

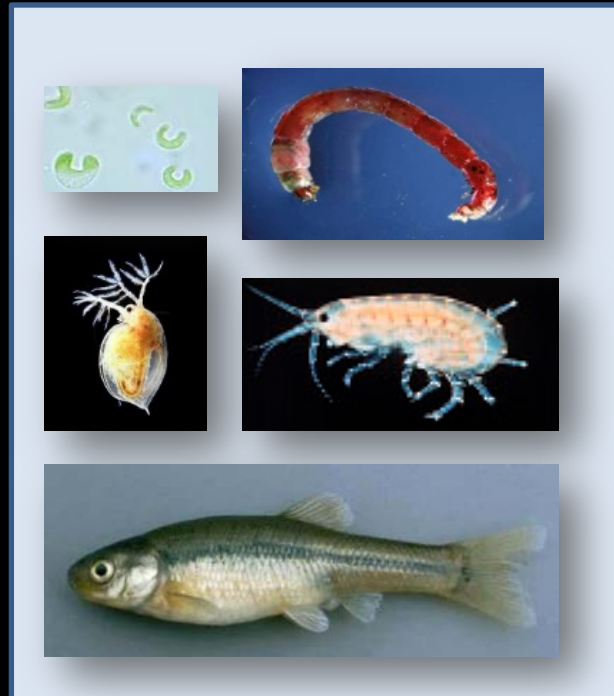
The Use of PUR and Monitoring Data for the Protection of Surface Waters in California

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Surface Water Protection Program, EMB
California Department of Pesticide Regulation

