



January 19, 2016

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Central Valley Regional Water Quality Control Board
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The Sacramento Valley Water Quality Coalition (SVWQC or Coalition) and the Dixon/Solano Subwatershed respectfully request your determination that the diuron Management Plan for Ulatis Creek be deemed complete. The primary basis for this request is that Ulatis Creek has been determined to meet the water quality objectives (WQOs) for diuron. Additional factors supporting the request include the extensive outreach conducted with members and non-member agencies in the subwatershed and county and focused in the represented drainage area to further augment and expand implementation of management practices to manage discharges of diuron and other agricultural pesticides.

BACKGROUND FOR MANAGEMENT PLAN REQUIREMENT

The Ulatis Creek monitoring location at Brown Road (UCBRD) is in the Cache Slough drainage and is a representative monitoring site for SVWQC. The Cache Slough drainage is 228,993 acres, approximately 136,900 irrigated acres (non-rice), and currently represents a total of 312,892 acres in the Solano subwatershed, including Putah Creek South, Sacramento River – Solano, and SW Yolo Bypass. The Management Plan requirement for diuron was originally triggered by exceedances observed in February and December of 2007, with subsequent exceedances observed in January 2008, February 2009, January 2010, and January 2012.

DATA AND EXCEEDANCES

Relevant monitoring data for diuron are provided in **Table 1**. The monitoring results indicate the following:

- A total of 37 sample events have been conducted for diuron in Ulatis Creek. There have been *six* (6) exceedances of the diuron trigger limit, with the last observed in January 2012 (see **Table 1**).
- A total of 47 sample events have been conducted for *Selenastrum* toxicity in Ulatis Creek. There have been *seven* (7) exceedances of the toxicity trigger limit, with the last observed in observed in January 2012 (see **Table 1**). Six of these exceedances were determined to be caused by elevated diuron, while the water quality sample from February 2006 that showed toxicity exceedance did not include an analysis of diuron.
- There have been 10 diuron sample events conducted in the last 3 years with no exceedances since January 2012.
- There have been 17 *Selenastrum* sample events conducted over the last 6 years with no exceedances since January 2012.

Evaluations of the six observed diuron exceedances (based on a 2.0 µg/L USEPA Health Advisory Level) and reported agricultural and non-agricultural pesticide applications indicate that both agricultural and non-

agricultural applications were a contributing source of the observed diuron exceedances. The detected diuron concentrations in five out of six water quality samples exceeding the diuron trigger limit were sufficient to explain the observed toxicity to *Selenastrum* (based on an EC50 for *Selenastrum* of 2.4 µg/L taken from the USEPA ECOTOX Database), and occurred during the time that (or shortly thereafter) diuron applications were made in the Cache Slough drainage. The January 2010 exceedance of the diuron trigger limit had a detected concentration of 2.3 µg/L which is very close to the EC50 for *Selenastrum* of 2.4 µg/L. However, no toxicity analysis was performed on this water quality sample.

Because agricultural and non-agricultural diuron applications were reported in the Cache Slough drainage in the months during and prior to the sampling, it is likely that both types of application of the herbicide caused or contributed to the observed exceedances. During 2005 – 2007, reported non-agricultural uses of diuron were approximately equal to total agricultural uses of diuron in Solano County. During the same time period, approximately 87% of the reported non-agricultural uses occurred from November through February. Approximately 92% of the reported agricultural uses occurred from December through February, with about half of the applications occurring in January. All six of the observed diuron exceedances occurred during periods affected by wet weather. Generally, applications during storm season have a great potential to cause exceedances. This risk is particularly high for diuron because applications are commonly tied to occur just before rain events. The timing of rain events and applications to alfalfa and rights of way (the most common non-agricultural use of diuron) appears likely to have contributed to the elevated diuron and toxicity exceedances observed in the months of December through February. The toxicity exceedance observed in April 2008 occurred when diuron applications to walnuts and rights of way are common. It should be noted that the timing of exceedances indicates that irrigation tailwater runoff was probably not a contributing factor.

Overall, these monitoring data indicate that diuron is (1) currently meeting water quality objectives, (2) is no longer a chronic problem in Cache Slough, and (3) that agricultural management practices in the Cache Slough drainage and larger represented area are already adequate to prevent exceedances of the ILRP Trigger Limit for diuron and potential contributions to *Selenastrum* toxicity (see Table 2). To this end, we concluded that the practices that growers and applicators are implementing are sufficient.

