal WQTL occurred on these dates.

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 Kellogg Creek subwatershed.

Priority E Constituents

The priority E constituents listed under the Kellogg Creek subwatershed management plan are DDE, DDT, DO, *E. coli,* pH, *P. promelas toxicity*, SC and TDS.

DDE in ambient samples exceeded the WQTL three times in this subwatershed (July 2006, February and July 2007), and DDT WQTL exceedances occurred during two of the same three events (July 2006 and

2007). DDE is a breakdown product of DDT and indicates that DDT was applied several decades prior to sampling. DDE is found primarily bound to sediments and was likely included in the water samples due to bottom sediments that were mobilized by storm flows or the sample collection process. Application of DDT is illegal.

Dissolved oxygen concentration in samples exceeded the WQTL during 11 events from 2005 through 2008. Kellogg Creek along Hoffman Ln was monitored for BOD during the September 2006 and (February, March, April and July) 2007 monitoring events in an attempt to better understand the DO dynamics in the waterway. The study did not eliminate or confirm BOD as the cause of DO exceedances, and the contributing factors to DO exceedances remain unknown at this time.

E. coli exceeded its WQTL during nine events since 2005. Kellogg Creek @ Hwy 4 was sampled as part of the 2006 *E. coli* study. Molecular markers were used to distinguish human, bovine, and avian sources. Human and avian molecular markers were found in the watershed indicating active inputs from these species. Because this study was performed at a single time of the year with a limited set of potential hosts, further studies need to be initiated to better understand the contributing factors to the bacterial contamination in the subwatershed. To address *E. coli* exceedances, the Coalition plans to participate in the focus group along with other Coalitions and Regional Board staff to develop a joint Work Plan to characterize the potential agricultural sources of *E. coli* and identify management practices to prevent discharges to surface waters.

Six exceedances of the pH WQTL occurred in the Kellogg Creek subwatershed. pH is a non-conserved indicator of biological and physical inputs to the system and is not possible to manage unless the causes are known.

Toxicity to *P. promelas* occurred in June and September 2005. Neither one of the toxicities were associated with any exceedances of any constituent. A TIE was performed on the first sample and the results indicated an organophosphate pesticide was the cause of the toxicity. In the 2008 Management Plan the Coalition indicated that several organophosphate chemicals were applied in the watershed prior to sampling including dimethoate. It is likely that the toxicity was associated with sediment-bound constituents moving from the fields to Kellogg Creek.

Specific conductivity and TDS are measures of salt and are often found as exceedances together. From 2005-2011, twelve SC and eight TDS exceedances occurred in the Kellogg Creek subwatershed. The 2008 Management Plan states that Kellogg Creek is under tidal influence and it is assumed that the SC/TDS exceedances are a result of the tidal prism moving water back into the creek.

The Coalition will continue to collect monitoring data for DO, pH and SC field parameters during each monitoring event. DDE, DDT, *E. coli*, and *P. promelas* are currently monitored only during Assessment Monitoring events at this site, and Kellogg Creek will rotate to Assessment Monitoring as scheduled after 2031. Until these constituents become a higher priority, the Coalition will not attempt to

determine their causes. These constituents are also discussed during targeted outreach with growers and annual grower meetings.

Evaluation

Kellogg Creek along Hoffman Ln is one of the fourth priority site subwatersheds within the SJCDWQC 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 Kellogg Creek 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, specifically to growers with the potential to drain to the waterway. Orchard and row crop growers will be targeted for outreach especially prior to the irrigation season. Outreach includes grower notification, management practice outreach and education, tracking of management practices implementation, and providing information on special studies of management practice efficacy.

Grower surveys documenting current management practices and assessing future planned implementations will be completed by October 2012. The Coalition will then assess 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. Complete summary of current and 'to be implemented' management practices will be in the 2013 MPUR.

In 2012, MPM is scheduled for chlorpyrifos (February), copper (February and July), *C. dubia* (February, March and April), *S. capricornutum* (April, May and August) and *H. azteca* (March and September).

XI. MORMON SLOUGH @ JACK TONE RD

Management Plan Constituents

Priority A/B

- Chlorpyrifos

Priority D

- *Ceriodaphnia dubia* water column toxicity
- *Selenastrum capricornutum* water column toxicity

Priority E

- Dissolved Oxygen
- pH

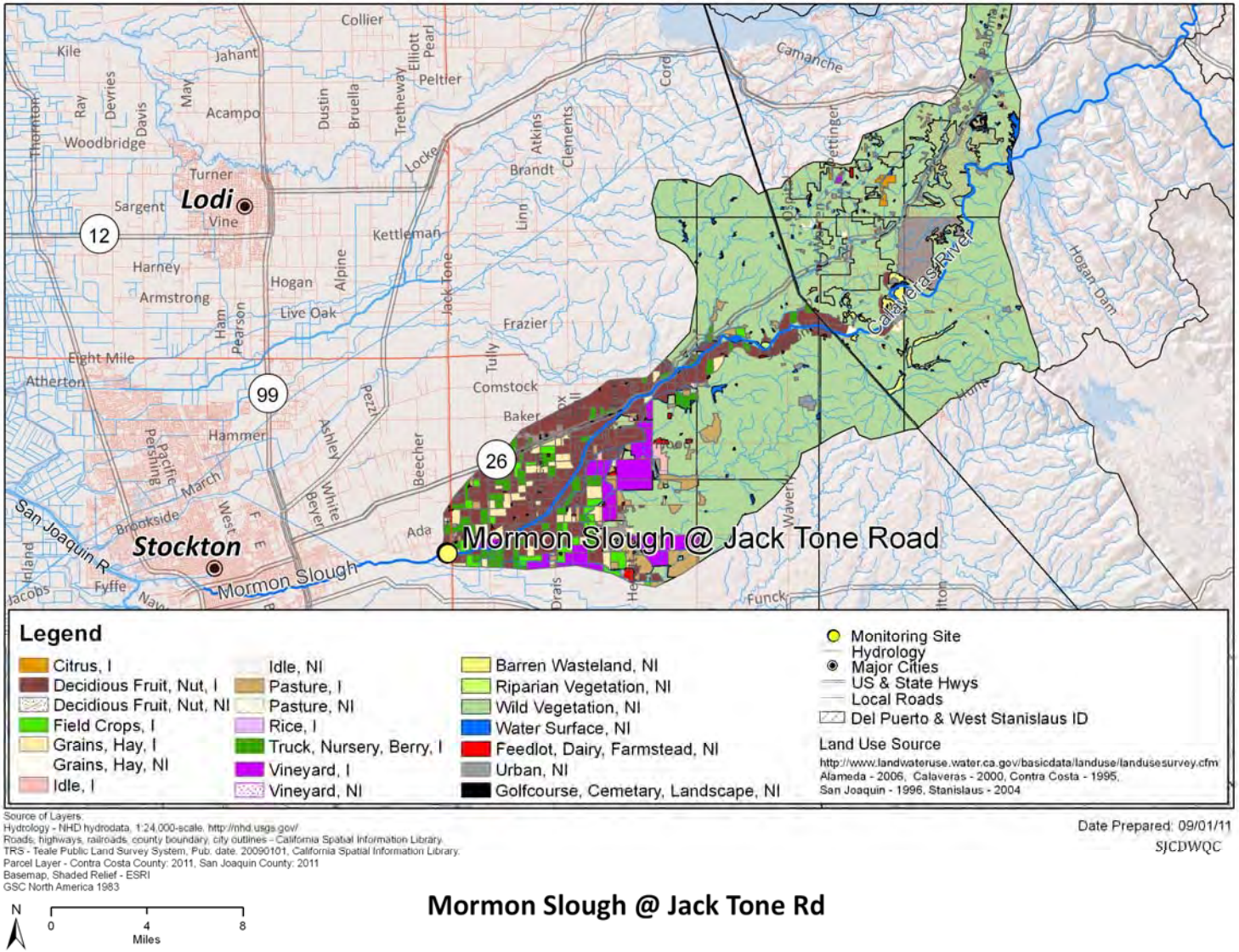
Description of Mormon Slough Site Subwatershed

Mormon Slough @ Jack Tone Rd (24,615 irrigated acres) – This site is located on the eastern portion of San Joaquin County and extends upstream into Calaveras County. This subwatershed is located to the north of and runs parallel to the Duck Creek site subwatershed. Its target coordinates are provided in Table XI-1. The primary crops consist of deciduous trees with smaller amounts of vineyard, truck farm/nursery and berry crops (Figure XI-1).

Table XI-1. Mormon Slough @ Jack Tone Rd site subwatershed sampling location coordinates.

Site Name	Station Code	Target Latitude	Target Longitude
Mormon Slough @ Jack Tone Rd	544MSAJTR	37.9647	-121.1488

Figure XI-1. Mormon Slough @ Jack Tone Rd site subwatershed land use map.



Mormon Slough @ Jack Tone Rd

Subwatershed Monitoring History

Monitoring was initiated at Mormon Slough @ Jack Tone Rd in the irrigation season of 2006 and continued through 2008. Sampling did not occur at Mormon Slough @ Jack Tone Rd during 2009 and 2010, but began again in 2011 (Table XI-2). Monitoring constituents for Mormon Slough are listed by year and season in Table XI-3.

Management Plan Monitoring was initiated for chlorpyrifos during the 2008 irrigation season (May and September). No MPM took place during 2009 and 2010. Management Plan Monitoring continued in 2011 for chlorpyrifos (May, July, August and September), *S. capricornutum* toxicity (May and July) and *C. dubia* toxicity (May and September, Table XI-4). MPM is scheduled to continue in 2012.

Mormon Slough @ Jack Tone Rd is located within the French Camp Slough Zone (Zone 2). Assessment Monitoring is scheduled for 2017.

Mormon Slough is currently on California's 2008-2010 303d List of Impaired Waterbodies for chlorpyrifos and unknown toxicity.

Table XI-2. Mormon Slough @ Jack Tone Rd site subwatershed sampling events per season and year (including MPM).