PUR Workshop 2017

Surface Water Protection Program



DATA

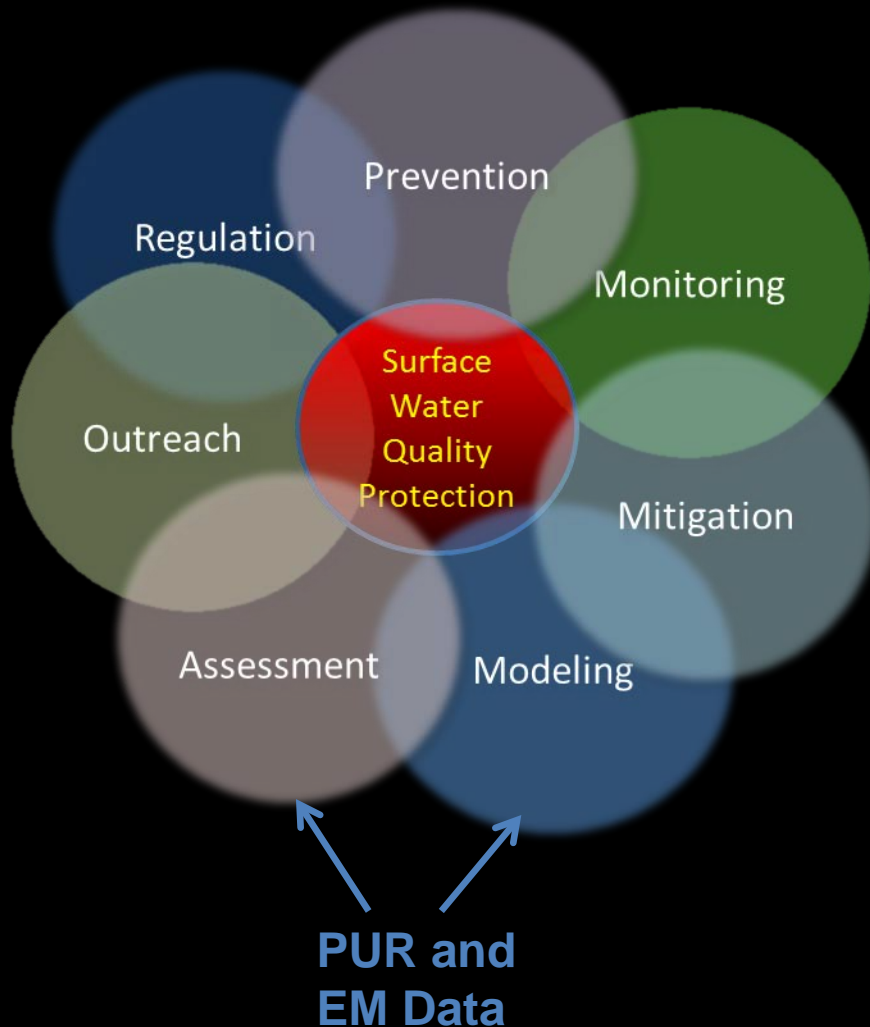


KNOWLEDGE



ACTION

Surface Water Protection Program



Outline:

- Monitoring prioritization
- Mitigation strategy
- Regulation effectiveness
- PUR data QAQC

Monitoring

Monitoring Prioritization

- What
 - Pesticides of interest (POI)
- Where
 - Areas of interest (AOI)
- When
 - Seasonality under evaluation, useful for mass loading estimation

Pesticide Prioritization for Surface Water Monitoring, V...

Help

Configuration Advanced Options Watershed

Use patterns

Agricultural use Urban use "Rights of way" (site_code=40)

Or, user-specified site_code(s)=

PUR data

Based on PUR data from to

Toxicity data

Acute Chronic Both

USEPA Aquatic Life Benchmarks

Supplemented by Benchmark Equivalent (based on FOOTPRINT PPDB)

USEPA Drinking Water Standard