SUMMARY OF EVALUATIONS SUPPORTING REQUEST

The following evaluations and factors support this request:

Assessment of Compliance with Water Quality Objectives	<ul style="list-style-type: none"> All detected concentrations of diuron since January 2012 have been in compliance with the 2.0 µg/L USEPA Health Advisory Level (A total of 10 diuron analyses were performed over the past 3 years, with no exceedances).
Lack of agricultural contribution to exceedances	<ul style="list-style-type: none"> Since January 2012, no agricultural applications of diuron reported in the Cache Slough drainage have resulted in the observance of diuron exceedances.
Lack of agricultural contribution to toxicity	<ul style="list-style-type: none"> Since January 2012, only 2 detected diuron concentrations were observed in 9 sample events and both were well below concentrations known to cause or substantially contribute to toxicity in sensitive species. Diuron analyses since January 2012 were associated with 8 toxicity analyses performed for the Cache Slough drainage over the past 3 years with no observed toxicity.
Outreach and Education	<ul style="list-style-type: none"> Extensively conducted to increase awareness of issues for this Management Plan and the chlorpyrifos Management Plan in the Ulatis Creek drainage. Included outreach to non-member agencies applying diuron in the

	County (County, Irrigation Districts, and CALTRANS) to educate and reduce potential for non-agricultural discharges.
Implemented Practices	<ul style="list-style-type: none"> • Adequate to prevent diuron exceedances (based on monitoring results, survey results, and use patterns). • There has been reduced use of Diuron and increased use of alternative products for alfalfa (fall/winter) weed control. • Pest control applicators and advisors have attended targeted applicator trainings through Agricultural Commissioner's Office. • Where agricultural use has continued, recommendations of no applications to saturated soil (at field capacity) or just prior to rain events with predicted runoff or filtering of post-treatment runoff have continued.

SOURCE EVALUATIONS

An evaluation of potential sources contributing to diuron exceedances in the Ulatis Creek drainage was completed in 2010¹. The source evaluation assessed the diuron applications by agriculture, which crops applied diuron prior to exceedances, irrigation patterns and methods, and environmental conditions relevant to potential discharges of diuron, and potential non-agricultural sources of diuron. The source evaluation included analysis of pesticide use reporting (PUR) data from the California Department of Pesticide Regulation (CDPR) and the Solano County Agriculture Department. Conclusions of the source evaluations included:

- Based on evaluations of reported pesticide applications and predominant crops in the drainage, agriculture is a potential contributing source the observed toxicity exceedances associated with elevated diuron.
- Diuron was determined to cause or contribute to the toxicity of six of the seven cases of observed toxicity. The February 2006 case of toxicity was not associated with an analysis of diuron in the water quality sample showing toxicity. Based on these results, diuron should be the focus of surveys and outreach for the *Selenastrum* toxicity Management Plan for Ulatis Creek.
- Diuron use on alfalfa appears to account for the largest proportion of the agricultural applications of the herbicide relevant to the observed exceedances. This crop should be the priority for surveys and outreach. Other crops using diuron in Solano County include walnuts, grapes, apples, and pears. Common non-agricultural uses include rights of way, landscape maintenance, structural pest control, and ditch bank.
- Non-agricultural uses of diuron for rights of way also have a high potential to have caused or contributed to some or all of the observed exceedances. Urban and rural residential acreage also represents a potentially significant non-agricultural source of diuron in the drainage. The Central Valley Water Board should consider these sources for outreach and management.

Based on evaluations of reported pesticide applications and predominant crops in the drainage, agriculture is likely a contributing source of some of the observed toxicity exceedances associated with elevated diuron during the period 2006 – 2012.

Based on a review of currently available pesticide use information in Solano County for 1999 – 2013, the use of diuron has shown a decreasing trend in the County for irrigated agriculture since 2009 and for all other uses (primarily for weed control in rights of way) since 2007 (see **Figure 1**). Use of diuron on alfalfa and walnut

¹ *Source Evaluation Report: Selenastrum Toxicity in Ulatis Creek*. Sacramento Valley Water Quality Coalition. March 2010

orchards during December through February remains the primary use of the herbicide in the County. The primary pathways of transport in agricultural applications are storm runoff discharges and drift from applications, and managing these has been the focus of outreach to control diuron exceedances.