Year	Season	Events Sampled	Events Not Sampled[1]	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	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	5	0	**5**
	Fall	NA	NA	**NA**

[1]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. Mormon Slough @ Jack Tone 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	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	4	9	2	11						5	
NA	Specific Conductivity		5	4	9	2	11						5	
NA	pH		5	4	9	2	11						5	
EPA 110.2	Color		5	2	6	1	6							
EPA 160.1	Dissolved Solids		5	2	6	1	6							
EPA 180.1	Turbidity		5	2	6	1	6							
EPA 415.1	Total Organic Carbon		5	2	6	1	6							
SM 9223	*E. coli*		5	2	6	1	6							
EPA 405.1	BOD		1	2	2									
Carbamates														
EPA 8321A	Aldicarb		5	2	6	1	6							
EPA 8321A	Carbaryl		5	2	6	1	6							
EPA 8321A	Carbofuran		5	2	6	1	6							
EPA 8321A	Diuron		5	2	6	1	6							
EPA 8321A	Linuron		5	2	6	1	6							
EPA 8321A	Methiocarb		5	2	6	1	6							
EPA 8321A	Methomyl		5	2	6	1	6							
EPA 8321A	Oxamyl		5	2	6	1	6							
Organochlorines														
EPA 8081A	DDD(p,p')		5	2	6	1	6							
EPA 8081A	DDE(p,p')		5	2	6	1	6							
EPA 8081A	DDT(p,p')		5	2	6	1	6							
EPA 8081A	Dicofol		5	2	6	1	6							
EPA 8081A	Dieldrin		5	2	6	1	6							
EPA 8081A	Endrin		5	2	6	1	6							
EPA 8081A	Methoxychlor		5	2	6	1	6							

Method	Analyte	2006		2007		2008			2009	2010	2011			
		Storm*	Irrigation	Storm	Irrigation	Storm	Irrigation	Fall*	Winter - Fall*	Winter - Fall*	Winter*	Storm*	Irrigation	Fall*
Organophosphates														
EPA 8141A	Azinphos methyl		5	2	6	1	6							
EPA 8141A	Chlorpyrifos		5	2	6	1	8						4	
EPA 8141A	Demeton-s													
EPA 8141A	Diazinon		5	2	6	1	6							
EPA 8141A	Dichlorvos													
EPA 8141A	Dimethoate		5	2	6	1	6							
EPA 8141A	Disulfoton		5	2	6	1	6							
EPA 8141A	Malathion		5	2	6	1	6							
EPA 8321A	Methamidophos		5	2	6	1	6							
EPA 8141A	Methidathion		5	2	6	1	6							
EPA 8141A	Molinate		5	2	6	1	6							
EPA 8141A	Parathion, Methyl		5	2	6	1	6							
EPA 8141A	Phorate		5	2	6	1	6							
EPA 8141A	Phosmet		5	2	6	1	6							
EPA 8141A	Thiobencarb		5	2	6	1	6							
EPA 8141A	Trifluralin													
Pyrethroids														
EPA 8081A	Bifenthrin		5	2	6	1	6							
EPA 8081A	Cyfluthrin, total		5	2	6	1	6							
EPA 8081A	Cyhalothrin, lambda, total		5	2	6	1	6							
EPA 8081A	Cypermethrin, total		5	2	6	1	6							
EPA 8081A	Esfenvalerate/ Fenvalerate, total		5	2	6	1	6							
EPA 8081A	Permethrin, total		5	2	6	1	6							
Triazines														
EPA 547M	Glyphosate		5	2	6	1	6							
EPA 549.2M	Paraquat dichloride		5	2	6	1	6							
EPA 619	Atrazine		5	2	6	1	6							
EPA 619	Cyanazine		5	2	6	1	6							
EPA 619	Simazine		5	2	6	1	6							

Method	Analyte	2006		2007		2008			2009	2010	2011			
		Storm*	Irrigation	Storm	Irrigation	Storm	Irrigation	Fall*	Winter - Fall*	Winter - Fall*	Winter*	Storm*	Irrigation	Fall*
Metals (Total)														
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	Nickel						6							
EPA 200.8	Selenium						6							
EPA 200.8	Zinc						6							
Nutrients														
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				1		6							
EPA 365.2	OrthoPhosphate as P						6							
EPA 365.2	Phosphate as P						6							
Toxicity														
EPA 821/R-02-012	*Ceriodaphnia dubia*		5	2	7	1	7						2	
EPA 821/R-02-012	*Pimephales promelas*		5	2	6	1	6							
EPA 821/R-02-013	*Selenastrum capricornutum*		5	2	7	1	8						3	
EPA 600/R-99-064	*Hyalella azteca*			2	1	1	1							

*Site not sampled during the 2006 storm season, 2008 fall season, 2009 and 2010 sampling years, and the 2011 winter, storm and fall seasons.

Table XI-4. Mormon Slough @ Jack Tone Rd site subwatershed Management Plan Monitoring schedule (2008-2011).

Site Name	Sample Date	Monitoring Type	Chlorpyrifos	*C. dubia*	*S. capricornutum*
Mormon Slough @ Jack Tone Rd	7-May-08	A	X		
Mormon Slough @ Jack Tone Rd	9-Sep-08	A	X		
Mormon Slough @ Jack Tone Rd	12-Apr-11	MPM			X
Mormon Slough @ Jack Tone Rd	24-May-11	MPM	X	X	X
Mormon Slough @ Jack Tone Rd	26-Jul-11	MPM	X		X
Mormon Slough @ Jack Tone Rd	23-Aug-11	MPM	X		
Mormon Slough @ Jack Tone Rd	20-Sep-11	MPM	X	X	

A – Additional sampling
X – Constituent sampled for Management Plan Monitoring (MPM)

Exceedance History

Samples collected from Mormon Slough @ Jack Tone Rd from 2006 through 2008 and 2011 exceeded the WQTLs for field parameters, *E. coli* and pesticides (Table XI-5). Water column toxicity to *C. dubia* and *S. capricornutum* and sediment toxicity to *H. azteca* also occurred. Constituents that exceeded their respective WQTLs in this subwatershed are DO (11), pH (6), *E. coli* (1), chlorpyrifos (8), parathion, methyl (1) and simazine (1). Toxicity to *C. dubia* (2), *S. capricornutum* (4) and *H. azteca* sediment (1) occurred (Table XI-5).

During 2011, exceedances of pH (2) and chlorpyrifos (1) occurred (Table XI-5).

The highest priority constituents in the Mormon Slough @ Jack Tone Rd subwatershed are chlorpyrifos (A/B) and *C. dubia* and *S. capricornutum* toxicity (D).

Table XI-5. Mormon Slough @ Jack Tone Rd site subwatershed exceedances (2006-2011).
The WQTLs are listed in the header after the analyte. Data sorted by season and date.

Site Name	Season	Sample Date	Oxygen, Dissolved, <7 mg/L	pH, <6.5 and >8.5 units	*E. coli*, >235 MPN/100 mL	Chlorpyrifos, >0.015 µg/L	Methyl Parathion, >0 µg/L	Simazine, >4 µg/L	*C. dubia*, (% Control)	*S. capricornutum*, (% Control)	*H. azteca*, (% Control)
Mormon Slough @ Jack Tone Rd	Irrigation	5/16/2006				0.035					
Mormon Slough @ Jack Tone Rd	Irrigation	6/20/2006	5.80								
Mormon Slough @ Jack Tone Rd	Irrigation	7/18/2006	6.60								
Mormon Slough @ Jack Tone Rd	Irrigation	9/19/2006	6.90								
Mormon Slough @ Jack Tone Rd	Storm	2/28/2007			2400						
Mormon Slough @ Jack Tone Rd	Storm	3/6/2007									91
Mormon Slough @ Jack Tone Rd	Irrigation	6/12/2007	6.68								
Mormon Slough @ Jack Tone Rd	Irrigation	7/10/2007	6.27							61	
Mormon Slough @ Jack Tone Rd	Irrigation	7/17/2007	6.00								
Mormon Slough @ Jack Tone Rd	Irrigation	9/4/2007				0.210			0		
Mormon Slough @ Jack Tone Rd	Storm	1/23/2008						5.4			
Mormon Slough @ Jack Tone Rd	Sediment	3/18/2008	5.19								
Mormon Slough @ Jack Tone Rd	Irrigation	4/15/2008	6.34							18	
Mormon Slough @ Jack Tone Rd	Irrigation	4/23/2008								26	
Mormon Slough @ Jack Tone Rd	Irrigation	5/7/2008	6.70								
Mormon Slough @ Jack Tone Rd	Irrigation	5/13/2008	4.50			0.066			0	4	
Mormon Slough @ Jack Tone Rd	Irrigation	6/10/2008									

Site Name	Season	Sample Date	Oxygen, Dissolved, <7 mg/L	pH, <6.5 and >8.5 units	*E. coli*, >235 MPN/100 mL	Chlorpyrifos, >0.015 µg/L	Methyl Parathion, >0 µg/L	Simazine, >4 µg/L	*C. dubia*, (% Control)	*S. capricornutum*, (% Control)	*H. azteca*, (% Control)
Mormon Slough @ Jack Tone Rd	Irrigation	7/15/2008		8.61		0.047					
Mormon Slough @ Jack Tone Rd	Irrigation	8/12/2008	4.82			0.025	0.15				
Mormon Slough @ Jack Tone Rd	Irrigation	8/13/2008		8.59							
Mormon Slough @ Jack Tone Rd	Irrigation	9/9/2008		8.57		0.034					
Mormon Slough @ Jack Tone Rd	Irrigation	9/16/2008		8.58		0.036					
Mormon Slough @ Jack Tone Rd	Irrigation	4/12/2011		8.52							
Mormon Slough @ Jack Tone Rd	Irrigation	8/23/2011		8.51							
Mormon Slough @ Jack Tone Rd	Irrigation	9/20/2011				0.11					
		Constituent Priority	**E**	**E**	**NP**	**A/B**	**NP**	**NP**	**D**	**D**	**NP**

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

2007-2011 Management Plan Monitoring Results

All monitoring results for high priority management plan constituents in the Mormon Slough @ Jack Tone Rd subwatershed are listed in Table XI-6, which include chlorpyrifos and water column toxicity to *C. dubia* and *S. capricornutum*. In the Mormon Slough @ Jack Tone Rd subwatershed, MPM occurred in 2008 for additional MPM and in 2011 for MPM.

