

Central Valley Regional Water Quality Control Board

11 July 2016

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APPROVAL OF MANAGEMENT PLAN COMPLETION FOR SELECT SITE/CONSTITUENT PAIRS FOR THE SACRAMENTO VALLEY WATER QUALITY COALITION

Thank you for your submittal of management plan completion requests for seven (7) site/constituent pairs in the Sacramento Valley Water Quality Coalition (Coalition) area. The requests included:

- (1) Diuron and *Selenastrum capricornutum* (*S. capricornutum*) in Willow Slough Bypass at Pole Line Road (10 December 2015);
- (2) Chlorpyrifos and *Ceriodaphnia dubia* (*C. dubia*) in Willow Slough Bypass at Pole Line Road (15 December 2015);
- (3) Diuron and *S. capricornutum* in Ulatis Creek at Brown Road (19 January 2016); and
- (4) Diazinon in Gilsizer Slough at George Washington Boulevard (19 January 2016).

The Coalition has implemented management plans according to requirements in the Waste Discharge Requirements General Order R5-2014-0030-R1 for Growers within the Sacramento River Watershed that are Members of a Third-party Group (Order). The conditions for requesting completion of a Management Plan outlined in the Order apply (Attachment B, Appendix MRP-1, Section III).

Based on the information provided in the request letters and in the enclosed staff review, I approve management plan completion for four (4) of the seven requests, including *S. capricornutum* and chlorpyrifos in Willow Slough Bypass at Pole Line Road, and diuron and *S. capricornutum* in Ulatis Creek at Brown Road. The Coalition should continue to collect and analyze samples from Willow Slough Bypass at Pole Line Road and Ulatis Creek at Brown Road, both Coalition Representative monitoring sites, according to the regular monitoring schedule.

Additional analytical results that show no exceedances in the months of past exceedances are needed before completion of the management plans for diuron and *C. dubia* in Willow Slough Bypass at Pole Line Road, and diazinon in Gilsizer Slough at George Washington Boulevard can be considered for approval. The respective months and number of sampling events still needed are identified in the attached memorandum.

If you have any questions or comments regarding this approval letter, please contact Ashley Peters by phone at (916) 464-4857, or by email at Ashley.Peters@waterboards.ca.gov or Lynn Coster at (530) 224-2437 or by email at Lynn.Coster@waterboards.ca.gov.

Original signed by

Pamela C. Creedon
Executive Officer

Enclosure: REVIEW OF MANAGEMENT PLAN COMPLETION REQUESTS FOR SEVEN
SITE/CONSTITUENT PAIRS FOR THE SACRAMENTO VALLEY WATER
QUALITY COALITION

cc: Bruce Houdesheldt, Northern California Water Association
Claus Suverkropp, Larry Walker Associates
Lynn Coster, Central Valley Water Board, Redding



Central Valley Regional Water Quality Control Board

TO: Susan Fregien
Senior Environmental Scientist
IRRIGATED LANDS REGULATORY PROGRAM

FROM: Ashley Peters
Water Resource Control Engineer
IRRIGATED LANDS REGULATORY PROGRAM

DATE: 22 June 2016

SUBJECT: REVIEW OF MANAGEMENT PLAN COMPLETION REQUESTS FOR SEVEN SITE/CONSTITUENT PAIRS FOR THE SACRAMENTO VALLEY WATER QUALITY COALITION

The Sacramento Valley Water Quality Coalition (Coalition) is required to implement management plans for constituents that exceed water quality objectives at the same site two or more times in a three-year period (Order R5-2014-0030-R1). The Coalition has submitted requests to approve completion of the management plans for seven (7) site/constituent pairs:

- (1) Diuron and *Selenastrum capricornutum* (*S. capricornutum*) in Willow Slough Bypass at Pole Line Road (10 December 2015);
- (2) Chlorpyrifos and *Ceriodaphnia dubia* (*C. dubia*) in Willow Slough Bypass at Pole Line Road (15 December 2015);
- (3) Diuron and *S. capricornutum* in Ulatis Creek at Brown Road (19 January 2016); and
- (4) Diazinon in Gilsizer Slough at George Washington Boulevard (19 January 2016).