OUTREACH AND EDUCATION

Outreach and education efforts are not specifically cited as a basis for this request. However, growers in the subwatershed have been made aware of the Diuron Management Plan, the consequences of any detections of diuron, transport and transfer pathways, and recommended management practices. In addition to direct communication with all 2008-2012 registered users of diuron, the Dixon and Solano Resource Conservation Districts (RCD), Dixon/Solano RCD Water Quality Coalition (DSWQC), Solano County Farm Bureau, USDA Natural Resources Conservation Service, University of CA Cooperative Extension and Solano County Agricultural Commissioner's office have continued to include information on the water quality risks, recommended practices, and the special circumstances regarding regulation of diuron detections in their outreach activities. Outreach specific to the Diuron Management Plan was conducted in tandem with outreach for the subwatershed's internal management goals for chlorpyrifos for the represented drainages. The combined outreach for these Management Plans has reached all of the Dixon/Solano subwatershed membership (currently 620 members) by newsletter, as well as the continued direct telephone contacts with all diuron users in the represented drainages and pre-season alerts to pest-control advisors and potential diuron users. Increased awareness by the growers and applicators has contributed to changes in practices and reduced diuron discharges from agriculture and non-agricultural users, as evidenced by the lack of diuron and *Selenastrum* toxicity exceedances since January 2012.

Relevant Outreach & Education Conducted from 2009 – 2015

- 2008 – Dixon and Solano RCDs provided a 30-minute review of specific water quality monitoring results and program requirements to Solano growers at the Ag Commissioner's Pesticide Application training in December.
- 2009 – Dixon and Solano RCDs sent Annual Newsletter to 675 Coalition members.
- 2009 – Dixon Solano Water Quality Coalition (DSWQC) provided BMP survey to Coalition members in December.
- 2009 – Solano County Department of Agriculture provided presentation on ILRP updates in December.
- 2010 – Spray Safe program workshop provided to 225 attendees by Yolo and Solano County Farm Bureaus and Yolo and Solano County Agricultural Commissioner's offices in June.
- 2010 – Yolo and Solano County Farm Bureaus, Yolo and Solano County Agricultural Commissioner's offices, and DSWQC provided presentation on local pesticide exceedances and recommendations in June.
- 2010 – Solano County Agricultural Commissioner's office lead presentations on two dates (10 attendees in total; including Caltrans representatives) to discuss diuron exceedances and recommended management practices for rights-of-way applications in December.
- 2010 – DSWQC lead presentation with 35 members to discuss monitoring results and program requirements for Solano County growers in December.
- 2011 – DSWQC lead three presentations on monitoring results and program requirements (154 attendees in total) in January.
- 2011 – Spray Safe program workshop provided to 350 attendees by Yolo and Solano County Farm Bureaus, Yolo and Solano County Agricultural Commissioner's offices, and DSWQC in February.
- 2011 – DSWQC distributed newsletter on long-term ILRP changes to 587 members in May.

- 2011 – DSWQC distributed Annual Newsletter to 581 members in October.
- 2011 – DSWQC made direct phone contact, followed by the mailing of informational packets, to discuss diuron and malathion exceedances with all (36) registered ag users in November.
- 2011 – DSWQC and Solano County Agriculture Department lead two training sessions (81 attendees in total) on pesticide use and water protection for PCA/CAAs in December.
- 2012 – DSWQC and Solano County Agriculture Department lead a training session to 42 attendees on pesticide use and water protection for PCA/CAAs in January.
- 2012 – Solano Irrigation District lead three furrow irrigation workshops for foremen and irrigators (including Spanish language presentations) to 27 attendees in April.
- 2012 – DSWQC distributed flyer to 63 growers and 33 PCAs focusing on pre-season of diuron use water quality reminders in November.
- 2013 – DSWQC distributed General Insecticide Issues Flyer to 120 members in February.
- 2013 – DSWQC made direct phone contact with 45 members to complete baseline management practices survey in February and March.
- 2013 – DSWQC lead two Solano Agricultural Commissioner Pesticide Applicator Trainings in November (34 attendees) and December (35 attendees).
- 2014 – DSWQC lead Solano Agricultural Commissioner Pesticide Applicator Training to 35 attendees in January.
- 2014 – DSWQC and Solano County Farm Bureau distributed monthly e-newsletter with water quality update to 290 members in August.
- 2015 DSWQC held two PCA Informational Meetings for a total of 25 (PCAs), a training for 10 tenants with large acreages and presented at two Solano County Ag Commissioner Applicator Trainings (total of 68 pesticide applicators). All of these outreach events included information on pesticide monitoring results, recommended practices including information specific to Diuron.
- Annually – Review pesticide use reports annually to incorporate any new users of diuron into the direct outreach efforts described above.
- Annually – Continue ongoing education efforts for other potential diuron uses in the Solano County Coalition.