USEPA Human Health Benchmark

Note: if multiple toxicity databases are selected, the lowest toxicity value for each pesticide will be used for prioritization

POI: What Do We “Look” For?

- Surface Water Monitoring Prioritization Model (SWMP)
 - Rank annual use and toxicity (usually aquatic)

chem_code	CHEMNAME	use	usescore	benchmark	toxscore	finalscore	toxflag	recom
2008	PERMETHRIN	169533.5	5	0.0014	7	35		True
2300	BIFENTHRIN	126414.7	5	0.0013	7	35		True
2223	CYFLUTHRIN	64898.4	5	0.0074	7	35		True
3995	FIPRONIL	80732.9	5	0.011	6	30		True
2171	CYPERMETHRIN	46638.2	5	0.069	6	30		True
3010	DELTAMETHRIN	23747.8	4	0.0041	7	28		True
2297	LAMBDA-CYHALOTHRIN	14840.6	4	0.002	7	28		True
677	CHLOROTHALONIL	92740.9	5	0.6	5	25		False
3849	IMIDACLOPRID	81497.2	5	1.05	4	20		True
229	DIQUAT DIBROMIDE	17811.3	4	0.75	5	20		False

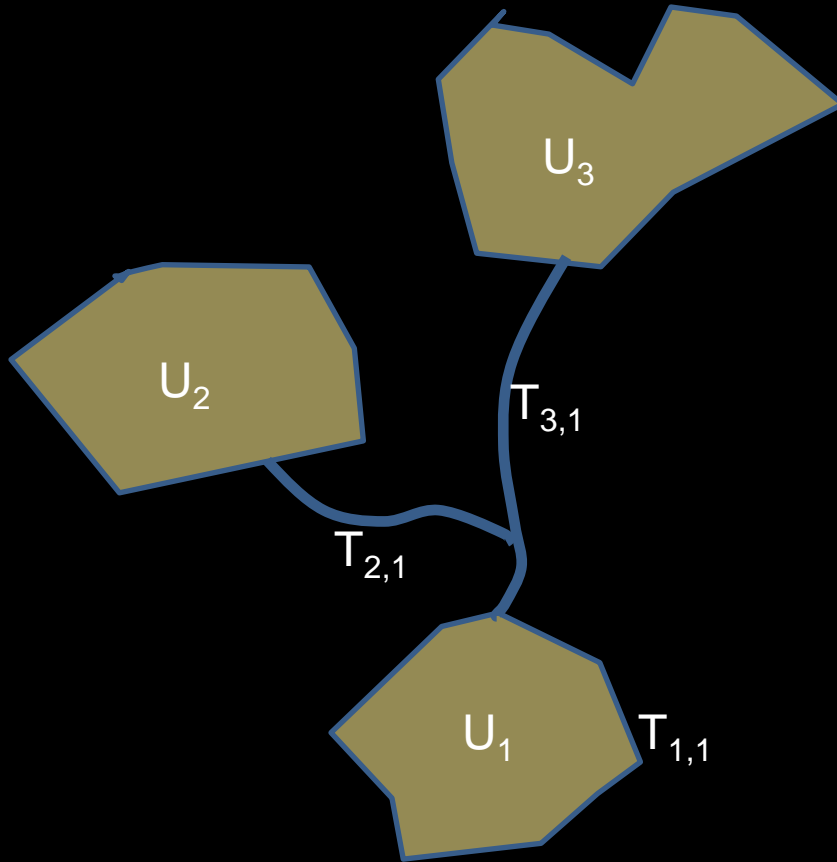
POI: What Do We “Look” For?

