DPR Environmental Monitoring Surface Water Program

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Outline

- Overview of DPR surface water monitoring program

- Chlorpyrifos along Central Coast
  - Why it is important case study

DPR Process for Identifying and Addressing Water Quality Problems

Step 1: Identify Water Quality Problem

- Determine frequency of detections and exceedances compared to USEPA aquatic benchmarks and water quality objectives.
- Consider monitoring data from other sources (government agencies, university researchers , ect.

Step 2: Identify Potential Sources

- Compare pesticide concentrations with use data to identify potential sources of contamination.
- Review labels of pesticide products for additional information pertinent to the sources of contamination.

Step 3: Identify Potential Mitigation

- Peer-reviewed literature.
- Research conducted by DPR, academic institutions, other government agencies, and registrants.
- Meet with relevant stakeholders; County Agricultural Commissioners, Pest Control Advisors, UC Extension Specialists, Pest Control Businesses, residential users.

Step 4: Implement Restrictions

- Permit conditions to regulate pesticide as a restricted material. (FAC 14004.5).
- Counties identify pesticide as permitted material and County Ag Commissioner must determine that its use will present an undue hazard when used under local conditions (FAC 14006.6).
- Counties adopt a regulation implementing restrictions. Requires the directors approval (FAC 11503).
- Registrants may choose to modify label language.

SW Monitoring Program

- Split into two focus areas: Agricultural and Urban
- Agricultural
  - Seasonal monitoring based on regional use patterns
- Urban
  - Waters receiving residential runoff
  - Dry season and storm event sampling
  - Monitoring stations located at storm drain outlets and receiving waters

DPR Monitoring Regions (FY 12-13)

Monitoring Sites, Urban

Pleasant Grove Creek, Roseville

Alder Creek, Folsom

Salt Creek, Laguna Niguel

Wood Creek, Aliso Viejo

Monitoring Sites, Ag

Old Salinas River, Salinas Valley

Alamo River, Imperial Valley

Tembladero Slough,
Salinas Valley

Solomon Canyon Creek,
Santa Maria Valley

Prioritization Model for Ag

Active ingredient	Use Type	Ave Lbs Used	Use Score	Min Aquatic Benchmark	Tox Score	Prioritization Score
Paraquat dichloride	Herbicide	1,879,636	5	0.396	5	25
Chlorpyrifos	Insecticide	1,295,679	4	0.05	6	24
Permethrin	Insecticide	114,362	3	0.01	7	21
Pendimethalin	Herbicide	1,835,108	5	5.2	4	20
Copper hydroxide	Fungicide	1,644,087	5	8.5	4	20
Oxyfluorfen	Herbicide	619,879	4	0.29	5	20
Malathion	Insecticide	492,296	4	0.3	5	20
Chlororthalonil	Fungicide	819,484	4	1.8	4	16
Ziram	Fungicide	740,610	4	9.7	4	16
Trifluralin	Herbicide	494,499	4	7.52	4	16
Diuron	Herbicide	349,605	4	2.4	4	16
Propanil	Herbicide	2,128,121	5	16	3	15
Diazinon	Insecticide	117,158	3	0.11	5	15
Phosmet	Insecticide	115,414	3	1	5	15
Carbaryl	Insecticide	101,063	3	0.85	5	15
Lambda-cyhalothrin	Insecticide	43,882	2	0.0035	7	14
Diflubenzuron	Insecticide	37,005	2	0.0014	7	14
Bifenthrin	Insecticide	86,105	2	0.075	6	12
Esfenvalerate	Insecticide	39,006	2	0.025	6	12
Simazine	Herbicide	399,845	4	36	3	12
Methomyl	Insecticide	225,684	3	2.5	4	12