SURVEYS

The degree to which management practices are implemented in the drainage was initially evaluated through surveys of selected high priority growers along Ulatis Creek in 2009, and a report² summarizing these results was prepared and submitted to the Water Board in 2011. Nineteen individual high-priority parcels (seven members with 1,200 total acres) were identified representing the acreage with the highest potential to contribute to observed exceedances in this initial survey. Based on the responses from the initial targeted survey, it was concluded that most growers in the Ulatis Creek drainage are implementing adequate best management practices to protect surface water quality.

- Awareness of IPM pesticide management practices, use of PCAs, and appropriate training were universally high, as was implementation of practices to control and minimize overspray and drift.

² *Grower Survey Report: Ulatis Creek*. Prepared for Sacramento Valley Water Quality Coalition By The Coalition for Urban/Rural Environmental Stewardship. 2011.

- Most growers implemented at least one type of relevant pesticide product choice, pesticide application practices, irrigation management and drainage practice. The majority of growers indicated having storm runoff from their fields only in heavy rainstorms.
- Most operations also implemented additional practices to minimize discharge of pesticides in irrigation and storm runoff (e.g., sediment traps, vegetated ditches, tailwater returns systems).

A second survey consisting of the Farm Evaluations for all agricultural operations in the represented drainages was completed in March 2015 and has been compiled for the evaluation of implementation of a wide range of management practices, including irrigation, pesticide, and sediment management practices relevant to the diuron Management Plan. Preliminary results confirm high levels of awareness of issues related to pesticide exceedances, as well as high levels of implementation of management practices to reduce and eliminate pesticide and toxicity exceedances.

MANAGEMENT PRACTICES

Based on the monitoring results, management practices in the drainage appear adequate to prevent discharges of diuron to surface waters, and the implementation of practices is part of the basis for this request. Diuron is a federally restricted material and requires a user to obtain one of the following certifications: Private Applicator Certificate (PAC), Qualified Applicator License (QAL), or Qualified Applicator Certificate (QAC). Additionally, diuron is identified as a Groundwater Protection Material and its use in Groundwater Protection Areas (GWPA) is restricted to prevent potential pollution of groundwater. The Solano County Agriculture Department provides growers in GWPA with educational materials that specify the method in which diuron must be used and practices for preventing the pesticide from being transported from its site of application. Additionally, many original users of diuron chose the option of using alternative products thus, resulting in fewer applications of diuron in the subwatershed. We believe that the lack of diuron exceedances related to agricultural applications can be attributed largely to changes in practices as a result of increased awareness of the growers and applicators, and that this resulted from the consistent and intensive outreach efforts of the Dixon and Solano RCDs and DSWQC, with additional assistance from the Solano County Agriculture Department. The lack of diuron exceedances can also be attributed, in part, to fewer applications of the herbicide in the subwatershed. The specific implementation goals documented in the diuron Management Plan have been achieved for the represented area.

Implementation Goal	Percent Implementation
100% of growers contacted through diuron outreach activities are aware of and consider IPM practices and choices before deciding to apply pesticides	100% ⁽¹⁾
100% of growers contacted through diuron outreach activities consider runoff or leaching potential when selecting specific pesticide for application	100% ⁽¹⁾
100% of growers contacted through diuron outreach activities consider alternative products and lowest risk pesticide choice needed to accomplish pest management	100% ⁽¹⁾
100% of (agricultural) diuron applicators contacted through diuron outreach activities will have training specific to the water quality concerns and properties of diuron (chemical and toxicological characteristics)	100% ⁽¹⁾
100% of Coalition members using diuron in the represented drainages will be contacted in person or via phone to inform them of the potential risks of diuron applications, and the available and recommended management practices to limit this risk.	100% ⁽¹⁾