- Surface Water Monitoring Prioritization Model (SWMP)
 - Rank annual use and toxicity (usually aquatic)
 - Check use pattern and E-fate properties

chem_code	CHEMNAME	use	usescore	benchmark	toxscore	finalscore	toxflag	recom
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- Review historical monitoring data

AOI: Where Shall We “Look”?



For a particular POI
(1) mass resulted from upstream uses, first-order decay:

$$\begin{aligned} M_1 &= U_1 \cdot e^{-d \cdot T_{1,1}} \\ &+ U_2 \cdot e^{-d \cdot T_{2,1}} \\ &+ U_3 \cdot e^{-d \cdot T_{3,1}} \\ &+ \dots \\ &= \sum_i U_i \cdot e^{-d \cdot T_{i,1}} \end{aligned}$$

(2) priority mapping index (PMI) =

$$\frac{M_1}{\text{Area}_1 \times \text{Toxicity Value}}$$

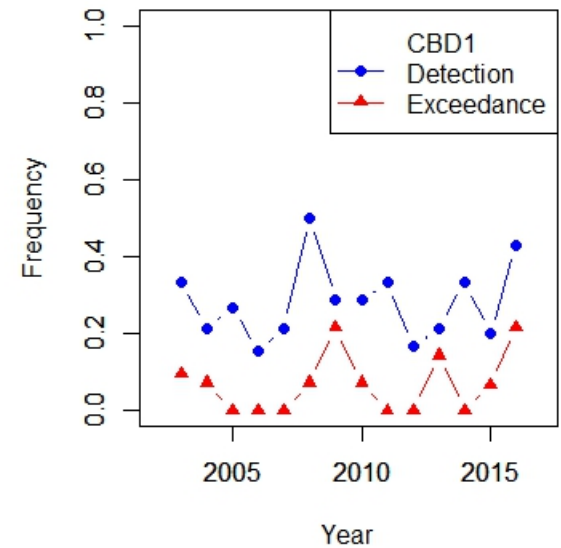
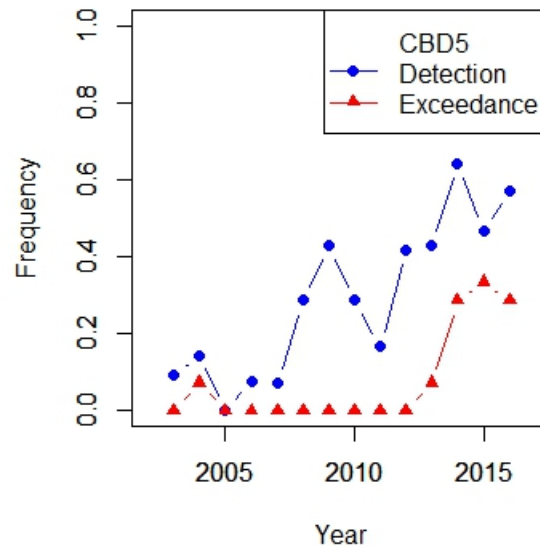
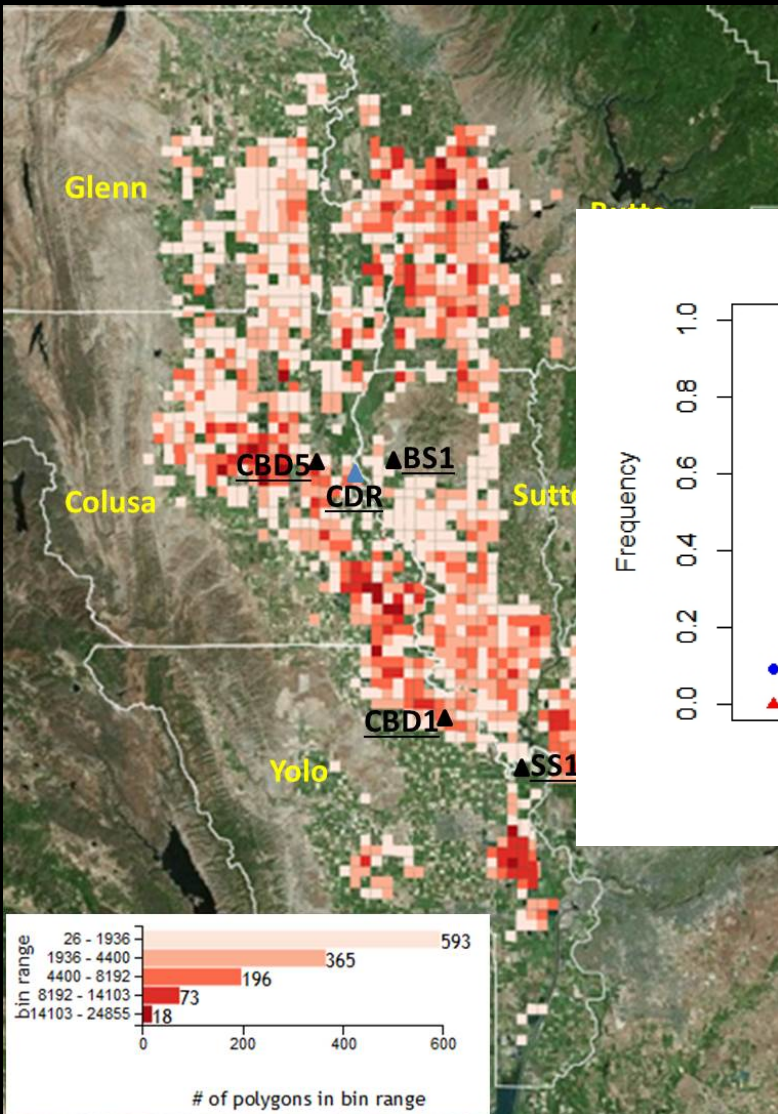
(3) rank HUC12s based on PMI