Chlorpyrifos first exceeded the WQTL (0.015 µg/L) in Mormon Slough @ Jack Tone Rd subwatershed during 2006 May monitoring, and then again during 2007 September monitoring. Additional MPM for chlorpyrifos was scheduled during 2008 (May and September). Four exceedances of the chlorpyrifos WQTL occurred during 2008 Normal Monitoring, and one occurred during the 2008 September additional MPM. Monitoring at Mormon Slough @ Jack Tone Rd did not occur again until 2011 MPM, and there were no chlorpyrifos exceedances during that time. Chlorpyrifos MPM is scheduled to occur in 2012 (May, July, August and September).

Toxicity to *C. dubia* occurred in September 2007 and May 2008. Both toxicities coincided with chlorpyrifos exceedances (Table XI-6). No toxicity occurred during 2011 MPM (May and September). The Coalition will conduct MPM for *C. dubia* toxicity in 2012 during the months of past exceedances, May and September.

Toxicity to *S. capricornutum* occurred in July 2007, twice in April 2008 (Normal Monitoring and resample) and again in May 2008 (Table XI-6). Consequently the constituent was added to the Mormon Slough @ Jack Tone Rd Management Plan. No toxicity occurred during the 2011 MPM. The Coalition will conduct MPM for *S. capricornutum* toxicity in 2012 (April, May and July).

Table XI-6. Mormon Slough @ Jack Tone 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:	JANUARY	APRIL	MAY	JUNE	JULY	AUGUST	SEPTEMBER
2008 MPM	Date:	NA	NA	5/7/08	NA	NA	NA	9/9/08
	Chlorpyrifos µg/L	NA	NA	<0.003	NA	NA	NA	**0.034**
2008 NM	Date:	1/23/08	4/15/08	5/13/08	6/10/08	7/15/08	8/12/08	9/16/08
	Chlorpyrifos µg/L	0.007	<0.003	**0.066**	<0.003	**0.047**	**0.025**	**0.036**
2011 MPM	Date:	NA	4/12/11	5/24/11	NA	7/26/11	8/23/11	9/20/11
	Chlorpyrifos µg/L	NA	NA	<0.003	NA	<0.003	<0.003	**0.11**
	C. dubia (% Control)	NA	NA	100	NA	NA	NA	100
	S. capricornutum (% Control)	NA	1323	637	NA	699	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

Load calculations are not relevant to the management of priority constituents in this site subwatershed.

Loads were calculated for the chlorpyrifos detections (Table IX-7) based on the following formula:

Load = Discharge (cfs) X 28.317L/ft^3 X Concentration (µg/L).

Table XI-7. Mormon Slough @ Jack Tone Rd site subwatershed instantaneous load calculations for chlorpyrifos. Sorted by analyte and date.

Site Name	Analyte Name	Sample Date	Discharge cfs	Concentration µg/L	Loading Rate µg/sec
Mormon Slough @ Jack Tone Rd	Chlorpyrifos	07/10/07	0	0.015	0
Mormon Slough @ Jack Tone Rd	Chlorpyrifos	09/04/07	0	0.21	0
Mormon Slough @ Jack Tone Rd	Chlorpyrifos	09/16/08	0	0.036	0
Mormon Slough @ Jack Tone Rd	Chlorpyrifos	09/20/11	0	0.11	0

Source Identification and Outreach

To address source identification and determine an outreach strategy, the Coalition considers past monitoring results and associated PUR data and focuses its efforts on appropriate pesticides. In 2008, the Coalition conducted additional MPM during the months when exceedances historically occurred to better characterize water quality in the subwatershed. Normal Monitoring results from 2006 through 2008 and MPM monitoring results from 2008 and 2011, coupled with a review of PUR data to determine the most frequent crop type and timing associated with pesticide applications, provided the Coalition with sufficient data to derive an outreach strategy, which is detailed in the following sections.

The Mormon Slough @ Jack Tone 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 Mormon Slough @ Jack Tone 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. 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 for the Mormon Slough @ Jack Tone Rd subwatershed Management Plan.

Chlorpyrifos

The WQTL for chlorpyrifos (0.015 µg/L) was exceeded seven times in the Mormon Slough @ Jack Tone Rd subwatershed—in May 2006, September 2007, and July, August and September 2008. The exceedances from September 2007 and May 2008 were associated with toxicity to *C. dubia*.

The land use within this subwatershed generates the potential for chlorpyrifos applications throughout the year. Chlorpyrifos may be applied for dormant sprays to orchards during the winter months and may be applied to orchards and row crops at various times during the irrigation season.

Pesticide Use Report data were reviewed for the number of monthly chlorpyrifos applications, pounds of active ingredient applied, and the acres treated within the subwatershed (Table XI-8, Figure XI-2). The amount of chlorpyrifos applied in the subwatershed has fluctuated over the years. The greatest amount of chlorpyrifos use occurred in 2010 (16,010 lbs AI) with the lowest amount of use occurring in 2011 (1,414 lbs AI, confirmed PUR data only through May 2011). The greatest chlorpyrifos use occurred consistently in the month of July, with the exception of 2010 when the highest use occurred in August. Exceedances do not always correspond to a month with the greatest applications (Figure XI-2).

The Coalition also uses PUR data to assess which crops received the most applications of chlorpyrifos (Table XI-9). The largest amount of chlorpyrifos applied from 2006 through 2011 by far was to walnut orchards (48,599 lbs AI), followed by grapes (1,577 lbs AI). The most common product containing chlorpyrifos used within this subwatershed was Lorsban (Table XI-9).

Table XI-8. Mormon Slough @ Jack Tone Rd site subwatershed chlorpyrifos applications, lbs AI applied, and acres treated by month (2006-2011).

PUR data available through May 2011 for San Joaquin County; all PUR data after May 2011 are preliminary. If a month is not included in the table, no applications were made.

Month/Year	Number of Chlorpyrifos Applications	Pounds of AI Applied	Acres Treated
February, 2006	5	209.8	109.7
March, 2006	9	477.8	256.5
April, 2006	5	88.9	74
May, 2006	82	3146.3	3098
June, 2006	22	1086.6	686
July, 2006	49	3584.7	2155.5
August, 2006	39	1660.4	1076.5
September, 2006	24	1263.9	674.3
October, 2006	5	493.2	267.2
November, 2006	6	392.8	214.9
December, 2006	1	0.5	1
January, 2007	1	1.2	3
March, 2007	13	326.2	301
April, 2007	51	1441.5	2013.5
May, 2007	13	842.1	519
June, 2007	5	579.6	303
July, 2007	37	2005.9	1221
August, 2007	37	1722.4	938.6
September, 2007	10	395.1	218
March, 2008	10	243.5	173
April, 2008	31	833.4	1258.0
May, 2008	14	1223.5	639.5
June, 2008	1	74.3	40

Month/Year	Number of Chlorpyrifos Applications	Pounds of AI Applied	Acres Treated
July, 2008	22	1954.2	1069.5
August, 2008	24	821.3	597.8
March, 2009	6	156.0	95
April, 2009	18	424.1	569.7
May, 2009	30	1625.7	1435.5
June, 2009	2	170.1	85
July, 2009	55	4727.4	2425.7
August, 2009	36	2200.2	1162
September, 2009	9	268.8	243
March, 2010	9	250.8	214
April, 2010	52	2638.3	3216.7
May, 2010	9	272.3	202
June, 2010	5	616.0	320
July, 2010	38	2580.5	1458.5
August, 2010	56	9323.7	1632.5
September, 2010	14	329.1	257
March, 2011	1	15.3	10
April, 2011	1	7.5	4
May, 2011	14	539.5	389
June, 2011	3	47.1	97
July, 2011	7	386.9	206
August, 2011	8	290.8	176
September, 2011	4	127.4	92.5
Summaries by Year			
2006 Total	247	12405.0	8613.6
2007 Total	167	7314.0	5517.1
2008 Total	102	5150.2	3777.8
2009 Total	156	9572.3	6016.0
2010 Total	183	16010.8	7300.7
2011 Total	38	1414.3	974.5
Total	**893**	**51866.7**	**32199.7**

Figure XI-2. Mormon Slough @ Jack Tone Rd site subwatershed lbs chlorpyrifos applied by month (2006-2011).

PUR data available through May 2011 for San Joaquin County; all PUR data after May 2011 are preliminary. Asterisk (*) denotes months with exceedances.