The requests are based upon the Coalition's findings that the drainages represented by each monitoring location are meeting the water quality objective for the respective constituent(s). Extensive outreach efforts implemented in each subwatershed are also documented in each request. For the toxicity indicator species, information is presented in support of completion of the toxicity management plans, although their completion is not specifically requested. Staff confirmed that the Coalition intended to request management plan completion for the toxicity indicator species discussed in the requests.

Based on the requirements in Order R5-2014-0030-R1, management plans may be completed in one of two ways: irrigated agriculture is demonstrated not to be causing or contributing to the water quality problem, or the improved management practices have resolved the water quality problem and the water quality data show at least three years of compliance.

(1) Diuron and *S. capricornutum* in Willow Slough Bypass at Pole Line Road:

Monitoring data. The management plan for diuron in Willow Slough Bypass at Pole Line Road was triggered by exceedances of the water quality objective in April and December 2007 (Figure 1). Additional exceedances were observed in January and April 2008 and

January 2010. Toxicity to *S. capricornutum* was observed in April 2007, January 2008, and February 2009 (Figure 2). Pesticide analyses were not conducted at the time of the February 2009 toxicity exceedance. The detected concentrations of diuron in April 2007 (3.7 µg/L) and January 2008 (3.7 µg/L) were sufficient to account for the reduced *S. capricornutum* survival for those samples.

There have been no exceedances of diuron in 16 sampling events conducted since the last exceedance in January 2010. However, only one monitoring event was conducted during the month of April; therefore, two more years of compliance monitoring are needed before completion can be considered. Three years of sampling for *S. capricornutum* toxicity in Willow Slough Bypass at Pole Line Road has been completed in every month that exceedances previously occurred, with no further issues.

Potential sources. The 2010 *Source Evaluation Report: Selenastrum Toxicity in Willow Slough* concluded that agriculture was the likely source of the diuron exceedances in December 2007, January 2008, and January 2010. It concluded that agriculture was not the likely source of the diuron exceedances in April 2007 and April 2008. The primary use of diuron in the drainage is on alfalfa, grapes, and walnut orchards from December through February of each year.

Based on a review of Pesticide Use Report (PUR) data from the California Department of Pesticide Regulation (DPR), the two exceedances for diuron that occurred in April 2007 and April 2008 did not coincide with peak agricultural applications of diuron. The amount of diuron applied in November through April of the 2007 and 2008 monitoring years are shown in Table 1. Diuron applications for agriculture generally occur from December through February. However, based on environmental fate data, diuron is considered both mobile and persistent and has been measured in runoff four months after application.¹ Therefore, it cannot be concluded that agricultural usage of diuron did not contribute to the exceedances measured in April 2007 and April 2008.

Only one year of sampling for diuron in Willow Slough Bypass at Pole Line Road was conducted in April following the April 2008 exceedance. Although PUR data shows that agricultural use of diuron is less than non-agricultural use in March 2007 and 2008 and April 2008, cumulative agricultural use from December through April is several times greater than non-agricultural use. Given diuron's environmental persistence and mobility for many months, agriculture cannot be ruled out as a contributing source of the April exceedances.

Third-party outreach and management practice implementation. The Coalition identified 28 individual high-priority parcels with the highest potential to contribute to the observed exceedances in the Willow Slough drainage, and growers were surveyed in 2009 regarding current and planned management practice implementation. The focus of the outreach was on the method of diuron applications and irrigation management and drainage practices implemented to minimize discharge of pesticides in irrigation and stormwater runoff.