PUR Information Used

- Active ingredients
 - application time
 - application location

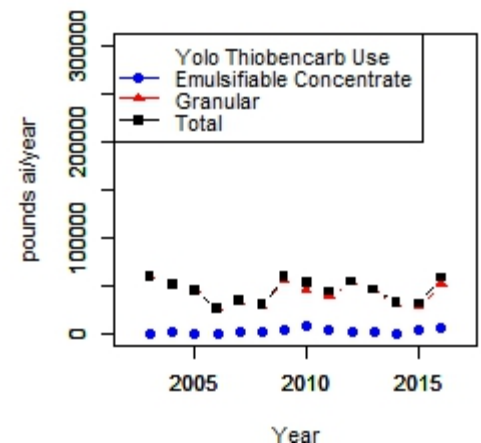
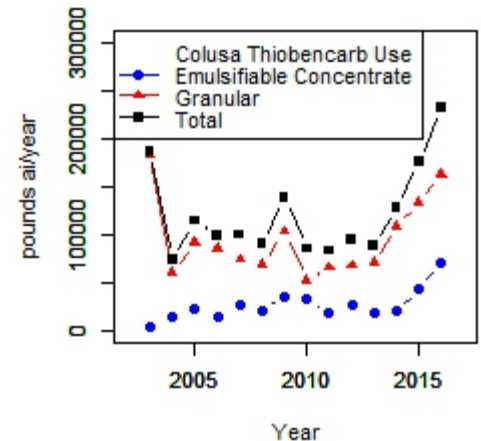
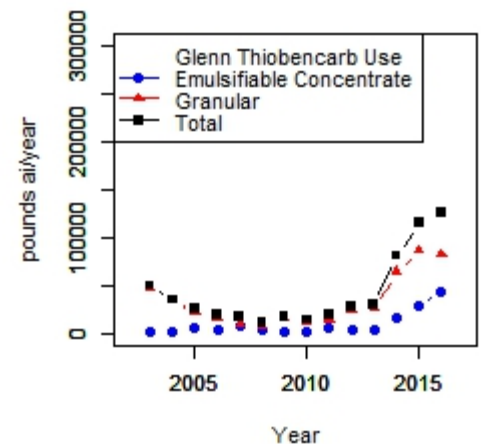
Mitigation

Mitigation: Thiobencarb Story



Emulsifiable Concentrate?

- Emulsifiable products use increase, so DID granular products
- Exceedance affected by (PLS regression):
 - CBD5: use in Glenn and Colusa counties; flowrate at nearby SacRiver site
 - CBD1: use in Colusa and Yolo counties
- PLS cannot distinguish the two formulations: co-linearity



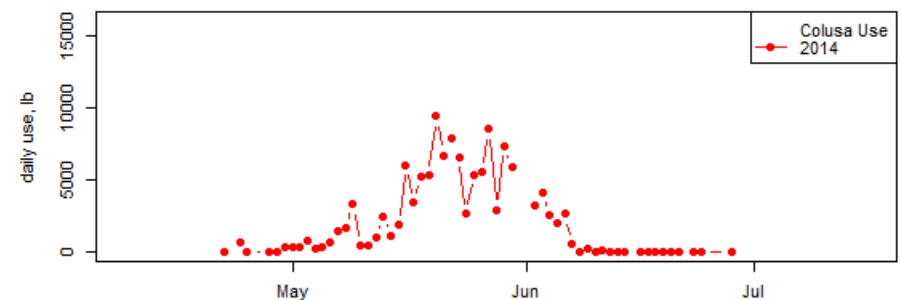
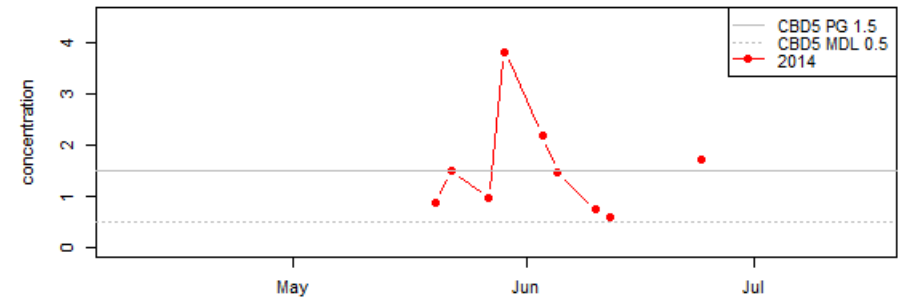
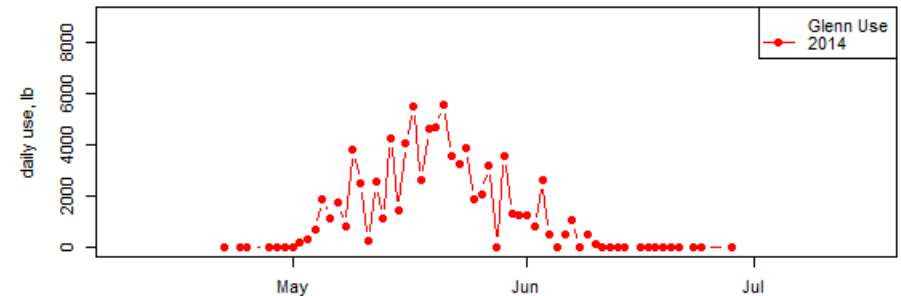
Formulation Difference