100% of previously contacted agricultural diuron users will be contacted by phone to discuss storm season monitoring results, review which practices were implemented in fall/winter 2010-2011, and discuss additional practices for fall/winter 2012, if necessary.	100% ⁽¹⁾
100% of growers applying diuron should implement one or more of the following optional practices (if appropriate):	99.9% ⁽²⁾
	<i>Individual Practice Percent Implementation</i>
Consider soil saturation and precipitation forecast and DO NOT apply when ground is at field capacity (when runoff is likely)	80.1% ⁽²⁾
Apply to level vegetated ground (all alfalfa applications qualify for this)	>90.7% ⁽³⁾
In bare ground applications incorporate within 7 days of application	--- ⁽⁴⁾
Consider use of alternative products on field perimeters with diuron restricted to insides of fields, where equipment and field configuration allow	--- ⁽⁴⁾
Direct post-application runoff through vegetated drain ditches	33.8% ⁽²⁾
Direct post-application runoff through vegetative filter strips and buffers	11.7% ⁽²⁾

1. Percent implementation response provided by Dixon/Solano RCD Water Quality Coalition based on outreach records.
2. Percent implementation based on 2015 Farm Evaluation Survey results. Reported percentages represent practices reported by the entire Dixon/Solano Subwatershed membership, and it is anticipated that percent implementation of practices by diuron users is higher than shown above.
3. Minimum percent implementation based on 2013 CDPR PUR data.
4. Percent implementation of goal indeterminate based on available information.

OTHER RELEVANT INFORMATION

Implementation of additional practices continues to be pursued as part of the Management Plan for chlorpyrifos in the same represented drainages. Additional implementation of relevant practices will continue to occur through 2017 through the Natural Resources Conservation Service (NRCS) Environmental Quality Incentives Program (EQIP) financial assistance program and additional special funding with priorities to address water quality in Solano County (Bay Delta Initiative for Cache Slough Complex watersheds and the Bay Area Regional Conservation Partnership Program). The Dixon and Solano RCDs in partnership with the Solano office of USDA NRCS received \$1.28 million over three years in Environmental Quality Incentives Program (EQIP) funding specifically to assist local growers in addressing water quality issues related to pesticide exceedances. As of December 2, 2015, 105 individuals have submitted applications and 61 have received contracts for financial assistance with management practice implementation. Although it does not appear necessary to further control and prevent diuron exceedances, the additional awareness and implementation of practices will further reduce the risks of diuron use in the represented drainages.

CONCLUSIONS

Based on the monitoring results summarized above, Ulati Creek is meeting the ILRP water quality Trigger Limit for diuron and has done so for the last 3 years. Outreach and education efforts and implemented practices have achieved the goals of the Management Plan and resulted in meeting water quality objectives. Based on the findings presented in this request, we conclude that agricultural practices implemented in the Ulati Creek drainage and represented area have been and continue to be sufficient to prevent agricultural contributions to exceedances of diuron in the area represented by Ulati Creek. Additionally, the ongoing Management Plan for chlorpyrifos continues to pursue implementation of additional practices, and NRCS EQIP grants have been

awarded to augment management practices in the represented drainages that will further reduce the risk of diuron discharges and exceedances in regional surface waters.

As specified in the Management Plan Completion section of the MRP-1: Management Plan Requirements for Surface Water and Groundwater (Waste Discharge Requirements General Order for Growers within the Sacramento River Watershed that are Members of a Third Party Group; Order R5-2014-0030-R1), we respectfully request that you make a determination of the completeness of this Management Plan.

Sincerely,



David J. Guy
President
Northern California Water Association

Cc: Lynn Coster
Gurbinder Dhaliwal
Susan Fregien
Sue McConnell
Denise Sagara
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Claus Suverkropp

TABLES AND FIGURES

Table 1: Monitoring results for diuron in Ulatis Creek water quality samples.