Yellow = currently monitored, Green = previously monitored

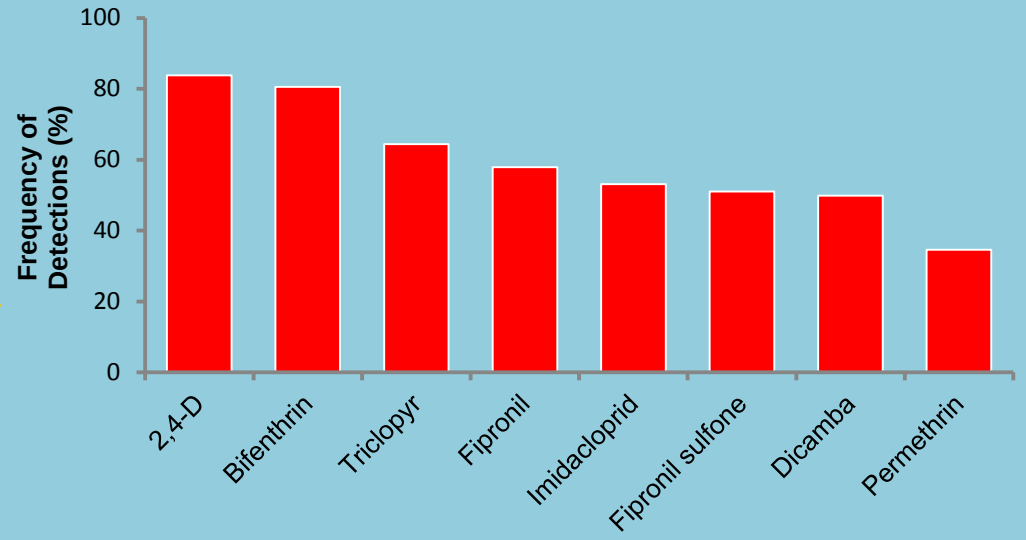
SW Database

- Storage house for pesticide monitoring data collected within surface waters of California
- Data collected by DPR, USGS, counties, universities, CEDEN
- Includes sample location, date, agency, and pesticide concentration
- Newly incorporated into Google Fusion table – easier public querying of data

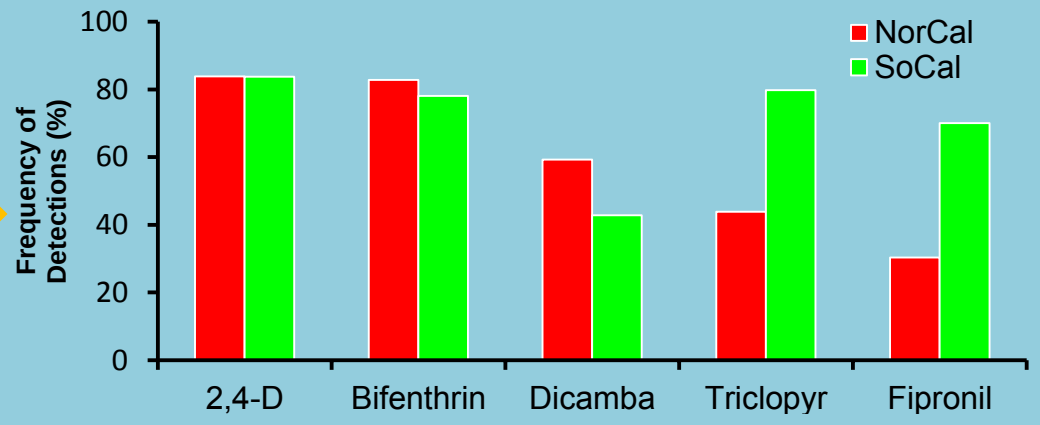
Data Usage*

Region	Sample Date	SiteID	Analyte Name	Result (ug/L)
NorCal	5 /27/2008	PGC010	2,4-D	11.5
NorCal	5 /27/2008	PGC020	2,4-D	8.2
NorCal	8 /1 /2011	PGC010	2,4-D	3.5
NorCal	8 /2 /2011	FOL001	2,4-D	4.1
NorCal	6 /19/2012	PGC022	2,4-D	5.2
NorCal	10/13/2009	PGC010	2,4-D	ND
NorCal	10/13/2009	PGC040	2,4-D	ND
NorCal	10/5 /2011	FOL001	2,4-D	5.7
NorCal	2 /19/2013	FOL005	2,4-D	6.4
NorCal	4 /13/2009	PGC040	Bifenthrin	ND
NorCal	8 /28/2009	PGC040	Bifenthrin	ND
NorCal	8 /28/2009	NAT001	Bifenthrin	ND
NorCal	6 /27/2011	SBP100	Bifenthrin	ND
NorCal	10/5 /2011	PGC021	Bifenthrin	131.0
NorCal	10/5 /2011	PGC022	Bifenthrin	67.5
NorCal	10/5 /2011	PGC010	Bifenthrin	54.1
NorCal	10/5 /2011	PGC025	Bifenthrin	50.8
NorCal	1 /20/2012	PGC010	Bifenthrin	52.5
NorCal	2 /19/2013	FOL002	Bifenthrin	59.8
NorCal	2 /19/2013	PGC010	Bifenthrin	141.0
NorCal	2 /19/2013	PGC022	Bifenthrin	49.9
SoCal	4 /8 /2008	SC5	Fipronil	0.1
SoCal	4 /8 /2008	SC1	Fipronil	ND
SoCal	4 /8 /2008	SC3	Fipronil	ND