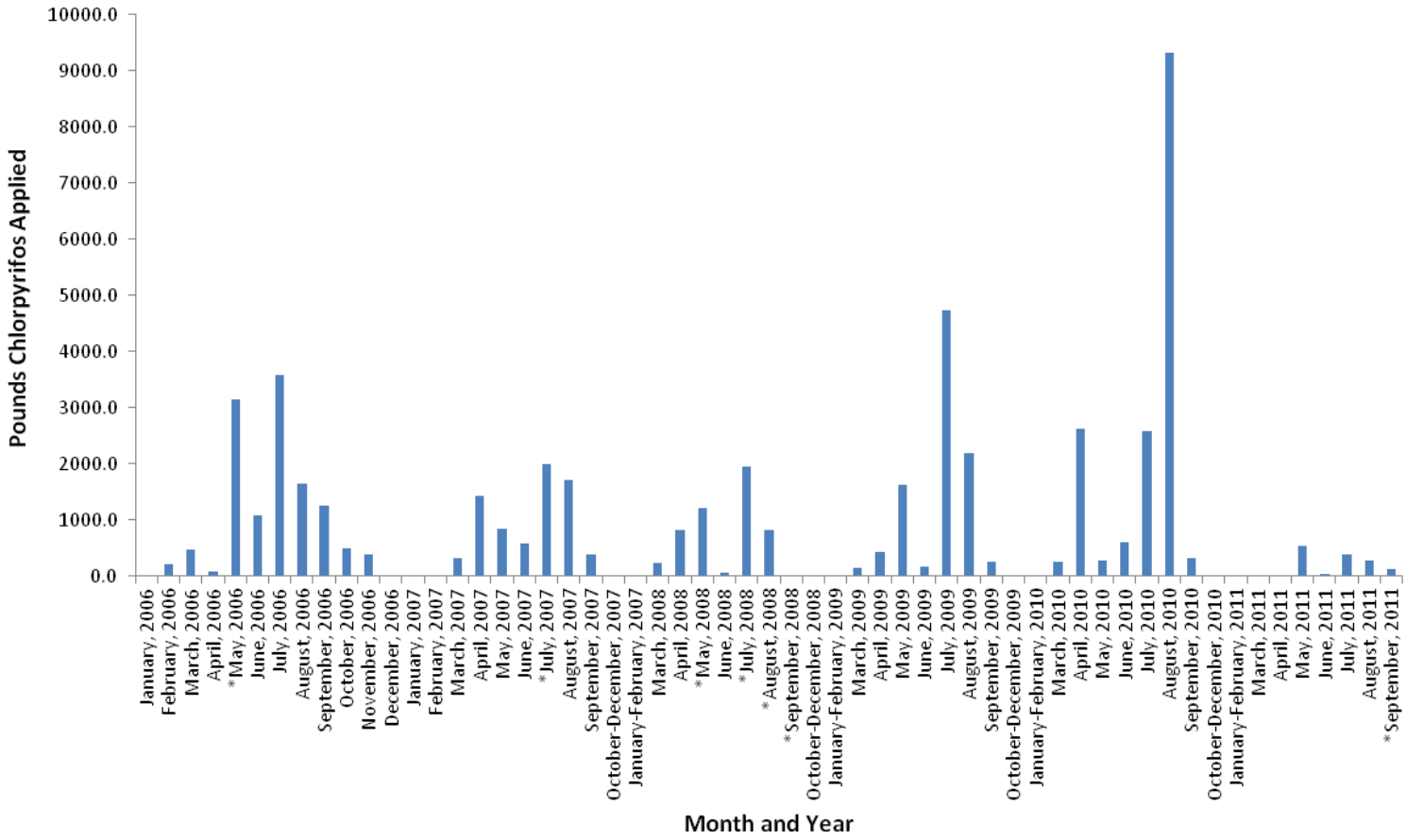


Table XI-9. Mormon Slough @ Jack Tone Rd site subwatershed chlorpyrifos PUR data (2006-2011).

PUR data available through May 2011 for San Joaquin County; all PUR data after May 2011 are preliminary.

Chemical Name	Commodity	Product Name	Lbs AI Applied
CHLORPYRIFOS	ALFALFA (FORAGE - FODDER) (ALFALFA HAY)	LOCK-ON INSECTICIDE	126.7
		LORSBAN ADVANCED	23.5
		LORSBAN-4E	91.2
	APPLE	LORSBAN 4E INSECTICIDE	10.0
		LORSBAN 4E-HF	9.0
		LORSBAN ADVANCED	167.1
		LORSBAN-4E	677.4
		NUFOS 4E	15.3
	CORN (FORAGE - FODDER)	GOVERN 4E INSECTICIDE	72.7
		LORSBAN 15G GRANULAR INSECTICIDE	135.9
		LORSBAN ADVANCED	61.0
	GRAPES	LORSBAN 4E-HF	555.2
		LORSBAN-4E	883.1
	GRAPES (WINE)	NUFOS 4E	123.6
		PROFESSIONAL TURF INSECTICIDE	15.1
	N-OUTDR CONTAINER/FLD GRWN PLANTS	DURSBAN PRO	300.5
	WALNUT (ENGLISH WALNUT, PERSIAN WALNUT)	CHLORPYRIFOS 4E AG	112.8
		GOVERN 4E INSECTICIDE	1525.1
		LORSBAN 4E INSECTICIDE	6120.8
		LORSBAN 4E-HF	3271.1
		LORSBAN ADVANCED	14079.2
		LORSBAN-4E	20572.0
		NUFOS 4E	2918.2

ALFALFA - Total Pounds Chlorpyrifos Applied	**241.4**
APPLE - Total Pounds Chlorpyrifos Applied	**878.8**
CORN - Total Pounds Chlorpyrifos Applied	**269.7**
GRAPES - Total Pounds Chlorpyrifos Applied	**1577.1**
N-OUTDR CONTAINER - Total Pounds Chlorpyrifos Applied	**300.5**
WALNUT - Total Pounds Chlorpyrifos Applied	**48599.2**
Total Pounds Chlorpyrifos Applied (2006-2011)	**51866.7**

Monitoring results and PUR data indicate that management of chlorpyrifos in this subwatershed should focus on applications during the irrigation months. The Coalition's strategy is to provide information on a subwatershed basis to growers to review their operation and determine if spray drift and irrigation return flows are managed properly, specifically to growers with the potential to drift or drain to the slough. Orchard and vineyard operators will be advised of methods to reduce spray drift.

Since 2007, Coalition outreach included grower meetings and the mailing/distribution of information. A complete list of Coalition outreach that occurred in high priority subwatersheds during 2011 is provided in the Performance Goals and Schedules section of this report. The Coalition is focusing outreach to growers who farm parcels in the direct drainage area of the subwatershed and who used chlorpyrifos within recent years. From these criteria, the Coalition compiled a targeted list of growers.

The Coalition began conducting individual contact meetings with targeted growers during the winter of 2012. Although meetings focused mainly on chlorpyrifos exceedances, all water quality results were reviewed and discussed including exceedances of DO, pH, *E. coli*, parathion, methyl, simazine, and toxicity to *C. dubia*, *S. capricornutum* and *H. azteca*. The Coalition contacted 34 growers accounting for 2,050 acres of direct drainage within the Mormon Slough @ Jack Tone Rd subwatershed. To date, the Coalition achieved 100% of initial contact for targeted growers.

Grower surveys completed at the meetings, documenting members' current practices and indicating which recommended practices growers anticipated implementing in the upcoming years, will be complied and assessed by the Coalition. Follow up with targeted growers will occur to determine what additional management practices were implemented in 2012 and if additional practices are planned for 2013.

Management Plan Monitoring is scheduled to occur at Mormon Slough @ Jack Tone 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 D Constituents

Water column toxicity to *C. dubia* and *S. capricornutum* are listed as priority D constituents in the Mormon Slough @ Jack Tone Rd Management Plan.

C. dubia toxicity

C. dubia toxicity occurred twice in the subwatershed, once in September 2007 and once in May 2008 (Table XI-5). Toxicity Identification Evaluations were performed for both samples, and the TIE for the 2007 toxicity indicated that a non-polar organic chemical was the cause. The calculated TUs were accounted for by the concentration of chlorpyrifos in the associated water sample. The second TIE performed on the 2008 toxicity sample was inconclusive since the toxicity was not persistent, but chlorpyrifos did exceed the WQTL in the associated water sample. A resample was collected a week later and did not exhibit *C. dubia* toxicity. The Coalition will conduct MPM for toxicity to *C. dubia* in 2012 during months of past exceedances (May and September).

S. capricornutum toxicity

S. capricornutum toxicity occurred four times in the subwatershed, once in 2007 (July) and three times in 2008 (April Normal Monitoring and resample, and May; Table XI-5). The 2007 toxicity was resampled and the toxicity was not persistent. A TIE was performed on the April 2008 sample and non-polar organics and metals were determined to be the cause of toxicity. A resample was collected a week later and the toxicity was persistent. The TIE for the May 2008 toxicity also concluded that metals were the cause of *S. capricornutum* toxicity. The toxicity was not persistent in the May resample. Though non-polar organics and metals were determined to be the cause of toxicity, no concurrent detections of metals or organics occurred.

Priority E Constituents

Priority E constituents listed for Mormon Slough @ Jack Tone Rd are DO and pH.

Dissolved oxygen exceeded the WQTL during 11 events from 2006 through 2008. Mormon Slough @ Jack Tone Rd was monitored for BOD during the September 2006 and (February, March, April and July) 2007 monitoring events in an attempt to better understand the DO dynamics in the waterway. The study did not eliminate or confirm BOD as the cause of DO exceedances, and the contributing factors to DO exceedances in Mormon Slough remain unknown at this time.

Five exceedances of pH occurred in the subwatershed. The constituent pH is a non-conserved indicator of biological and physical inputs and is not possible to manage unless the causes are known. The cause of the variability in pH is unknown.

Although these constituents will remain low priority, the Coalition will continue to collect DO and pH field parameters during each monitoring event. The priority E constituents will be discussed during targeted outreach and at annual grower meetings.

Evaluation

Mormon Slough @ Jack Tone Rd is one of the fourth priority site subwatersheds within the SJCDWQC and is in its first year of focused outreach (2012-2014).

The Coalition will focus its resources on identifying sources of agricultural discharge that could result in water quality impairments, extending outreach to Coalition members, and setting evaluation goals based on effectiveness of management practices (by considering changes in water quality over time).

The Coalition's strategy for the Mormon Slough @ Jack Tone 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 spray drift 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, into the waterway. Future outreach efforts will include 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 will be completed by the end of October 2012. The Coalition will then assess these results and plan the final stages of outreach including follow up contacts with growers to identify newly implemented practices. Future monitoring will evaluate water quality. Complete summary of current and 'to be implemented' management practices will be included in the 2013 MPUR.

In 2012, MPM is scheduled for months of historical, high priority exceedances. Monitoring will occur for chlorpyrifos (May, July, August and September), *C. dubia* toxicity (May and September) and *S. capricornutum* toxicity (April, May and July).