Event	Sample Date	Diuron (µg/L)	Selenastrum growth (% of control)	Notes
9	02/28/2006	---	63.4	1
10	03/16/2006	---	229.3	
12	05/26/2006	---	373.8	
13	06/22/2006	---	548.2	
14	07/20/2006	---	1152.4	
15	08/17/2006	---	540.7	
16	09/22/2006	---	629.9	
17	02/12/2007	15	67.7	1,2
19	04/17/2007	1.6	---	
20	05/15/2007	0.25	---	
21	06/20/2007	0.31	---	
22	07/17/2007	<0.2	---	
23	08/21/2007	<0.2	---	
24	09/19/2007	<0.2	---	
25	12/19/2007	12	75	1,2
26	01/28/2008	3.5	88.8	1,2
27	02/21/2008	0.29	129.9	
28	04/21/2008	1.5	55	1
28.1	4/30/2008	---	226.9	
29	05/19/2008	0.21	584	
30	06/17/2008	<0.2	86.8	
31	07/14/2008	0.26	123.8	
32	08/18/2008	<0.2	197.4	
33	09/15/2008	<0.2	361	
36	02/16/2009	8.8	57	1,2
37	03/19/2009	<0.2	310.8	
38	04/20/2009	<0.2	252.6	
47	01/19/2010	2.3	---	2
48	02/16/2010	0.21	---	
49	3/16/2010	<0.2	---	
50	04/20/2010	<0.2	---	
58	12/07/2010	1.2	---	
59	01/18/2011	<0.2	258.3	
60	02/15/2011	<0.2	325.5	
61	03/15/2011	---	225	
62	04/20/2011	---	153	
63	05/17/2011	---	280	
64	06/21/2011	---	209	
65	07/19/2011	---	292	
69	11/08/2011	---	265	
70	12/07/2011	<0.2	221	
71	01/23/2012	8.1	49.6	1,2
72	02/21/2012	<0.2	221	
82	12/11/2012	0.32	205	
83	01/22/2013	<0.2	231	
84	02/19/2013	<0.2	314	
94	12/10/2013	<0.2	---	
95	01/14/2014	<0.2	388	
96	02/10/2014	0.28	275	
97	03/18/2014	---	185.9	
98	04/15/2014	---	209	

Event	Sample Date	Diuron (µg/L)	<i>Selenastrum</i> growth (% of control)	Notes
99	05/20/2014	---	286	
100	06/17/2014	---	221	
101	07/15/2014	---	263	
102	08/19/2014	---	241	
103	09/16/2014	---	342.1	
105	11/18/2014	---	214	
106	12/02/2014	<0.2	211	
107	01/20/2015	<0.2	204	

1. Significant toxicity.

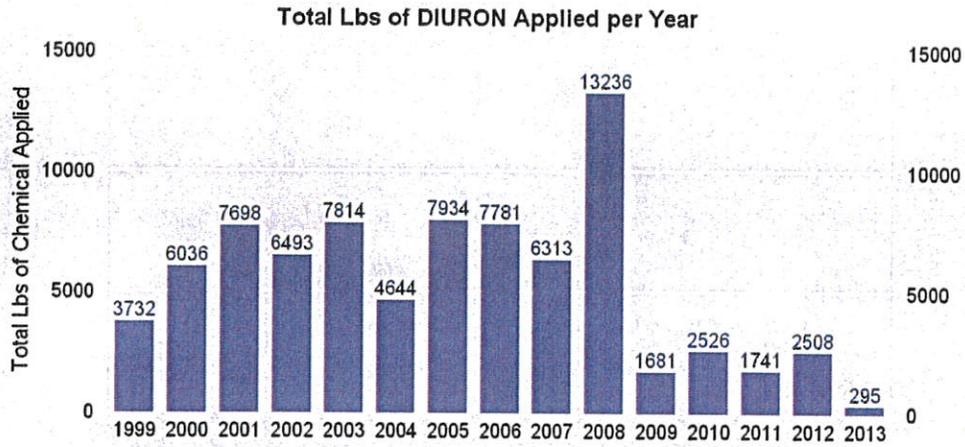
2. Exceedance of diuron trigger limit (2.0 µg/L, USEPA Health Advisory Level).

Table 2: Summary of Agricultural Practices Implemented in Ulatis Creek and Represented Drainages (Source: 2015 Farm Evaluation Survey).