The Yolo County Farm Bureau Education Corporation, Yolo County Agricultural Commissioner, and the University of California Cooperative Extension Farm Advisor

¹ Moncada, Adriana. 2004. Environmental Fate of Diuron. Environmental Monitoring Branch, Department of Pesticide Regulation.

conducted extensive outreach and education throughout Yolo County. Spray Safe program workshops were held annually from 2010 through 2015 with typical attendance rates of 300 plus attendees. New and past diuron users were also informed of the potential risks of diuron applications and available management practices when applying for pesticide application permits in 2012 through 2015.

Several management practices have been implemented as a result of increased grower awareness. Practices, quantified by grower percentage, such as level vegetated ground (all alfalfa) (>54.4%), cover crops (in orchards) (52.3%), vegetated drainage ditches (38.9%), and post-application runoff directed through filtering vegetation (26.7%) have the highest implementation rates in the represented area. In 2015 Farm Evaluation Surveys, over 96% of growers reported the implementation of one or more practice(s) to reduce the potential for runoff or sediment discharges. See Table 2 for implemented practices by acreage.

The lack of diuron and *S. capricornutum* exceedances during winter application periods is likely due to substantial reductions in agricultural applications of diuron (Figure 1), as well as changes in practices. Staff recommends management plan completion approval for *S. capricornutum*. However, an additional two years of monitoring during April without further diuron exceedances is needed before management plan completion for diuron can be recommended for approval.

(2) Chlorpyrifos and *C. dubia* in Willow Slough Bypass at Pole Line Road:

Monitoring data. The management plan for chlorpyrifos in Willow Slough Bypass at Pole Line Road was triggered by exceedances of the water quality objective in April and August 2007 (Figure 3). Additional exceedances were observed in September 2007 and March and August 2010. The *C. dubia* management plan in Willow Slough Bypass was triggered by toxicity exceedances in April and December 2007, with an additional exceedance occurring in July 2011 (Figure 4).

There have been no exceedances for chlorpyrifos in the 27 sampling events conducted since the last exceedance in August 2010. Three years of chlorpyrifos sampling has been completed in every month that exceedances previously occurred with no further issues. No *C. dubia* exceedances have been observed in three years of monitoring conducted during April and July since the July 2011 exceedance. However, no follow-up sampling for *C. dubia* toxicity has been conducted in December.

Potential sources. The 2010 *Source Evaluation Report: Chlorpyrifos in Willow Slough* concluded that agriculture was the probable source of the chlorpyrifos exceedances observed from 2007 through 2010. Non-production agricultural uses of chlorpyrifos are extremely limited. DPR PUR data has shown a decreasing trend in chlorpyrifos use in Yolo County for irrigated agriculture since 2007 when chlorpyrifos was established as a restricted material (Figure 3). The April 2007 *C. dubia* toxicity event was coincident with the April 2007 chlorpyrifos exceedance, suggesting that the pesticide caused or contributed to the toxicity. A Toxicity Identification Evaluation (TIE) was conducted to determine the source of the December 2007 *C. dubia* toxicity, but the results were inconclusive and chlorpyrifos was not detected in the sample. TIE results for the toxicity exceedance in July 2011 were also inconclusive.

Third-party outreach and management practice implementation. The Coalition identified 28 individual high-priority parcels in the Willow Slough drainage, and growers were

surveyed in 2009 regarding current and planned management practice implementation. Farm Evaluation Surveys were completed in March 2015 for evaluation of implemented management practices including irrigation, pesticide, and sediment management practices relevant to the subwatershed's internal management goals for chlorpyrifos.

The Yolo County Farm Bureau Education Corporation and Yolo County Agricultural Commissioner conducted extensive outreach and education throughout Yolo County. Spray Safe program workshops were held annually from 2010 through 2015 with typical attendance rates of 300 plus attendees. New and past chlorpyrifos users were also informed of the potential risks of chlorpyrifos applications and available management practices when applying for pesticide application permits in 2012 through 2015.