Formulation	Emulsifiable Concentrate	Granular
Required water holding time for single treated field	19 days	30 days
Concentration in tail water, field dissipation studies	1.2-13.9 ppb at 19 days	5-86 ppb at 30 days
Use pattern	Before flooding, mostly bound to soil	After flooding, mostly disperse in water

- Contamination pathways
 - Drift
 - Release of holding water
 - Seepage/overflow
- Latter two pathways: emulsifiable products less impact?

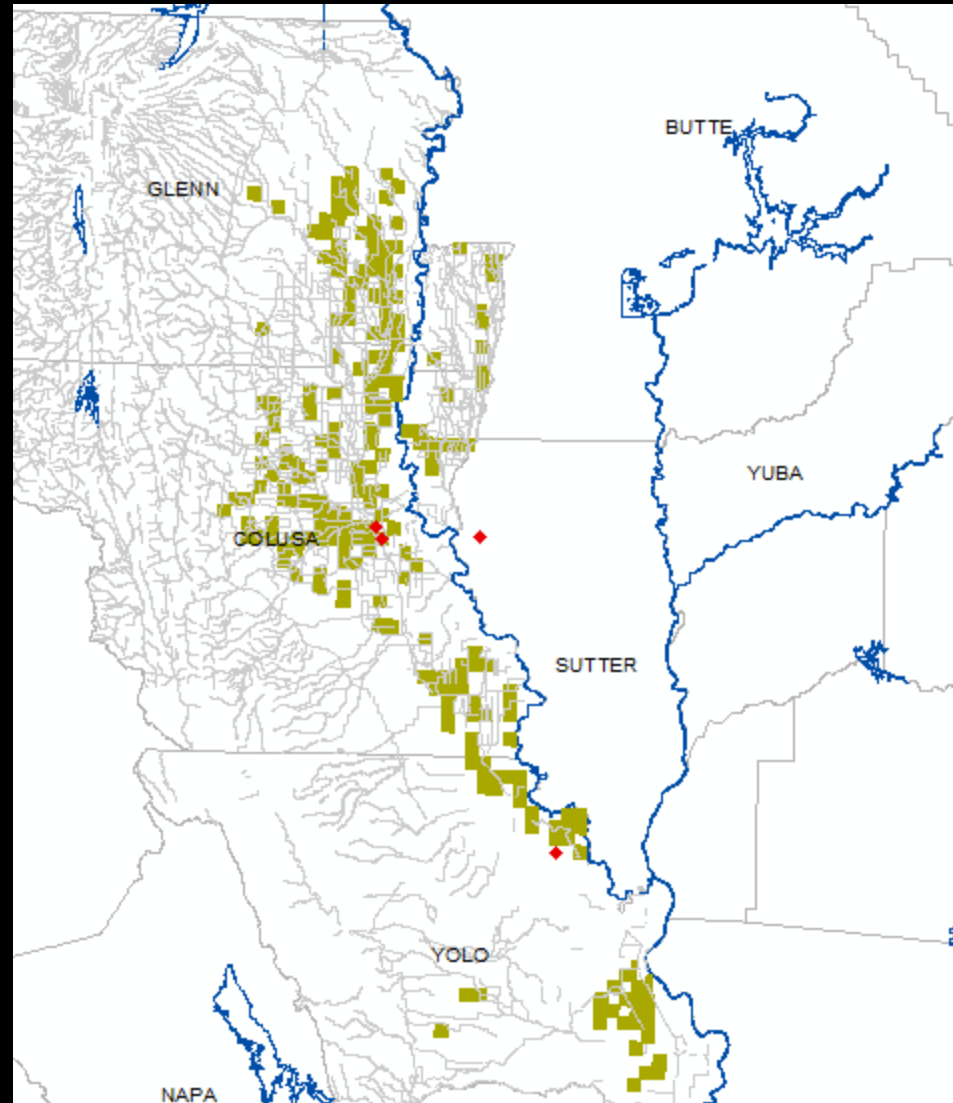
Contamination Pathways

- 1-3 week delay between peak use and peak concentration at monitoring sites
 - Drift: water travel time
 - Release of holding water: water holding time + water travel time
 - Seepage/overflow: continuous releasing, more prominent early on