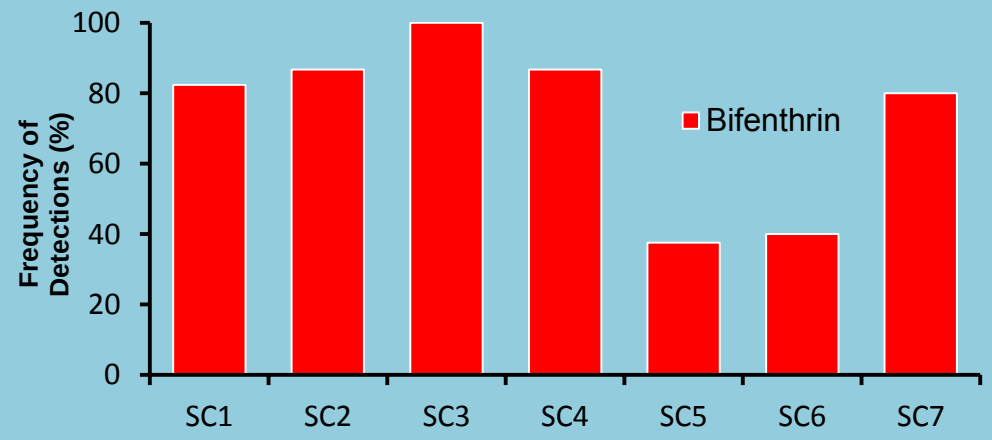
State



Region

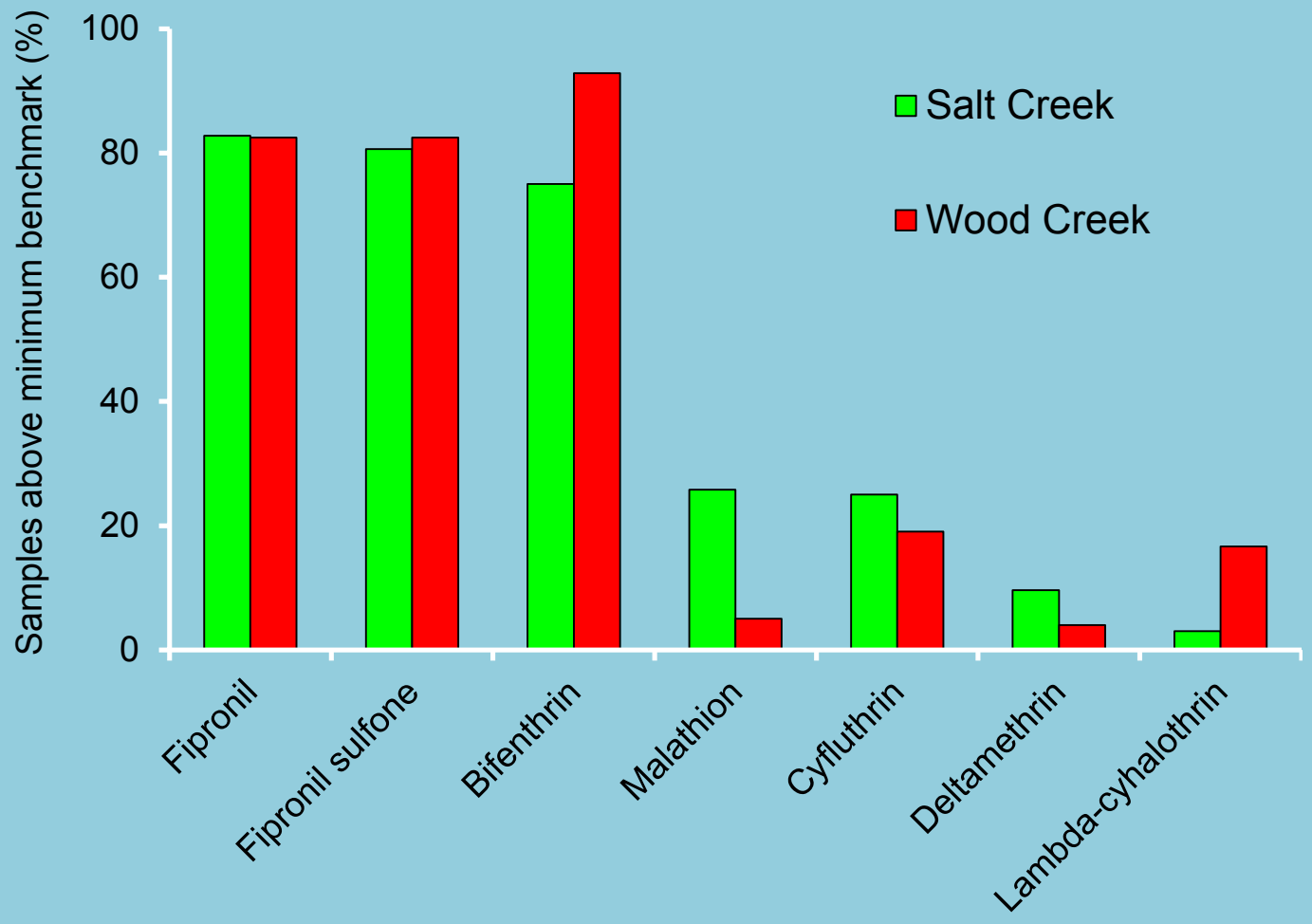


Local



* DPR urban dataset

Benchmark Evaluation



Concentrations compared to minimum EPA acute aquatic benchmark value:

http://www.epa.gov/oppefed1/ecorisk_ders/aquatic_life_benchmark.htm#benchmarks

Step 1: Problem Identification

Why is Chlorpyrifos in Central Coast a Concern?

Analysis of Chlorpyrifos Agricultural Use in Regions of Frequent Surface Water Detections in California, USA

Xuyang Zhang · Keith Starner · Frank Spurlock

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Abstract Chlorpyrifos is a common surface water contaminant in California, USA. We evaluated five years of chlorpyrifos use and surface water monitoring data in California's principal agricultural regions. Imperial County and three central coastal regions accounted for only 10 % of chlorpyrifos statewide use, but displayed consistently high aquatic benchmark exceedances (13.2 %–57.1 %). In

significantly (Phillips et al. 2007). However, the pesticide was still frequently detected in streams in agricultural areas of California. In 2002 and 2003, DPR and the Central Valley Regional Water Quality Control Board (CVRWQCB) collected water samples from rivers and tributaries of the San Joaquin Valley, the Sacramento/San Joaquin Delta, and Monterey County tributaries. Analysis of the monitoring