Several management practices have been implemented as a result of increased grower awareness. Practices such as observing wind conditions, applying chlorpyrifos a minimum of 72 hours prior to irrigation or precipitation, and skipping applications when the soil is fully saturated are considerations made by 100% of growers permitted to use chlorpyrifos in the represented drainage. These planning practices have been implemented to reduce the potential for runoff and drift. See Table 2 for implemented practices by acreage. The lack of chlorpyrifos and *C. dubia* toxicity (in April and July) exceedances related to agricultural uses is likely due to changes in practices.

Based on monitoring data, outreach and education, and management practice implementation, staff recommends approval of the Willow Slough chlorpyrifos management plan. Staff also recommends a minimum of three years of *C. dubia* monitoring in December at Willow Slough Bypass without further toxicity exceedances be conducted before management plan completion can be recommended for approval.

(3) Diuron and *S. capricornutum* in Ulatis Creek at Brown Road:

Monitoring data. The management plan for diuron in Ulatis Creek at Brown Road was triggered by exceedances of the water quality objective in February and December 2007 (Figure 5). Additional exceedances were observed in subsequent samples collected in January of 2008, 2010, and 2012 and February 2009. Toxicity to *S. capricornutum* was also observed during seven sampling events (Figure 6). The detected concentrations of diuron in five of the six samples exceeding the water quality objective were sufficient to account for the observed toxicity to *S. capricornutum*.

There have been no exceedances for diuron or *S. capricornutum* toxicity in Ulatis Creek since the last exceedances occurred in January 2012. Three years of monitoring during the months of past exceedances has been conducted with no further issues.

Potential sources. The 2010 *Source Evaluation Report: Selenastrum Toxicity in Ulatis Creek* concluded that agriculture was a potential contributing source of toxicity to *S. capricornutum* due to elevated diuron. Diuron use on alfalfa accounts for the largest application of the herbicide, relative to the exceedances.

Based on a review of PUR data from DPR, use of diuron for agriculture in Solano County has seen a decreasing trend since 2009 and for all other uses since 2007. Agricultural use of diuron generally occurs from December through February. Stormwater runoff and drift are the primary pathways of transport of diuron to surface waters.

Third-party outreach and management practice implementation. The Coalition identified 19 individual high-priority parcels in the Ulatis Creek drainage, and growers were surveyed in 2009 regarding current and planned management practice implementation. Based on the results of the survey, it was concluded that most growers (99.9%) are implementing best management practices.

Spray Safe program workshops were held in 2010 and 2011. The Dixon Solano Water Quality Coalition has also given many presentations on local pesticide exceedances, recommended management practices, sent newsletters, provided training, and made phone calls to educate growers in the area. A Farm Evaluation survey was completed in March 2015 and confirmed high levels of awareness of issues related to pesticide exceedances and implementation of management practices.

Several management practices have been implemented as a result of increased grower awareness. Nearly all of the growers applying diuron in the drainage have implemented one or more additional management practices, quantified by grower percentage, in the represented drainage including consideration of soil saturation and precipitation prior to application (80.1%), application to level vegetated ground (>90.7%), and direct post-application runoff through vegetated drain ditches (33.8%) and vegetative filter strips and buffers (11.7%). See Table 2 for implemented practices by acreage. The lack of diuron and *S. capricornutum* exceedances related to agriculture in the last three years is likely due to changing practices.

Based on monitoring data, outreach and education, and management practice implementation, staff recommends approval of the Ulatis Creek diuron and *S. capricornutum* management plans.

(4) Diazinon in Gilsizer Slough at George Washington Boulevard:

Monitoring data. The management plan for diazinon in Gilsizer Slough at George Washington Boulevard was triggered by exceedances of the water quality objective in February 2006 and 2007 (Figure 7). Additional exceedances were observed in January 2009 and February 2011.