XII. SAND CREEK @ HWY 4 BYPASS

Management Plan Constituents

Priority A/B

- Chlorpyrifos
- Diazinon

Priority C

- Disulfoton

Priority D

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

Priority E

- DDE
- DDT
- Dieldrin
- Dissolved Oxygen
- *E. coli*
- Specific Conductivity
- Total Dissolved Solids

Description of Sand Creek @ Hwy 4 Bypass Site Subwatershed

Sand Creek @ Hwy 4 Bypass (402 irrigated acres) – This site is located west of Brentwood at the intersection of Hwy 4 Bypass and Sand Creek (Table XII-1). Roddy Ranch Golf Club is located upstream of the sample location off Empire Mile Rd in Horse Valley, which is adjacent to a tributary of Sand Creek. Sand Creek runs from its headwaters in Black Diamond Mines Regional Park to its confluence with Marsh Creek just north of Brentwood. The creek drains approximately 14.4 square miles with seasonal flow in its more natural upland reaches, and perennial flow supported by agricultural return flows in the lowland reaches. Several tributaries provide surface water flow to the creek, including an unnamed drainage to the west, and Horse Creek to the south. The Creek substrate is dominated by mostly deep sandy soils in its lower reaches. Wastewater discharge to Sand Creek from oil/water separation processes associated with production commonly occurred in the past, and could include volatile aromatic compounds (such as benzene) as well as oil and grease. It is unknown to what extent residuals from these releases still exist in the creek.

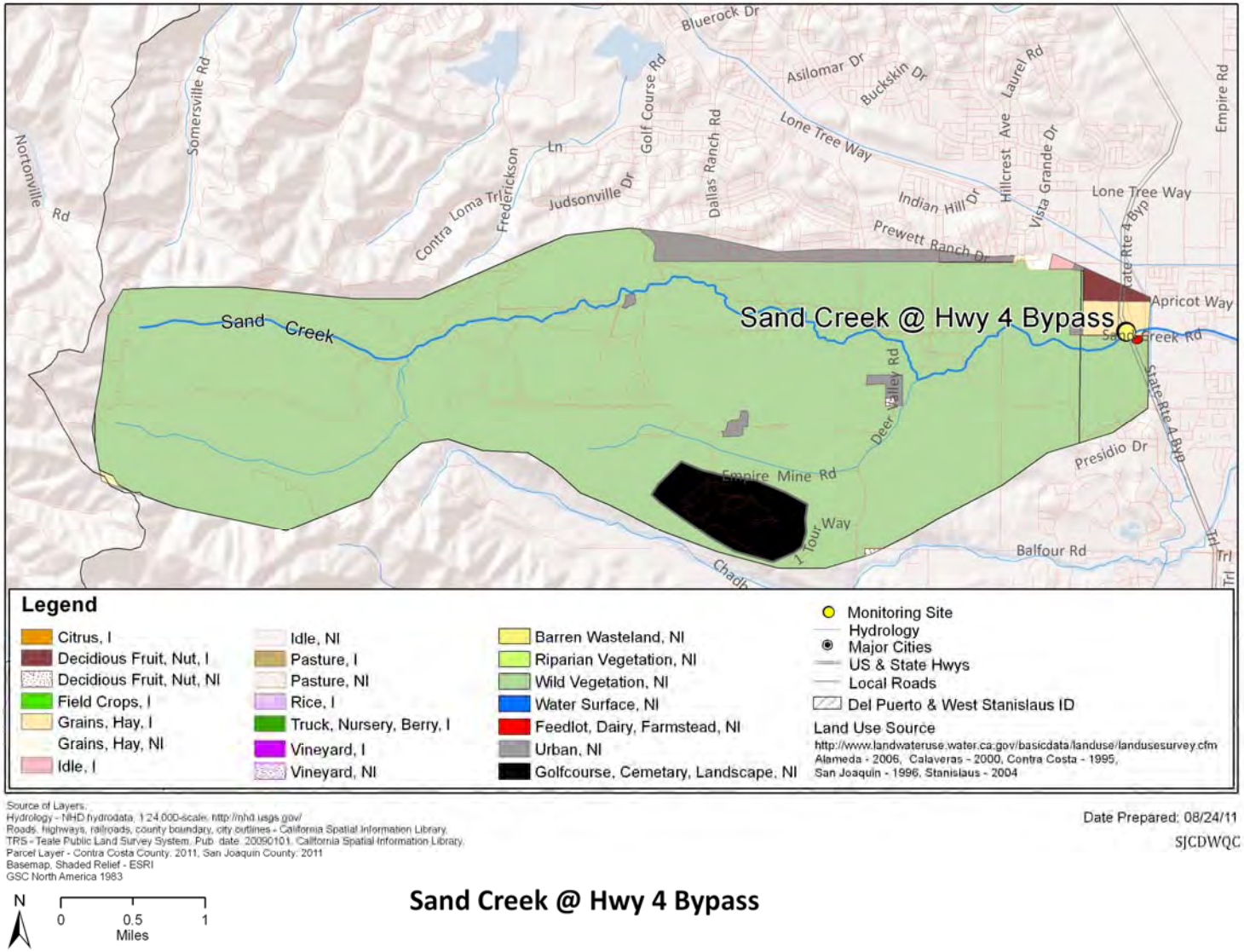
The land use map available from the Department of Water Resources indicates deciduous nuts, grains and hay (Figure XII-1); however, recent visits to the site indicate the area is planted in field crops, grains, hay and pastureland. Analysis using the USDA Cropland Data layer from 2009 (awifs 2009 - http://www.nass.usda.gov/research/Cropland/SARS1a.htm) indicate approximately 25 acres of planted

corn, wheat, safflower, alfalfa and tomatoes and approximately 775 acres of pastureland and grassland. Areas to the east and west of Highway 4 Bypass have had recent urban growth with new housing and shopping developments.

Table XII-1. Sand Creek @ Hwy 4 Bypass site subwatershed sampling location coordinates.

Site Name	Station Code	Target Latitude	Target Longitude
Sand Creek @ Hwy 4 Bypass	544SCAHFB	37.9475	-121.7430

Figure XII-1. Sand Creek @ Hwy 4 Bypass site subwatershed land use map.



Subwatershed Monitoring History

Monitoring was initiated at Sand Creek @ Hwy 4 Bypass in the irrigation season of 2006 and continued through the irrigation season of 2008. Monitoring did not occur during 2009 and 2010, but MPM resumed in 2011 (Table XII-2). Constituents monitored for all sampling events and seasons can be reviewed in Table XII-3.

Management Plan Monitoring was initiated for chlorpyrifos (June), dieldrin (June) and *C. dubia* toxicity (July) in 2007, and continued for chlorpyrifos (May and June), dieldrin (May and June), and *C. dubia* toxicity (May, June and July) in 2008 (Table XII-4). No MPM occurred at this location during 2009 through 2010. Management Plan Monitoring continued again in 2011 for chlorpyrifos, dieldrin and *C. dubia* toxicity, and new constituents were added—diazinon (January and July), disulfoton (May, June and August), *S. capricornutum* toxicity (April, August and September), and *H. azteca* toxicity (March and September). Sand Creek @ Hwy 4 Bypass MPM is scheduled to continue in 2012.

Sand Creek @ Hwy 4 Bypass is the only remaining site in the Contra Costa Zone (Zone 6). Due to the location being in Zone 6 where there is a high urban influence and being the only site in the zone that remains within the SJCDWQC Management Plan, the Sand Creek @ Hwy 4 Bypass is not scheduled for Assessment Monitoring.

Sand Creek is currently on California's 2008-2010 303d List of Impaired Waterbodies for chlorpyrifos, DDE, DDT, dieldrin, *E. coli*, salinity, and unknown water column toxicity.

Table XII-2. Sand Creek @ Hwy 4 Bypass site subwatershed sampling events per season and year (including MPM).

Year	Season	Events Sampled	Events Not Sampled[1]	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	9	0	**9**
	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	NA	NA	**NA**
	Irrigation	6	0	**6**
	Fall	NA	NA	**NA**

[1]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. Sand Creek @ Hwy 4 Bypass 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	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		8	4	10	3	13				2		7	
NA	Specific Conductivity		8	4	10	3	13				2		7	
NA	pH		8	4	10	3	13				2		7	
EPA 110.2	Color		5	2	6	1	6							
EPA 160.1	Dissolved Solids		5	2	6	1	6							
EPA 180.1	Turbidity		5	2	6	1	6							
EPA 415.1	Total Organic Carbon		5	2	6	1	6							
SM 9223	*E. coli*		5	2	6	1	6							
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	1	6							
EPA 8321A	Carbaryl		5	2	6	1	6							
EPA 8321A	Carbofuran		5	2	6	1	6							
EPA 8321A	Diuron		5	2	6	1	6							
EPA 8321A	Linuron		5	2	6	1	6							
EPA 8321A	Methiocarb		5	2	6	1	6							
EPA 8321A	Methomyl		5	2	6	1	6							
EPA 8321A	Oxamyl		5	2	6	1	6							
Organochlorines														
EPA 8081A	DDD(p,p')		5	2	6	1	6							
EPA 8081A	DDE(p,p')		5	2	6	1	6							
EPA 8081A	DDT(p,p')		5	2	6	1	6							
EPA 8081A	Dicofol		5	2	6	1	6							
EPA 8081A	Dieldrin		5	2	8	1	8						3	
EPA 8081A	Endrin		5	2	6	1	6							

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	Methoxychlor		5	2	6	1	6							
Organophosphates														
EPA 8141A	Azinphos methyl		5	2	6	1	6							
EPA 8141A	Chlorpyrifos		5	2	7	1	8						2	
EPA 8141A	Demeton-s													
EPA 8141A	Diazinon		5	2	6	1	6				1		1	
EPA 8141A	Dichlorvos													
EPA 8141A	Dimethoate		5	2	6	1	6							
EPA 8141A	Disulfoton		5	2	6	1	6						3	
EPA 8141A	Malathion		5	2	6	1	6							
EPA 8321A	Methamidophos		5	2	6	1	6							
EPA 8141A	Methidathion		5	2	6	1	6							
EPA 8141A	Molinate		5	2	6	1	6							
EPA 8141A	Parathion, Methyl		5	2	6	1	6							
EPA 8141A	Phorate		5	2	6	1	6							
EPA 8141A	Phosmet		5	2	6	1	6							
EPA 8141A	Thiobencarb		5	2	6	1	6							
Pyrethroids														
EPA 8081A	Bifenthrin		5	2	6	1	6							
EPA 8081A	Cyfluthrin, total		5	2	6	1	6							
EPA 8081A	Cyhalothrin, lambda, total		5	2	6	1	6							
EPA 8081A	Cypermethrin, total		5	2	6	1	6							
EPA 8081A	Esfenvalerate/ Fenvalerate, total		5	2	6	1	6							
EPA 8081A	Permethrin, total		5	2	6	1	6							
Triazines														
EPA 547M	Glyphosate		5	2	6	1	6							
EPA 549.2M	Paraquat dichloride		5	2	6	1	6							
EPA 619	Atrazine		5	2	6	1	6							
EPA 619	Cyanazine		5	2	6	1	6							
EPA 619	Simazine		5	2	6	1	6							