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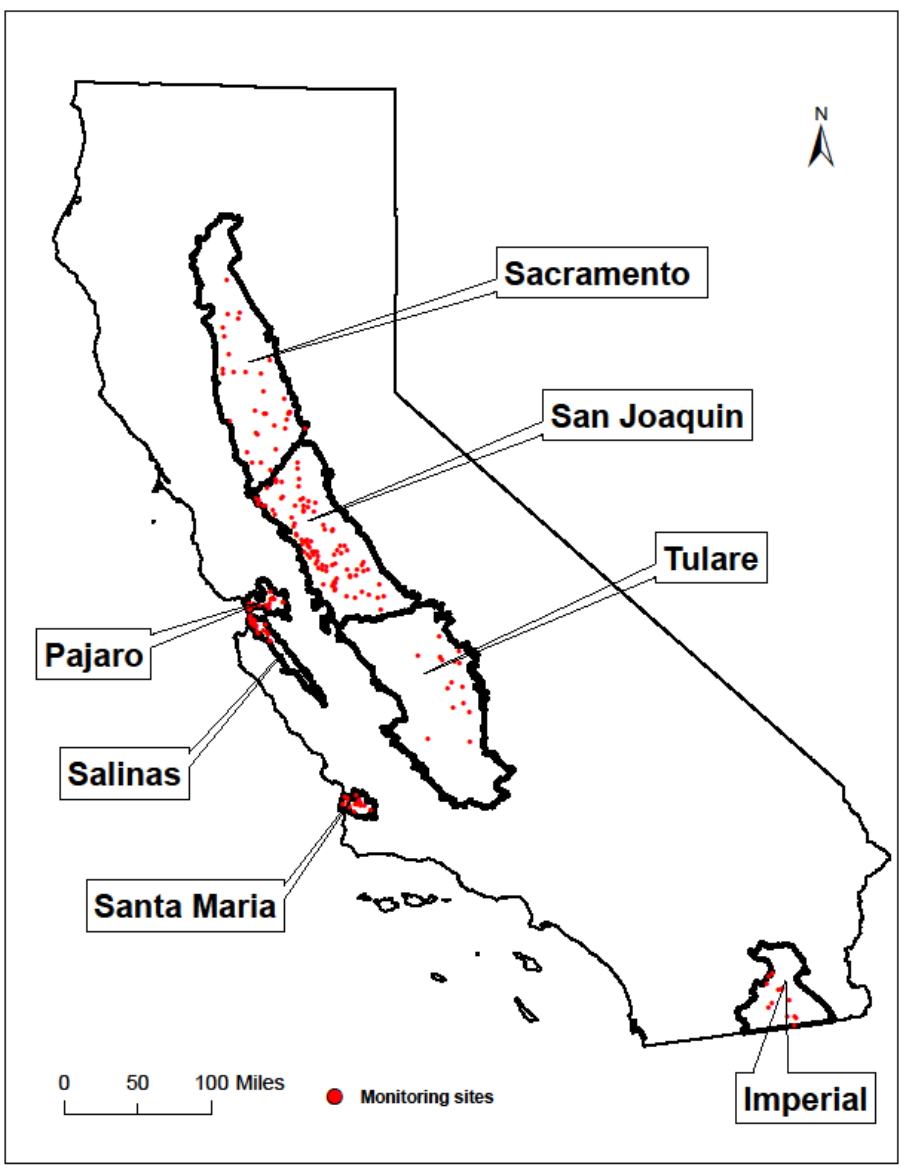