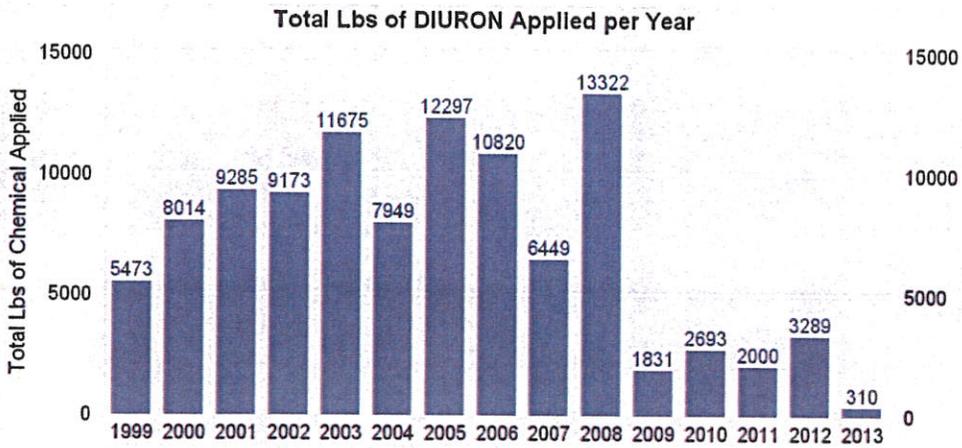
<i>PRACTICE CATEGORY</i>	Acres Reported	Percent of Total Acres Reported (122,735 acres)
Individual Practice		
<i>PESTICIDE APPLICATION PRACTICES</i>		
Follow Label Restrictions	108,178	88.1
County Permit Followed	106,659	86.9
Avoid Surface Water When Spraying	105,672	86.1
Monitor Wind Conditions	105,563	86.0
Use PCA Recommendations	102,247	83.3
Attend Trainings	98,817	80.5
Monitor Rain Forecasts	98,309	80.1
Use Appropriate Buffer Zones	96,643	78.7
End of Row Shutoff When Spraying	96,444	78.6
Use Drift Control Agents	95,457	77.8
Sensitive Areas Mapped	66,451	54.1
Reapply Rinsate to Treated Field	59,688	48.6
Use Vegetated Drain Ditches	41,485	33.8
Target Sensing Sprayer used	14,859	12.1
No Pesticides Applied	10,005	8.2
Other ¹	5,549	4.5
Chemigation	3,313	2.7
No Selection	148	0.1
<i>WHO DO YOU HAVE HELP DEVELOP YOUR CROP FERTILITY PLAN?</i>		
Pest Control Advisor (PCA)	101,873	83.0
Certified Crop Advisor (CCA)	58,598	47.7
Independently Prepared by Member	29,338	23.9
Professional Soil Scientist	28,687	23.4
Professional Agronomist	25,391	20.7
UC Farm Advisor	21,660	17.6
None of the above	9,358	7.6
Certified Technical Service Providers by NRCS	3,676	3.0
No Selection	176	0.1
<i>DOES YOUR FARM HAVE THE POTENTIAL TO DISCHARGE SEDIMENT TO OFF-FARM SURFACE WATERS?</i>		
Yes	62,981	51.3
No	59,075	48.1
No Selection	679	0.6
<i>IRRIGATION PRACTICES</i>		
Flood	46,420	37.8
Furrow	41,219	33.6
Drip	13,189	10.7
Sprinkler	10,661	8.7
Micro Sprinkler	8,056	6.6
No Selection	1,698	1.4
Border Strip	208	0.2
<i>SECONDARY IRRIGATION</i>		
No Selection	97,246	79.2
Sprinkler	12,503	10.2
Flood	8,352	6.8
Micro Sprinkler	1,118	0.9
Drip	1,027	0.8