There have been no exceedances of diazinon in the 25 sample events conducted since the last exceedance in February 2011. Five years of sampling in January and two years of sampling in February have been conducted since the last exceedance occurred in each month. The Coalition routinely conducts sampling for diazinon in Gilsizer Slough during the three months of peak usage as identified in DPR PUR data. PUR data from 2010-2012 presented in the Coalition's 2015 Monitoring Plan Update listed the top three usage months for diazinon as January (69%), April (9%), and May (10%). However, the Order requires a minimum of three years monitoring data without further exceedances during the times of year when previous exceedances occurred. One more year of monitoring during February without exceedances is needed.

Potential sources. The 2010 *Source Evaluation Report: Diazinon in Gilsizer Slough* concluded that agriculture is a potential source of elevated diazinon concentrations observed in the Gilsizer drainage. Diazinon is most extensively used on peaches and prunes during the time of year when the exceedances were observed. Walnuts and tomatoes are also treated with diazinon, but predominately in April and May.

Based on a review of the DPR PUR data, diazinon use in both the Gilsizer Slough drainage and Sutter County has shown a decreasing trend for agriculture since 2003/2004. Applications on peaches and prunes in January and February are the use most likely associated with the exceedances. Stormwater runoff and pesticide drift are the primary pathways of transport of diazinon to surface waters.

Third-party outreach and management practice implementation. The Coalition identified 13 individual high-priority parcels representing the acreage with the highest potential to contribute to the diazinon exceedances, and growers were surveyed in 2009 regarding current and planned management practice implementation. The focus of the outreach was on the method of diazinon applications and irrigation management and drainage practices implemented to minimize discharge of pesticides in irrigation and stormwater runoff. The survey results showed that awareness of pesticide management practices were universally high and most growers had implemented at least one relevant irrigation management or drainage practice.

Spray Safe program workshops were held annually from 2012 through 2014. The Butte-Yuba-Sutter Water Quality Coalition held multiple meetings to inform growers of the management plans in Sutter County, interviewed growers to assess management practice implementation, and irrigation water management workshops have been provided by Sutter County Resource Conservation District.

Several additional management practices have been implemented as a result of increased grower awareness. Practices, quantified by grower percentage, such as direction of runoff to settling ponds (15.8%), sediment basins (15.8%), and return systems (7.9%); and use of cover crops (36.0%), vegetated filter strips (25.2%), and vegetated drainage ditches (44.2%) have been implemented by over 90 percent of growers. See Table 2 for implemented practices by acreage. All of the Coalition members growing peaches and prunes have been contacted and informed of management practice implementation goals and surveyed for general awareness and progress toward implementation and implementation of additional practices continues to be pursued as part of the Management Plan for chlorpyrifos (in progress) in the drainage.

The lack of diazinon exceedances related to agriculture in recent years is likely due to the changes in practices. However, to meet Order requirements, staff recommends an additional year of diazinon monitoring during February without an exceedance be conducted before management plan completion can be recommended for approval.

Summary of Staff Recommendations:

Staff recommendations for management plan completion or continuance are summarized in Table 3. A total of two years of sampling in April for diuron in Willow Slough Bypass, three years of sampling in December for *C. dubia* toxicity in Willow Slough Bypass, and one year of sampling in February for diazinon in Gilsizer Slough are still needed before these management plans can be recommended for completion. Monitoring must be conducted during the times of the year when previous exceedances occurred as well as during peak use periods.