Method	Analyte	2006		2007		2008			2009	2010	2011			
		Storm*	Irrigation	Storm	Irrigation	Storm	Irrigation	Fall*	Winter - Fall*	Winter - Fall*	Winter	Storm*	Irrigation	Fall*
Metals (Total)														
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							
Nutrients														
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							
Sediment Pesticides														
EPA 8270M_NCI	Bifenthrin										1		1	
EPA 8270M_NCI	Chlorpyrifos										1		1	
EPA 8270M_NCI	Cyfluthrin										1		1	
EPA 8270M_NCI	Cyhalothrin, lambda										1		1	
EPA 8270M_NCI	Cypermethrin										1		1	
EPA 8270M_NCI	Deltamethrin: Tralomethrin										1		1	
EPA 8270M_NCI	Esfenvalerate/ Fenvalerate										1		1	
EPA 8270M_NCI	Fenpropathrin										1		1	
EPA 8270M_NCI	Permethrin										1		1	

Method	Analyte	2006		2007		2008			2009	2010	2011			
		Storm *	Irrigation	Storm	Irrigation	Storm	Irrigation	Fall*	Winter - Fall*	Winter - Fall*	Winter	Storm*	Irrigation	Fall*
Toxicity														
EPA 821/R-02-012	*Ceriodaphnia dubia*		8	3	8	1	9						3	
EPA 821/R-02-012	*Pimephales promelas*		6	3	6	1	6							
EPA 821/R-02-013	*Selenastrum capricornutum*		5	3	6	1	8						2	
EPA 600/R-99-064	*Hyalella azteca*		2	2	2	2	2				1		1	

*Site not sampled during the 2006 storm season, 2008 fall season, 2009 and 2010 sampling years, and the 2011 storm and fall seasons.

Table XII-4. Sand Creek @ Hwy 4 Bypass site subwatershed Management Plan Monitoring schedule (2007-2011).

Site Name	Sample Date	Monitoring Type	Chlorpyrifos	Diazinon	Dieldrin	Disulfoton	*C. dubia*	*S. capricornutum*	*H. azteca*
Sand Creek @ Hwy 4 Bypass	20-Jun-07	A	X		X				
Sand Creek @ Hwy 4 Bypass	30-Jul-07	A					X		
Sand Creek @ Hwy 4 Bypass	7-May-08	A	X		X		X		
Sand Creek @ Hwy 4 Bypass	3-Jun-08	A	X		X		X		
Sand Creek @ Hwy 4 Bypass	8-Jul-08	A					X		
Sand Creek @ Hwy 4 Bypass	11-Jan-11	MPM		X					
Sand Creek @ Hwy 4 Bypass	8-Mar-11	MPM							X
Sand Creek @ Hwy 4 Bypass	12-Apr-11	MPM						X	
Sand Creek @ Hwy 4 Bypass	24-May-11	MPM	X		X	X	X		
Sand Creek @ Hwy 4 Bypass	28-Jun-11	MPM	X		X	X	X		
Sand Creek @ Hwy 4 Bypass	26-Jul-11	MPM		X			X		
Sand Creek @ Hwy 4 Bypass	23-Aug-11	MPM			X	X		X	
Sand Creek @ Hwy 4 Bypass	14-Oct-11	MPM							X

A – Additional sampling
X – Constituent sampled for Management Plan Monitoring (MPM)

Exceedance History

Samples collected from Sand Creek @ Hwy 4 Bypass from 2006 through 2008 and 2011 exceeded the WQTL for field parameters, *E. coli*, TDS and pesticides (Table XII-5). Water column toxicity to *C. dubia*, *P. promelas*, *S. capricornutum* and sediment toxicity to *H. azteca* also occurred (Table XII-5). Constituents that exceeded their respective WQTLs in this subwatershed are DO (31), SC (45), *E. coli* (17), TDS (19), chlorpyrifos (2), DDD (1), DDE (5), DDT (3), diazinon (2), dieldrin (5), disulfoton (3), endrin (1) and methomyl (1). Toxicity to *C. dubia* (3), *S. capricornutum* (3) and *H. azteca* sediment toxicity (12) occurred (Table XII-5).

During 2011, exceedances of DO (6), SC (9), dieldrin (1) and sediment toxicity (2) occurred (Table XII-5).

The highest priority constituents in the Sand Creek @ Hwy 4 Bypass subwatershed are chlorpyrifos and diazinon (A/B), disulfoton (C), and *C. dubia, S. capricornutum,* and *H. azteca* toxicities (D).

Table XII-5. Sand Creek @ Hwy 4 Bypass site subwatershed exceedances (2006-2011).

The WQTLs are listed in the header after the analyte. Data sorted by season and date.

Site Name	Season	Sample Date	Oxygen, Dissolved, <7 mg/L	Specific Conductivity, >700 µS/cm	Total Dissolved Solids, >450 mg/L	*E. coli*, >235 MPN/100 mL	Chlorpyrifos, >0.015 µg/L	DDD (p,p'), >0.00083 µg/L	DDE (p,p'), >0.00059 µg/L	DDT (p,p'), >0.00059 µg/L	Diazinon, >0.1 µg/L	Dieldrin, >0.00014 µg/L	Disulfoton, >0.05 µg/L	Endrin, >0.036 µg/L	Methomyl, >0.52 µg/L	*C. dubia*, (% Control)	*P. promelas*, (% Control)	*S. capricornutum*, (% Control)	*H. azteca*, (% Control)
Sand Creek @ Hwy 4 Bypass	Irrigation	5/16/2006	6.30			330	0.089		0.1	0.054		0.076				16	60		
Sand Creek @ Hwy 4 Bypass	Irrigation	5/25/2006	6.30	1718															
Sand Creek @ Hwy 4 Bypass	Irrigation	6/20/2006			980	520	0.038		0.48	0.4		0.11		0.082	12	0			
Sand Creek @ Hwy 4 Bypass	Irrigation	6/28/2006	6.62	1455															
Sand Creek @ Hwy 4 Bypass	Irrigation	7/18/2006	5.30	1475	1200	980					0.45					0			
Sand Creek @ Hwy 4 Bypass	Irrigation	7/26/2006	5.70	1557															
Sand Creek @ Hwy 4 Bypass	Irrigation	8/15/2006	6.20	1544	1200	820													0
Sand Creek @ Hwy 4 Bypass	Irrigation	9/19/2006	5.50	1386	1100	1300													0
Sand Creek @ Hwy 4 Bypass	Storm	2/11/2007		2851	2100	2400													
Sand Creek @ Hwy 4 Bypass	Storm	2/28/2007		3701	2700	2000													
Sand Creek @ Hwy 4 Bypass	Storm	3/6/2007		2433															4
Sand Creek @ Hwy 4 Bypass	Storm	3/29/2007		1816															3
Sand Creek @ Hwy 4 Bypass	Irrigation	4/11/2007		1919	1400														
Sand Creek @ Hwy 4 Bypass	Irrigation	5/22/2007		1946	1400														
Sand Creek @ Hwy 4 Bypass	Irrigation	6/12/2007	6.35	1848	1300	460													
Sand Creek @ Hwy 4 Bypass	Irrigation	6/20/2007		1913															
Sand Creek @ Hwy 4 Bypass	Irrigation	7/10/2007		1554	1000	280			0.0066										
Sand Creek @ Hwy 4 Bypass	Irrigation	7/30/2007	5.02	1817															

Site Name	Season	Sample Date	Oxygen, Dissolved, <7 mg/L	Specific Conductivity, >700 µS/cm	Total Dissolved Solids, >450 mg/L	*E. coli*, >235 MPN/100 mL	Chlorpyrifos, >0.015 µg/L	DDD (p,p'), >0.00083 µg/L	DDE (p,p'), >0.00059 µg/L	DDT (p,p'), >0.00059 µg/L	Diazinon, >0.1 µg/L	Dieldrin, >0.00014 µg/L	Disulfoton, >0.05 µg/L	Endrin, >0.036 µg/L	Methomyl, >0.52 µg/L	*C. dubia*, (% Control)	*P. promelas*, (% Control)	*S. capricornutum*, (% Control)	*H. azteca*, (% Control)
Sand Creek @ Hwy 4 Bypass	Irrigation	8/7/2007	6.82	1762	1300														
Sand Creek @ Hwy 4 Bypass	Irrigation	8/9/2007	4.90	1723															0
Sand Creek @ Hwy 4 Bypass	Irrigation	8/31/2007	5.77	1522															0
Sand Creek @ Hwy 4 Bypass	Irrigation	9/4/2007	5.27	1608	1200	360													
Sand Creek @ Hwy 4 Bypass	Storm	1/23/2008		1058	750	1400					0.11								
Sand Creek @ Hwy 4 Bypass	Sediment	3/18/2008		1400															0
Sand Creek @ Hwy 4 Bypass	Sediment	4/9/2008		2034															0
Sand Creek @ Hwy 4 Bypass	Irrigation	4/15/2008	5.97	2029	1500	330												44	
Sand Creek @ Hwy 4 Bypass	Irrigation	4/23/2008	5.97	1913														54	
Sand Creek @ Hwy 4 Bypass	Irrigation	5/7/2008	5.21	1707								0.012							
Sand Creek @ Hwy 4 Bypass	Irrigation	5/13/2008	5.77	1859	1400	290							0.11						
Sand Creek @ Hwy 4 Bypass	Irrigation	6/3/2008	5.26	1898															
Sand Creek @ Hwy 4 Bypass	Irrigation	6/10/2008	2.92	1845	1100	370			0.006				0.2						
Sand Creek @ Hwy 4 Bypass	Irrigation	7/8/2008	3.52	1758															
Sand Creek @ Hwy 4 Bypass	Irrigation	7/15/2008	4.77	1059	1200	250													
Sand Creek @ Hwy 4 Bypass	Irrigation	8/12/2008	5.36	1885	2800	460		0.008	0.078	0.011		0.006	0.18					38	
Sand Creek @ Hwy 4 Bypass	Irrigation	8/13/2008	6.10	1818															2
Sand Creek @ Hwy 4 Bypass	Irrigation	8/19/2008	4.91	1897															
Sand Creek @ Hwy 4 Bypass	Irrigation	9/16/2008		1709	1200	310													
Sand Creek @ Hwy 4 Bypass	Sediment	9/18/2008	6.73	1854															0