Drift

- Aerial application predominant (77-100%)
- ALL fields are within 30 feet distance from the waterways
- Need new dissipation studies for emulsifiable products in waterways
- Need water travel time



PUR Information Used

- Products
 - formulation
 - application location
 - application time
 - application method

Regulation

Regulation Effectiveness: Diazinon Story

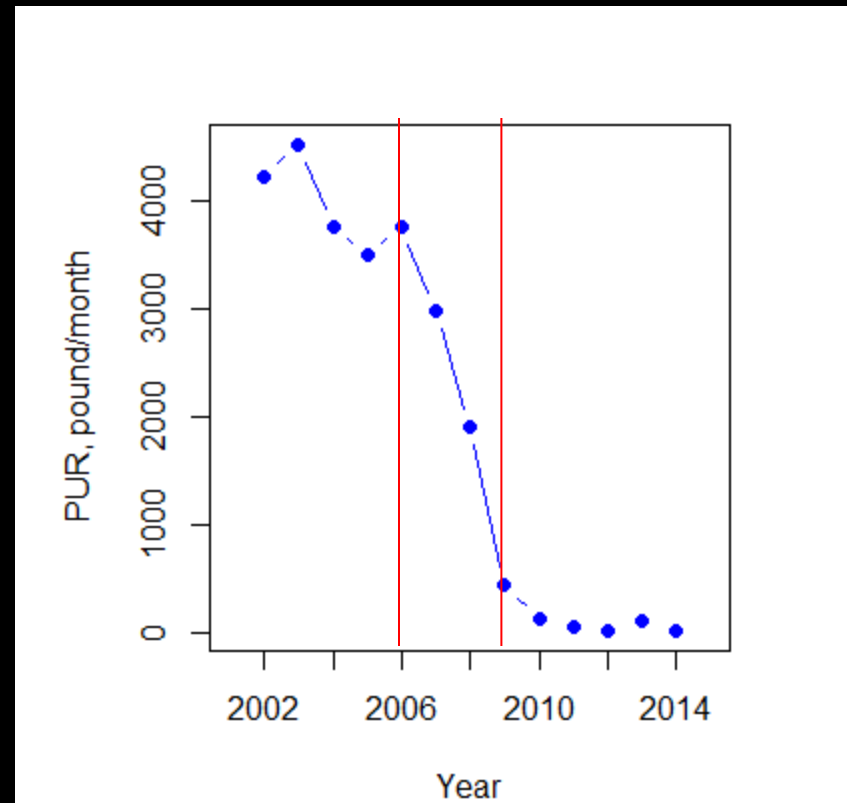
- Regulations/programs aimed to reduce Ag. diazinon use
 - USEPA: 2007 cancellation of certain uses
 - CDPR: 2003 dormant spray reevaluation, 2006 dormant spray regulation, 2010 in-season use reevaluation
 - Water board: 2003-2007, TMDLs and ILRP
- Direct vs. indirect influence on use reduction