Tables**Table 1.** PUR Data for Diuron in Yolo County

Application Month	Diuron Applied (lbs.)	
	Agriculture	Non-Agriculture
November 2006	692	663
December 2006	7,374	640
January 2007	10,399	520
February 2007	728	482
March 2007	380	1,171
April 2007	38	22
November 2007	306	14
December 2007	3,113	0
January 2008	4,398	201
February 2008	5,526	194
March 2008	30	168
April 2008	0	51

Table 2. Implemented Management Practices by Acreage

Site/Constituent	Diuron in Willow Slough¹ (218,129 total acres)	Chlorpyrifos in Willow Slough¹ (218,129 total acres)	Diuron in Ulatis Creek¹ (122,735 total acres)	Diazinon in Gilsizer Slough¹ (8,897 total acres)
Practice Category				
Pesticide Application Practices ²	196,055	196,055	108,178	8,301
Irrigation Practices ³	87,870	87,870	62,981	4,527
Nitrogen Management Methods to Minimize Leaching Past the Root Zone ⁴	159,252	159,252	84,829	6,982
Irrigation Practices for Managing Sediment and Erosion ⁵	125,378	125,378	76,669	6,204
Cultural Practices to Manage Sediment and Erosion ⁶	138,603	138,603	83,883	5,298

Notes:

1. Acreage reported is the acreage with at least one management practice implemented per practice category.
2. E.g., practices such as monitor wind conditions, attend trainings, use drift control agents.
3. E.g., drip, furrow, flood.
4. E.g., split fertilizer applications, soil testing, cover crops.
5. E.g., tail water return system, catchment basin, pesticide and irrigation timing coordination.
6. E.g., minimum tillage, cover crops or native vegetation used to reduce erosion.

Table 3. Summary of Management Plans Recommended for Completion

Management Plan	Criteria Met?	Comments
Diuron in Willow Slough Bypass	N	Sampling needed: 2 years in April.
<i>S. Capricornutum</i> in Willow Slough Bypass	✓	
Chlorpyrifos in Willow Slough Bypass	✓	
<i>C. Dubia</i> in Willow Slough Bypass	N	Sampling needed: 3 years in December.
Diuron in Ulatis Creek	✓	
<i>S. Capricornutum</i> in Ulatis Creek	✓	
Diazinon in Gilsizer Slough	N	Sampling needed: 3 rd year in February.

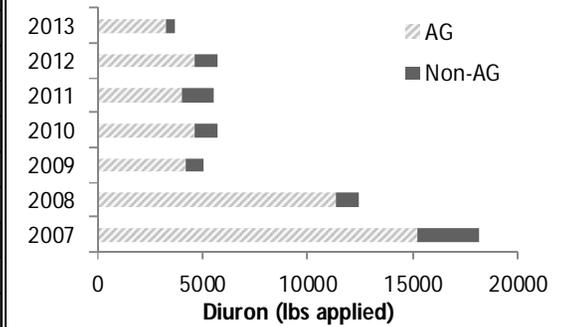
Figures

Figure 1. Diuron in Willow Slough Bypass at Pole Line Road

Monitoring Results

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2015												
2014												
2013												
2012												
2011												
2010	9.5											
2009												
2008	3.7			5.8								
2007				3.7								4.7
2006												
2005												
2004												

Yolo County PUR Data



Legend

not sampled
 no exceedance
 exceedance (µg/L)

Note: Bold values represent exceedance concentrations (ug/L)

Figure 2. *S. capricornutum* toxicity in Willow Slough Bypass at Pole Line Road

Monitoring Results

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2015												
2014												
2013												
2012												
2011												
2010												
2009		52.9										
2008	54.1											
2007				76.4								
2006												
2005												
2004												

Legend

not sampled
 no exceedance
 exceedance

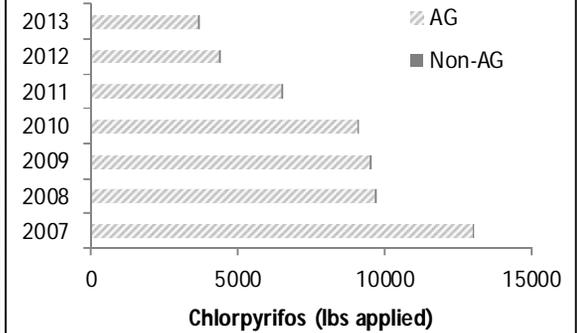
Note: Bold values represent toxicity exceedances (% survival)