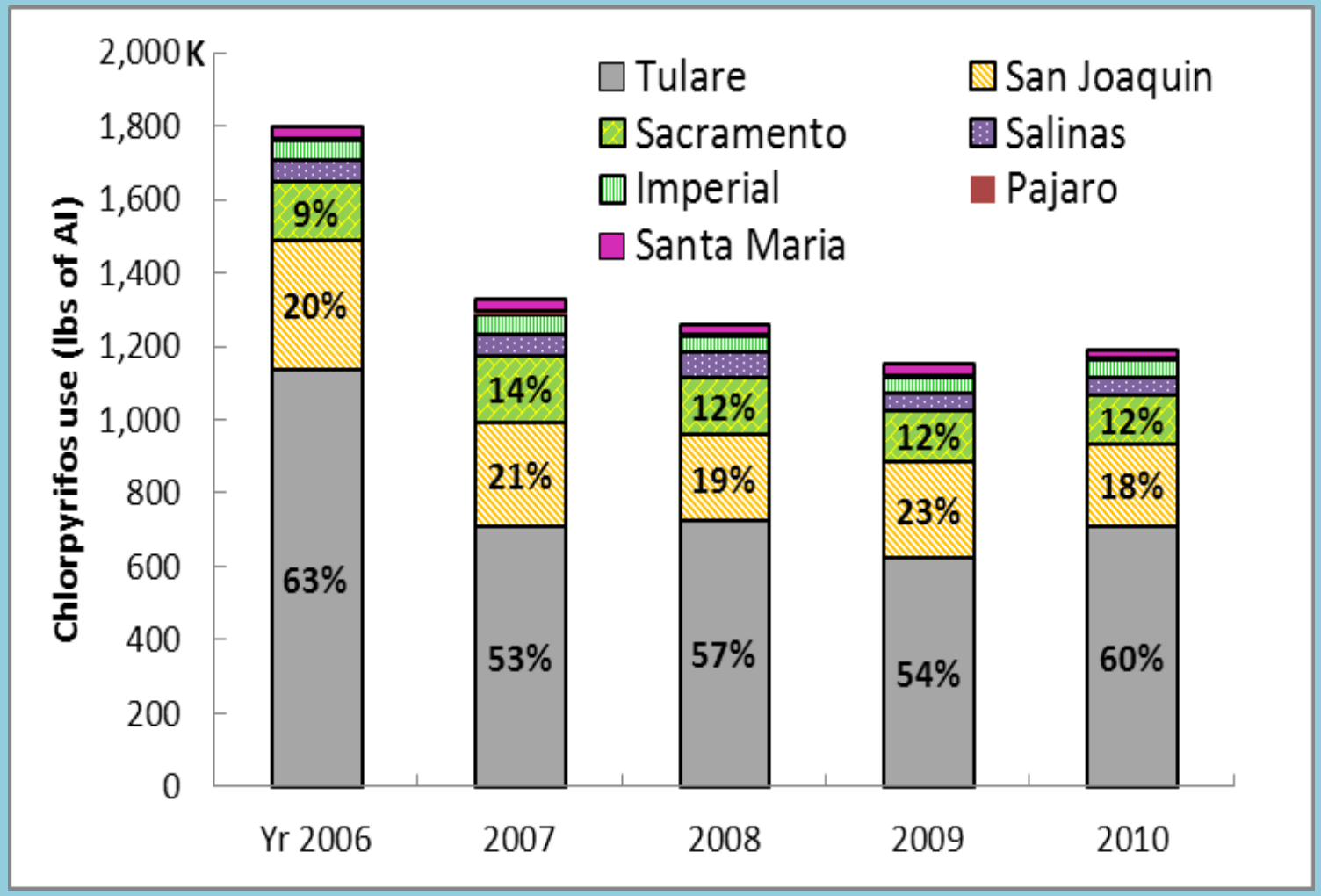
Statewide Chlorpyrifos Analysis