Diazinon: USEPA 2007 Cancellation

For granular products	CDPR PUR Database
beets (red and table)	Beet (29109)
broccoli	Broccoli (13005)
Brussels sprouts	Brussels Sprout (13006)
cabbage	Cabbage (13007)
carrots	Carrot (29111)
cauliflower	Cauliflower (13008)
collards	Collard (13009)
endive (escarole)	Endive (Escarole) (13015)
ginseng	not listed in PUR
kale	Kale (13011)
melons	Melon (29122)
mustard	Mustard (29123)
onions (bulb and green)	Onion, Green (16004); Onion, Dry (14011)
radishes	Radish (14014)
spinach	Spinach (13024)
sugar beets	<u>Sugarbeet</u> (29135)
sweet corn	Corn, Human Consumption (29119)
tomatoes	Tomato (11005); Tomato, Processing (29136)
For liquid and wettable powder products	CDPR PUR Database
Chinese broccoli	not listed in PUR
Chinese cabbage	Chinese Cabbage (<u>Nappa</u>) (13010)
Chinese mustard	Chinese Greens (13999)
Chinese radish	not listed in PUR
corn	Corn, Human Consumption (29119); Corn (Forage - Fodder) (22005)
grapes	Grape (29141); Grape, Wine (29143)
hops	not listed in PUR
mushroom houses	Mushroom House (61007); Mushroom (16003)
sugar beets	<u>Sugarbeet</u> (29135)
walnuts	Walnut (3009)
seed treatment	not listed in PUR

Diazinon: Use Reduction 2006-2009

- Direct: USEPA cancellation, 3,300 lbs/month reduction
- Overall: 19,000 lbs/month reduction
- Indirect: account for >80% of the reduction



PUR Information Used

- Active ingredients
 - Product formulation
 - Commodity

PUR Data QAQC

Urban PUR Self-Reporting Error

Year	MM / YYYY	Negative Use Report	<input type="checkbox"/>	Document #	Auto Assigned
Address				Phone	
Permit #	County	Report Month/Year			
	39 San Joaquin	/			
PA Number/Name	Total Product Used*	No. Applications	Commodity Treated		
<input type="text" value="Type a code or name"/>	<input type="text" value="choose one..."/>	<input type="text" value=""/>	<input type="text" value="Type a code or name"/>		
	* Liquids: Report concentrate, not diluted mix used.				
Save Line		Clear Line			
Zero Pesticide Use During the Month Indicated					

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Zero Pesticide Use During the Month Indicated					

Tracking License Number

Fipronil use in Sacramento County 2009-2013

Year	2009	2010	2011	2012	2013	Total
Sacramento County	1,967	1,805	2,236	7,455	8,844	22,307
All Others	1,928	1,732	2,182	1,353	1,540	8,734
License XX	40	73	54	6,103	7,303	13,572
% XX	2	4	2	82	83	61

Tracking License Number

Fipronil use by license # XX

Month	2011		2012		2013		Corrected 2012	Corrected 2013
	lbs Used	UNIT	lbs Used	UNIT	lbs Used	UNIT		
1	4	OZ	3	OZ	8	OZ	3	8
2	3	OZ	52	OZ	13	OZ	52	13
3	6	OZ	11	OZ	14	OZ	11	14
4	7	OZ	11	OZ	17	OZ	11	17
5	7	OZ	12	OZ	2,716	GA	12	21
6	5	OZ	8	OZ	1,785	GA	8	14
7	2	OZ	11	OZ	1,778	GA	11	14
8	4	OZ	2,502	GA	934	GA	20	7
9	4	OZ	49	GA	10	OZ	0	10
10	4	OZ	1,891	GA	9	OZ	15	9
11	3	OZ	1,546	GA	11	OZ	12	11
12	5	OZ	7	OZ	8	OZ	7	8

Tracking Company Name

- Bifenthrin use
 - Initially flagged company Bugout, Feb 2011, “Gallon” reporting
 - Check company’s complete history, suspect under-reporting
 - PestPac and other softwares periodically reset default units
- Statistical screening tool under development
 - Tracking the change of a company’s ranking/percentile or use%

PUR Information Used

- Active ingredients
 - company name
 - license number
 - application time
 - formulation

Thank you!

Questions

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