Figure 3. Chlorpyrifos in Willow Slough Bypass at Pole Line Road

Monitoring Results

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2015												
2014												
2013												
2012												
2011												
2010			0.1521					0.0471				
2009												
2008												
2007				0.083				0.023	0.016			
2006												
2005												
2004												

Yolo County PUR Data



Legend

not sampled
 no exceedance
 exceedance (µg/L)

Note: Bold values represent exceedance concentrations (ug/L)

Figure 4. *C. dubia* toxicity in Willow Slough Bypass at Pole Line Road

Monitoring Results

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2015												
2014												
2013												
2012												
2011							0					
2010												
2009												
2008												
2007				0								40
2006												
2005												
2004												

Legend

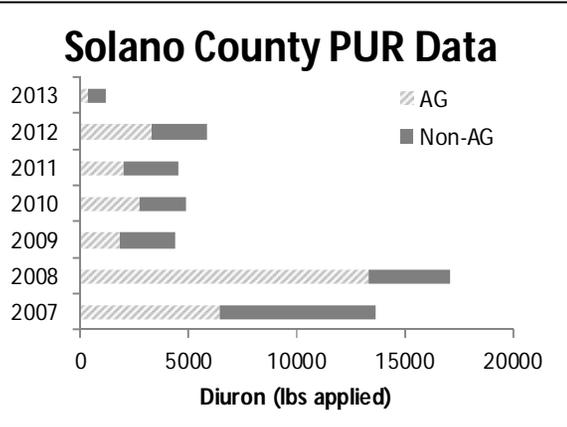
not sampled
 no exceedance
 exceedance (µg/L)

Note: Bold values represent toxicity exceedances (% survival)

Figure 5. Diuron in Ulatis Creek at Brown Road

Monitoring Results

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2015												
2014												
2013												
2012	8.1											
2011												
2010	2.3											
2009		8.8										
2008	3.5											
2007		15										12
2006												
2005												
2004												



Legend

not sampled no exceedance exceedance (µg/L)

Note: Bold values represent exceedance concentrations (ug/L)

Figure 6. *S. capricornutum* toxicity in Ulatis Creek at Brown Road

Monitoring Results

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2015												
2014												
2013												
2012	49.6											
2011												
2010												
2009		57										
2008	88.8			55								
2007		67.7										75
2006		63.4										
2005												
2004												

Legend

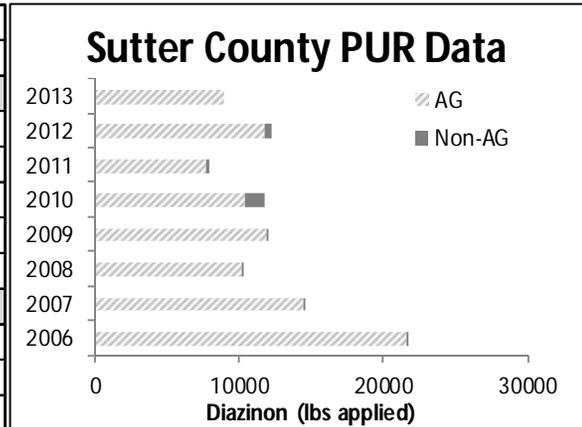
not sampled no exceedance 5.5 exceedance (µg/L)

Note: Bold values represent toxicity exceedances (% survival)

Figure 7. Diazinon in Gilsizer Slough at George Washington Boulevard

Monitoring Results

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2015												
2014												
2013												
2012												
2011		0.1352										
2010												
2009	0.6007											
2008												
2007		0.101										
2006		0.154										
2005												
2004												



Legend

not sampled
 no exceedance
 exceedance (µg/L)

Note: Bold values represent exceedance concentrations (ug/L)