Site Name	Season	Sample Date	Oxygen, Dissolved, <7 mg/L	Specific Conductivity, >700 µS/cm	Total Dissolved Solids, >450 mg/L	*E. coli*, >235 MPN/100 mL	Chlorpyrifos, >0.015 µg/L	DDD (p,p'), >0.00083 µg/L	DDE (p,p'), >0.00059 µg/L	DDT (p,p'), >0.00059 µg/L	Diazinon, >0.1 µg/L	Dieldrin, >0.00014 µg/L	Disulfoton, >0.05 µg/L	Endrin, >0.036 µg/L	Methomyl, >0.52 µg/L	*C. dubia*, (% Control)	*P. promelas*, (% Control)	*S. capricornutum*, (% Control)	*H. azteca*, (% Control)
Sand Creek @ Hwy 4 Bypass	Winter	1/11/2011		2086															
Sand Creek @ Hwy 4 Bypass	Winter	3/8/2011		2213															29
Sand Creek @ Hwy 4 Bypass	Irrigation	4/12/2011		2206															
Sand Creek @ Hwy 4 Bypass	Irrigation	5/24/2011	6.28	1995								0.027							
Sand Creek @ Hwy 4 Bypass	Irrigation	6/28/2011	4.78	1823															
Sand Creek @ Hwy 4 Bypass	Irrigation	7/26/2011	3.97	1671															
Sand Creek @ Hwy 4 Bypass	Irrigation	8/23/2011	4.70	1678															
Sand Creek @ Hwy 4 Bypass	Irrigation	9/20/2011	4.82	1777															
Sand Creek @ Hwy 4 Bypass	Irrigation	10/14/2011	5.40	1730															79
		Constituent Priority	**E**	**E**	**E**	**E**	**A/B**	**NP**	**E**	**E**	**A/B**	**E**	**C**	**NP**	**NP**	**D**	**NP**	**D**	**D**

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

2007-2011 Management Plan Monitoring Results

All monitoring results for high priority management plan constituents in the Sand Creek @ Hwy 4 Bypass subwatershed are listed in Table XII-6, which includes chlorpyrifos, diazinon, dieldrin, disulfoton, water column toxicity to *C. dubia* and *S. capricornutum*, and sediment toxicity to *H. azteca*. In the Sand Creek @ Hwy 4 Bypass subwatershed, additional MPM occurred in 2007 and 2008 and MPM in 2011.

Chlorpyrifos exceeded the WQTL in Sand Creek @ Hwy 4 Bypass during 2006 May and June monitoring events. Additional MPM monitoring was scheduled for chlorpyrifos in 2007 (June) and 2008 (May and June). Chlorpyrifos did not exceed the WQTL during 2007 and 2008 Normal Monitoring and additional MPM. Sand Creek @ Hwy 4 Bypass was not sampled from 2009 through 2010. However, MPM monitoring resumed in 2011 (May and June) and no exceedances of chlorpyrifos occurred. Management Plan Monitoring is scheduled for 2012 (May and June).

Diazinon first exceeded the WQTL in Sand Creek @ Hwy 4 Bypass during 2006 July monitoring, and again during 2008 January monitoring. No additional MPM for diazinon was scheduled for 2008. Monitoring did not occur at Sand Creek @ Hwy 4 Bypass during 2009 through 2010. In 2011, MPM for diazinon took place (July) and did not result in an exceedance. Diazinon MPM is scheduled to occur in 2012 (January and July).

Disulfoton exceeded the WQTL three times, all occurred in 2008 (May, June and August). No sampling took place at Sand Creek @ Hwy 4 Bypass 2009 through 2010. Disulfoton was added to the Sand Creek @ Hwy 4 Bypass management plan and MPM resumed in May, June and August 2011 with no exceedances. Management Plan Monitoring is scheduled for 2012 (May, June and August).

Toxicity to *C. dubia* occurred in May, June and July 2006. All three of the *C. dubia* toxicities coincided with one or more pesticide exceedance, in May (chlorpyrifos, DDE and DDT), June (chlorpyrifos, DDE, DDT, dieldrin and endrin), and July (diazinon). Additional monitoring for toxicity to *C. dubia* took place in 2007 (July) and included in the Sand Creek @ Hwy 4 Bypass management plan in 2008 (May, June and July). Toxicity to *C. dubia* did not occur during Normal Monitoring or additional MPM 2007 through 2008. Monitoring resumed in 2011 with MPM in May, June, and July, and *C. dubia* toxicity did not occur. *C. dubia* toxicity MPM is scheduled to occur in 2012 (May, June and July).

Sediment toxicity to *H. azteca* first occurred in August 2006 and was persistent in the September 2006 resample event. In 2007, four more *H. azteca* toxicities occurred (March Normal Monitoring and April resample event, and August Normal Monitoring and September resample event). *H. azteca* toxicity was listed in the Sand Creek @ Hwy 4 Management Plan in 2008, but MPM did not occur until 2011 (March and September). Sediment toxicity to *H. azteca* occurred during the 2011 March and September MPM. Due to a control failure, September MPM was recollected in October of 2011. Management Plan Monitoring for *H. azteca* toxicity is scheduled to occur in 2012 (March and September).

Toxicity to *S. capricornutum* occurred during 2008 (April) Normal Monitoring and resampling event and (August) Normal Monitoring event. *S. capricornutum* was added to the Sand Creek @ Hwy 4 Bypass management plan in 2009, but sampling did not occur at the site until 2011. No toxicity to *S. capricornutum* occurred during the 2011 MPM (April and August). *S. capricornutum* toxicity MPM is scheduled to occur in 2012 (April and August).

Dieldrin exceeded the WQTL twice during 2006 (May and June), therefore the constituent was monitored in 2007 (June) and included the Sand Creek @ Hwy 4 Bypass Management Plan as of 2008 (May and June). Two exceedances of dieldrin occurred in 2008, one during additional MPM (May) and one during Normal Monitoring (August). Although dieldrin is a priority E constituent, the Coalition decided to conduct MPM for dieldrin during 2011 (May, June and August) and resulted in one exceedance in May. Dieldrin MPM is scheduled to occur in 2012 (May, June and August).

Table XII-6. Sand Creek @ Hwy 4 Bypass 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	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT
2007 MPM A (@ Hwy 4 Bypass)	Date:	NA	NA	NA	NA	6/20/07	7/30/07	NA	NA	NA
	Chlorpyrifos µg/L	NA	NA	NA	NA	<0.003	NA	NA	NA	NA
	Dieldrin µg/L	NA	NA	NA	NA	<0.005	NA	NA	NA	NA
	C. dubia (% Control)	NA	NA	NA	NA	NA	100	NA	NA	NA
2008 NM (@ Hwy 4 Bypass)	Date:	1/23/08	3/18/08	4/15/08	5/13/08	6/10/08	7/15/08	8/12/08	9/16/08	NA
	Chlorpyrifos µg/L	<0.003	NA	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	NA
	Dieldrin µg/L	<0.005	NA	<0.005	<0.005	<0.005	<0.005	**0.0058**	<0.005	NA
	C. dubia (% Control)	100	NA	100	100	NA	NA	95	100	NA
	H. azteca (% Control)	NA	**0**	NA	NA	NA	NA	NA	NA	NA
2008 MPM A (@ Hwy 4 Bypass)	Date:	NA	NA	NA	5/7/08	6/3/08	7/8/08	NA	NA	NA
	Chlorpyrifos µg/L	NA	NA	NA	<0.003	<0.003	NA	NA	NA	NA
	Dieldrin µg/L	NA	NA	NA	**0.012**	<0.005	NA	NA	NA	NA
	C. dubia (% Control)	NA	NA	NA	100	100	100	NA	NA	NA
2011 MPM (@ Hwy 4 Bypass)	Date:	1/11/11	3/8/11	4/12/11	5/24/11	6/28/11	7/26/11	8/23/11	9/20/11	10/14/11
	Chlorpyrifos µg/L	NA	NA	NA	<0.003	<0.003	NA	NA	NA	NA
	Diazinon µg/L	<0.004	NA	NA	NA	NA	<0.004	NA	NA	NA
	Dieldrin µg/L	NA	NA	NA	**0.027**	<0.005	NA	<0.005	NA	NA
	Disulfoton µg/L	NA	NA	NA	<0.02	<0.02	NA	<0.02	NA	NA
	C. dubia (% Control)	NA	NA	NA	100	105	100	NA	NA	NA
	S. capricornutum (% Control)	NA	NA	262	NA	NA	NA	611	NA	NA
	H. azteca (% Control)	NA	**29**	NA	NA	NA	NA	NA	NA	**79**

A – Additional monitoring conducted in 2007 and 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

Load calculations are not relevant to the management of priority constituents in this site subwatershed.

Loads were calculated for the chlorpyrifos detections (Table XII-7) based on the following formula:

Load = Discharge (cfs) X 28.317L/ft^3 X Concentration (µg/L).

Table XII-7. Sand Creek @ Hwy 4 Bypass site subwatershed instantaneous load calculations for chlorpyrifos, diazinon, disulfoton, and dieldrin.

Sorted by analyte and date.