<i>PRACTICE CATEGORY</i>	Acres Reported	Percent of Total Acres Reported (122,735 acres)
Individual Practice		
Furrow	406	0.3
Border Strip	79	0.1
<i>NITROGEN MANGEMENT METHODS TO MINIMIZE LEACHING PAST THE ROOT ZONE</i>		
Split Fertilizer Applications	84,429	68.8
Soil Testing	72,989	59.5
Tissue/Petiole Testing	49,964	40.7
Irrigation Water N Testing	25,250	20.6
Foliar N Application	25,088	20.4
Fertigation	25,074	20.4
Cover Crops	18,662	15.2
Variable Rate Applications using GPS	15,409	12.6
Do Not Apply Nitrogen	11,867	9.7
Other	6,836	5.6
No Selection	5,908	4.8
Other2	73	0.1
<i>IRRIGATION PRACTICES FOR MANAGING SEDIMENT AND EROSION</i>		
The time between pesticide applications and the next irrigation is lengthened as much as possible to mitigate runoff of pesticide residue.	76,669	62.5
Shorter irrigation runs are used with checks to manage and capture flows.	52,478	42.8
In-furrow dams are used to increase infiltration and settling out of sediment prior to entering the tail ditch.	38,837	31.6
Tailwater Return System.	31,758	25.9
Use drip or micro-irrigation to eliminate irrigation drainage.	24,087	19.6
Catchment Basin.	21,997	17.9
Use of flow dissipaters to minimize erosion at discharge point.	20,014	16.3
Other	18,099	14.7
No irrigation drainage due to field or soil conditions.	12,768	10.4
No Selection	4,687	3.8
PAM (polyacrylamide) used in furrow and flood irrigated fields to help bind sediment and increase infiltration.	460	0.4
<i>CULTURAL PRACTICES TO MANAGE SEDIMENT AND EROSION</i>		
Soil water penetration has been increased through the use of amendments, deep ripping and/or aeration.	83,883	68.3
Crop rows are graded, directed and at a length that will optimize the use of rain and irrigation water.	68,863	56.1
Minimum tillage incorporated to minimize erosion.	50,208	40.9
Vegetated ditches are used to remove sediment as well as water soluble pesticides, phosphate fertilizers and some forms of nitrogen.	43,390	35.4
Cover crops or native vegetation are used to reduce erosion.	39,961	32.6
Storm water is captured using field borders.	33,797	27.5
Subsurface pipelines are used to channel runoff water.	27,884	22.7
Berms are constructed at low ends of fields to capture runoff and trap sediment.	25,386	20.7
Sediment basins / holding ponds are used to settle out sediment and hydrophobic pesticides such as pyrethroids from irrigation and storm runoff.	22,607	18.4
Vegetative filter strips and buffers are used to capture flows.	14,366	11.7

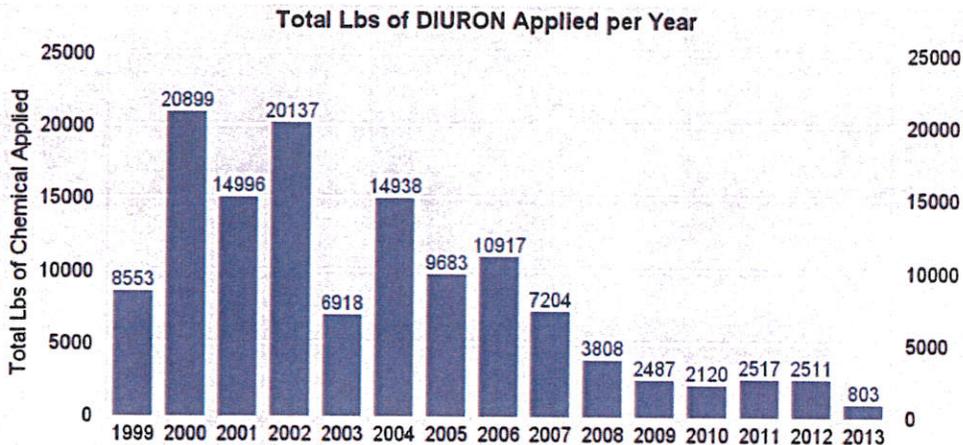
<i>PRACTICE CATEGORY</i>		
Individual Practice	Acres Reported	Percent of Total Acres Reported (122,735 acres)
Creek banks and stream banks have been stabilized.	12,932	10.5
Hedgerows or trees are used to help stabilize soils and trap sediment movement.	11,330	9.2
No storm drainage due to field or soil conditions.	6,365	5.2
No Selection	6,288	5.1
Other	6,175	5.0
Field is lower than surrounding terrain.	2,720	2.2



(a) Irrigated Agriculture in the Cache Slough Drainage.



(b) Irrigated Agriculture in Solano County.



(c) All Other Uses in Solano County.

Figure 1: Annual Diuron Use (lbs/year) for (a) Irrigated Agriculture in the Cache Slough Drainage, (b) Irrigated Agriculture in Solano County, and (c) All Other Uses in Solano County: 1999 – 2013.