- 2006 – 2010 monitoring data
- 7 major agricultural regions
- 2,495 samples
- 222 sites



Chlorpyrifos Use By County



Chlorpyrifos Use and Monitoring Results (2006-2010) by Region

		Monitoring Results in Surface Water					Pesticide Use		
Region	Sites	No. Samples	No. Detect	No. Exceed*	Detect %	Exceed %*	Lbs/year	Acre/year	Lbs/acre
Santa Maria	19	84	67	48	79.8	57.1	27,705	16,878	1.64
Imperial	15	72	34	22	47.2	30.6	47,946	31,726	1.51
Salinas	20	241	106	63	44.0	26.1	56,908	44,982	1.27
Pajaro	21	68	12	9	17.6	13.2	6,723	4,878	1.38
San Joaquin	96	1575	203	103	12.9	6.5	270,871	216,430	1.25
Sacramento	35	352	18	2	5.1	0.6	154,617	107,545	1.44
Tulare	16	103	1	1	1.0	1.0	779,716	605,869	1.29
All Regions	222	2495	441	248	17.7	9.9	1,344,486	1,028,308	1.31

Concentrations compared to minimum U.S. EPA aquatic benchmark (0.04 ug/L) to determine number and percent exceedances

Highest Detection and Exceedance Frequency in Areas with LOWEST Use

Step 2: Identify Potential Sources

Higher Use/ Low Detection Regions

Region	Crop	Total (lbs)	%	Major Irrigation
Tulare	Almond	1,194,140	31	Drip
	Orange	647,130	17	Drip
	Alfalfa	521,801	13	Gravity
	Cotton	476,993	12	Gravity
	All Crops	3,898,613		
San Joaquin	Almond	453,072	33	Drip
	Walnut	309,647	23	Drip Gravity
	Alfalfa	233,398	17	Gravity
	Grapes, Wine	126,826	9	Drip
	All Crops	1,354,356		
Sacramento	Walnut	497,586	64	Drip Sprinkler
	Almond	191,882	25	Drip
	Alfalfa	54,797	7	Gravity
	All Crops	773,087		

Lower Use/ High Detection Regions

Region	Crop	Total (lbs)	%	Major Irrigation
Salinas	Broccoli	153,695	54	Sprinkler, Drip
	Grapes, Wine	72,971	26	Drip
	Cauliflower	37,324	13	Sprinkler, Drip
	All Crops	284,541		
Imperial	Sugarbeet	128,883	54	Gravity
	Alfalfa	89,456	37	Gravity
	Corn	12,281	5	Gravity
	All Crops	239,728		
Santa Maria	Broccoli	86,061	62	Sprinkler, Drip
	Grapes, Wine	19,707	14	Drip
	Strawberry	15,891	11	Sprinkler, Drip
	Cauliflower	10,915	8	Sprinkler, Drip
	All Crops	138,524		
Pajaro	Apple	8,762	26	Sprinkler, Drip
	Cabbage	4,059	12	Sprinkler
	Corn	3,123	9	Drip
	All Crops	33,613		

Step 3: Potential Mitigation

- Technical Advisory Committee formed to address chlorpyrifos detections in Central Coast watersheds
- Committee a collaboration of County Agricultural Commissioners, university researchers, IPM advisor, local experts, regional Water Board and DPR staff
- Potential mitigation measures including the use of buffers, enzymes, improved soil incorporation, application timing and/or application technology

Step 4: Implementation; What's next?

- Currently evaluating possible mitigation practices and determining best regulatory approach
- CAC taking lead; considering county-specific permit conditions
- Once implemented, continue evaluating use patterns and measuring success through monitoring
- Look to possible areas in Central Valley to engage with coalitions and counties and determine best way to engage