Site Name	Analyte Name	Sample Date	Discharge cfs	Concentration µg/L	Loading Rate µg/sec
Sand Creek @ Hwy 4 Bypass	Chlorpyrifos	05/16/06	2.96	0.089	7.46
Sand Creek @ Hwy 4 Bypass	Diazinon	07/18/06	0.47	0.45	5.99
Sand Creek @ Hwy 4 Bypass	Diazinon	01/23/08	11.48	0.11	35.76
Sand Creek @ Hwy 4 Bypass	Dieldrin	05/24/11	0	0.027	0
Sand Creek @ Hwy 4 Bypass	Disulfoton	05/13/08	0.29	0.11	0.90
Sand Creek @ Hwy 4 Bypass	Disulfoton	06/10/08	0.41	0.2	2.32
Sand Creek @ Hwy 4 Bypass	Disulfoton	08/12/08	0	0.18	0
Sand Creek @ Hwy 4 Bypass	Disulfoton	09/16/08	0.53	0.036	0.54

Source Identification and Outreach

To address source identification and determine an outreach strategy, the Coalition considers past monitoring results and associated PUR data and focuses its efforts on appropriate pesticides. During 2007 through 2008 and in 2011, the Coalition conducted MPM during the months when exceedances historically occurred. The Coalition also reviews PUR data to determine the most frequent crop type and timing associated with pesticide applications. In the case of the Sand Creek subwatershed, only a single grower was targeted for outreach. While the grower indicated that storm water leaves the field, as well as a small amount of non-turbid tailwater, the grower did not apply any of the pesticides that exceeded the WQTLs in 2011, and no PUR data for the constituents of concern were reported from 2006 through 2011 in the subwatershed. The exception was a verbal discussion with a grower who said he applied chlorpyrifos to corn, as reported in the 2008 Management Plan. Furthermore, Sand Creek subwatershed experienced explosive urban development in the last five years. It is possible that many of the water quality impairments in the Sand Creek subwatershed are a result of multiple sources including urban discharges of pyrethroids that are common in new urban developments. There were no applications of any high priority constituents in the Sand Creek subwatershed and therefore PUR data are not available to assess for the purposes of the following sections.

The Sand Creek @ Hwy 4 Bypass 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 Sand 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. The grower in Sand Creek indicated that he intended to implement

and or continue five of the six specifically recommended practices in 2012 including, reducing/eliminating the use of pesticides found in exceedance, installing sprinkler or drip irrigation systems, reducing runoff water volumes using irrigation management, and treating runoff waters with PAM (polyacrylamide) if needed. Follow up with this grower will occur in early 2013 and results will be reported in the 2013 MPUR.

Priority A/B and C Constituents

Chlorpyrifos and diazinon are both listed as priority A/B constituents for the Sand Creek subwatershed management plan. Disulfoton is listed as the priority C constituent for Sand Creek.

Chlorpyrifos/Diazinon/Disulfoton

The WQTL for chlorpyrifos (0.015 µg/L) was exceeded twice in the Sand Creek subwatershed (Table XII-5). The first exceedance occurred in May 2006 and the second in June 2006. Both chlorpyrifos exceedances were associated with toxicity to *C. dubia*. Diazinon concentrations in samples exceeded the WQTL twice in the Sand Creek subwatershed in July 2006 and January 2008. The July 2006 diazinon exceedance coincided with toxicity to *C. dubia*. None of the three disulfoton exceedances experienced in the Sand Creek subwatershed were associated with toxicity to *C. dubia* (May, June, and August 2008).

Since 2007, Coalition outreach includes 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 chlorpyrifos. From these criteria, the Coalition identified a single targeted grower.

The Coalition initiated individual meetings with the single grower during the winter of 2012. Although meetings are focused mainly on chlorpyrifos exceedances, all water quality results are reviewed and discussed including exceedances of DO, *E. coli*, SC, TDS, diazinon, dieldrin, disulfoton, DDE, DDT, *C. dubia* toxicity, *H. azteca* toxicity and *S. capricornutum* 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 has contacted one grower accounting for 116 acres of direct drainage within the Sand Creek @ Hwy 4 Bypass subwatershed. To date, the Coalition achieved 100% of initial contacts for targeted growers.

Management Plan Monitoring is scheduled to occur during months of past exceedances for 2012 through 2014 in the Sand Creek @ Hwy 4 Bypass subwatershed. These data will allow the Coalition to evaluate improvements in water quality as recommended management practice implementations occurs.

The land use within this subwatershed is predominantly urban. Therefore no PUR data are available for review concerning these high priority constituents in this subwatershed.

Priority D Constituents

The priority D constituents listed in the Sand Creek @ Hwy 4 Bypass subwatershed management plan are water column toxicity to *C. dubia* and *S. capricornutum* and sediment toxicity to *H. azteca*.

C. dubia toxicity

C. dubia toxicity occurred three times in the subwatershed in May, June and July 2006 (Table XII-5). Through analysis of associated monitoring data and TIEs, the Coalition determined that organophoshates and metabolically activated pesticides were the causes of toxicity in the subwatershed. The May 2006, *C. dubia* toxicity coincided with exceedances of chlorpyrifos, dieldrin, DDE and DDT. The June 2006, *C. dubia* toxicity coincided with exceedances of chlorpyrifos, dieldrin, DDE and DDT, and endrin. Diazinon was the only pesticide exceedance associated with the July 2006 *C. dubia* toxicity. The Coalition continues to emphasize the importance of irrigation tailwater and storm water management, which will help control the movement of organophosphate pesticides to the creek.

H. azteca toxicity

H. azteca toxicity occurred 12 times in the subwatershed from 2006 through 2008 and 2011, with four of the toxicities occurring during resampling events (Table XII-5). Sediment chemistry analyses were not performed on the 2006 through 2008 toxic samples and the exact toxic constituent and the source(s) of those toxicities are unknown. Sediment chemistry analyses were performed on the 2011 March and October MPM toxic sediment samples, and pyrethroids were detected in both sediment samples.

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 are identified in past SAMRs such as, metals, organophosphates and pyrethroids. The Coalition believes eliminating irrigation and storm water runoff to Sand Creek will address many of the potential causes of sediment toxicity in the subwatershed.

S. capricornutum toxicity

Toxicity to *S. capricornutum* occurred three times in the Sand Creek subwatershed (during April and August 2008), one of which was persistent toxicity in a resample collected one week later than the original sample (Table XII-5). The April 2008 toxicities did not coincide with any pesticide or metal exceedances, but a TIE was performed which concluded that non-polar organics were the cause of toxicity. A TIE was also performed on the August 2008 toxicity, however all toxicity was lost. The Coalition believes that reducing or eliminating the offsite movement of agricultural constituents via mismanaged irrigation and storm water will reduce *S. capricornutum* toxicity.

Priority E Constituents

The priority E constituents listed under the Sand Creek @ Hwy 4 Bypass management plan are DDE, DDT, dieldrin, DO, *E. coli*, SC and TDS. Water column toxicity to *P. promelas* is also listed as priority E constituent.

DDE exceeded the WQTL during five events (May and June 2006, July 2007, and June and August 2008), and DDT during three of the same five events (May and June 2006 and August 2008). Dieldrin exceeded the WQTL six times in the subwatershed (May and June 2006, May and August 2008, and May 2011). The 2006 May and June exceedances coincided with toxicity to *C. dubia*. Dieldrin is an organochlorine pesticide that was banned from agriculture use in the United States in 1985. Although there is no requirement to monitor for legacy pesticides, the Coalition opted to monitor for dieldrin in the Sand Creek @ Hwy 4 Bypass subwatershed in an effort to demonstrate that the constituent is no longer contributing to water quality impairments.

Dissolved oxygen exceeded the WQTL during 27 events from 2006 through 2008 and 2011. Sand Creek @ Hwy 4 Bypass was monitored for BOD during the September 2006 and (February, March, April and July) 2007 monitoring events in an attempt to better understand the DO dynamics in the waterway. None of the samples collected from Sand Creek contained measurable amounts of BOD and only one sample resulted in an exceedance of the WQTL. The study did not eliminate or confirm BOD as the cause of DO exceedances, and the contributing factors to DO exceedances remain unknown at this time.

E. coli exceeded its WQTL during 17 events since 2006. As stated in the 2008 Management Plan, it is unknown if manure is applied in the watershed, but there is a large urban input from storm drains in Sand Creek. There is also a large amount of cattle grazing that takes place upstream. *E. coli* could originate with any or all of these sources. To address *E. coli* exceedances, the Coalition plans to participate in the focus group along with other Coalitions and Regional Board staff to develop a joint Work Plan to characterize the potential agricultural sources of *E. coli* and identify management practices to prevent discharges to surface waters.

Specific conductivity (SC) and TDS are measures of salt. From 2006 through 2008 and 2011, 41 SC and 19 TDS exceedances occurred in the Sand Creek subwatershed. The 2008 Management Plan states that Sand Creek is under tidal influence and it is assumed that the SC/TDS exceedances are a result of the tidal prism moving water back into the creek. There is so little agricultural land in the Sand Creek subwatershed that it is unlikely that fertilizer applications would result in exceedances in nine different months.

The Coalition will continue to collect monitoring data for DO, SC, and TDS field parameters during each monitoring event. DDE, DDT, *E. coli*, and *P. promelas* are currently monitored only during Assessment Monitoring events and due to high urban influence and being the only site in Zone 6, Sand Creek is not scheduled for Assessment Monitoring. Until these constituents become a higher priority, the Coalition will not attempt to determine their causes. These constituents are also discussed during targeted outreach with growers and annual grower meetings.

Evaluation

Sand Creek @ Hwy 4 Bypass is one of the fourth priority site subwatersheds within the SJCDWQC 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 effectiveness of management practices (by considering changes in water quality over time).

The Coalition's strategy for the Sand Creek @ Hwy 4 Bypass 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 is targeting the grower with crops located adjacent to the waterway and whose agricultural practices may result in the discharge or drift of pesticides, specifically chlorpyrifos, 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.

Individual grower surveys documenting current management practice implementations and assessing future planned implementations will be completed by the end of October 2012. The Coalition will then assess 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. Complete summary of current and 'to be implemented' management practices will be in the 2013 MPUR.

In 2012, MPM is scheduled for months of historical, high priority exceedances. Monitoring will occur for chlorpyrifos (May and June), diazinon (January and July), disulfoton (May, June and August), *C. dubia* toxicity (May, June and July), *H. azteca* sediment toxicity (March and September), *S. capricornutum* toxicity (April and August) and dieldrin (May, June and August).