Pesticide Monitoring and the Irrigated Lands Program: A Solution in Search of a Problem

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Outline

- Irrigated lands monitoring – pre-ILRP
- ILP/ILRP – the early years
- ILRP – the WDR years
- ILRP – the future

Pre-Irrigated Lands Program

- UC Davis monitoring of Sacramento River and San Joaquin River in mid-late 1990's
- Demonstration of significant toxicity and elevated concentrations of chlorpyrifos and diazinon
- Associated with dormant sprays on orchards
- Triggered work on chlorpyrifos and diazinon TMDL
  - Monitoring
  - Development of objectives

Irrigated Lands Program

- Regional Water Board monitoring 2004 – 2007
  - 92 sites monitored in dormant and irrigation seasons
  - 50 pesticides (both registered and legacy)
  - 9 metals
  - Water column toxicity
  - Physical parameters
  - Nutrients
  - Trihalomethane precursors

Results

- Detections of all pesticides except Captan
- Many detections were at concentrations below Reporting Limits

Results 2004 - 2007

Analyte (µg/L)	Mean (µg/L)	Minimum (µg/L)	Maximum (µg/L)	Trigger Limit (µg/L)	Count	Detections	Frequency %
Aldicarb	5.043	0.410	9.720	3.00	402	3	0.7
Carbaryl	0.594	0.061	3.600	2.53	402	9	2.2
Carbofuran	0.071	0.015	0.316	0	402	9	2.2
Methomyl	0.510	0.015	2.250	0.52	402	15	3.7

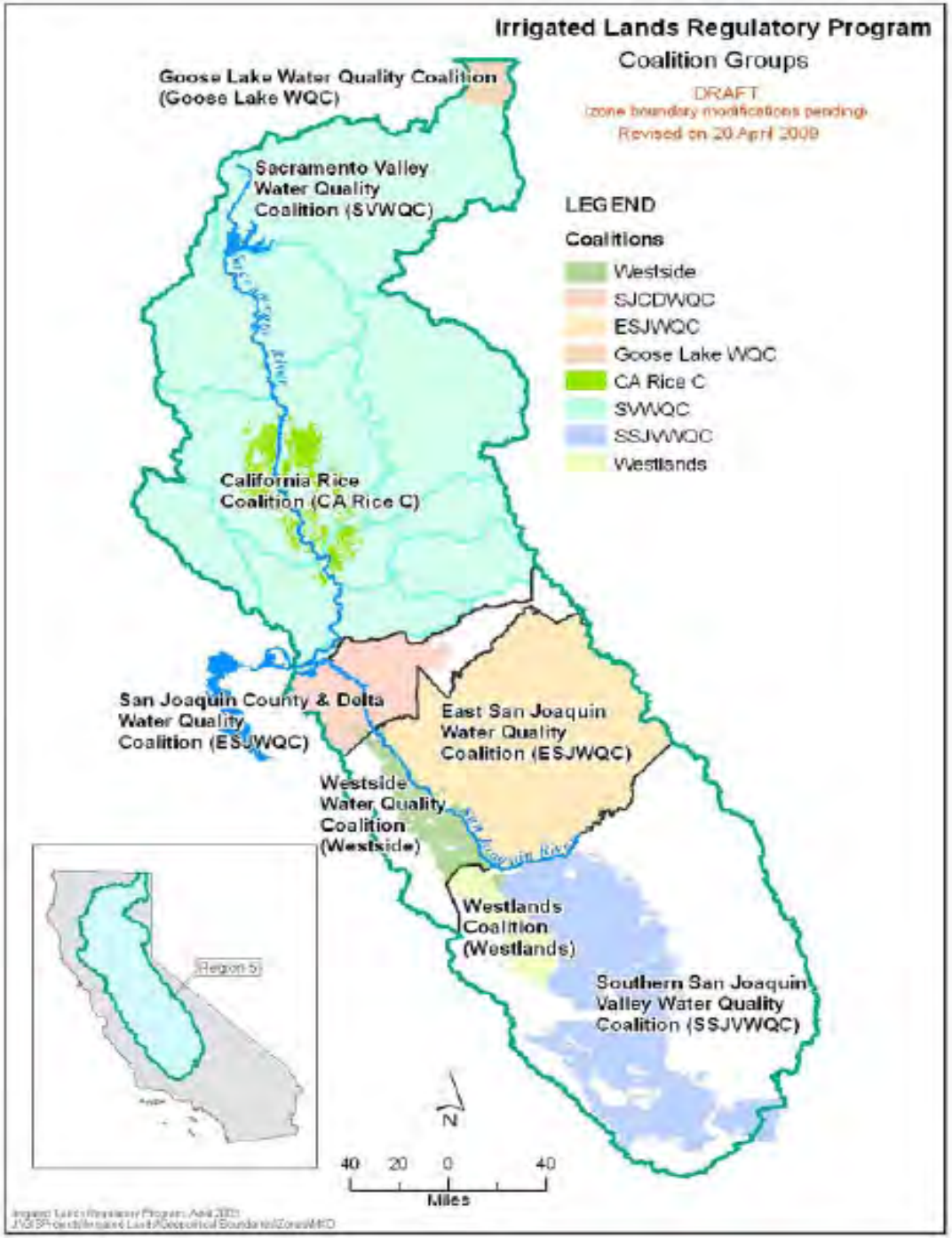
Analyte (µg/L)	Mean (µg/L)	Minimum (µg/L)	Maximum (µg/L)	Trigger Limit (µg/L)	Count	Detections	Frequency %
Chlorpyrifos	0.054	0.004	2.200	0.015	564	162	28.7
Diazinon	0.137	0.004	2.00	0.100	565	182	32.2
Dimethoate	0.307	0.030	1.84	1.000	565	60	10.6
Disulfoton	0.061	0.010	0.418	0.050	565	55	9.7
Malathion	1.885	0.032	46.000	0	565	26	4.6

Herbicides 2004 - 2007

Analyte (µg/L)	Mean	Minimum	Maximum	Trigger Limit	Count	Detections	Frequency %
Atrazine	0.082	0.020	0.740	1.0	111	63	57
Diuron	0.410	0.004	5.600	2.0	403	71	18
Metolachlor	0.496	0.012	3.370	NA	111	27	24
Simazine	0.785	0.024	5.400	4.0	484	93	19
Trifluralin	0.186	0.010	0.643	5.0	111	20	18
Propazine	0.037	0.013	0.115	NA	111	9	8
Propanil	3.726	0.116	23.170	NA	111	7	6

Irrigated Lands Program Conditional Waiver (2003 – 2012)

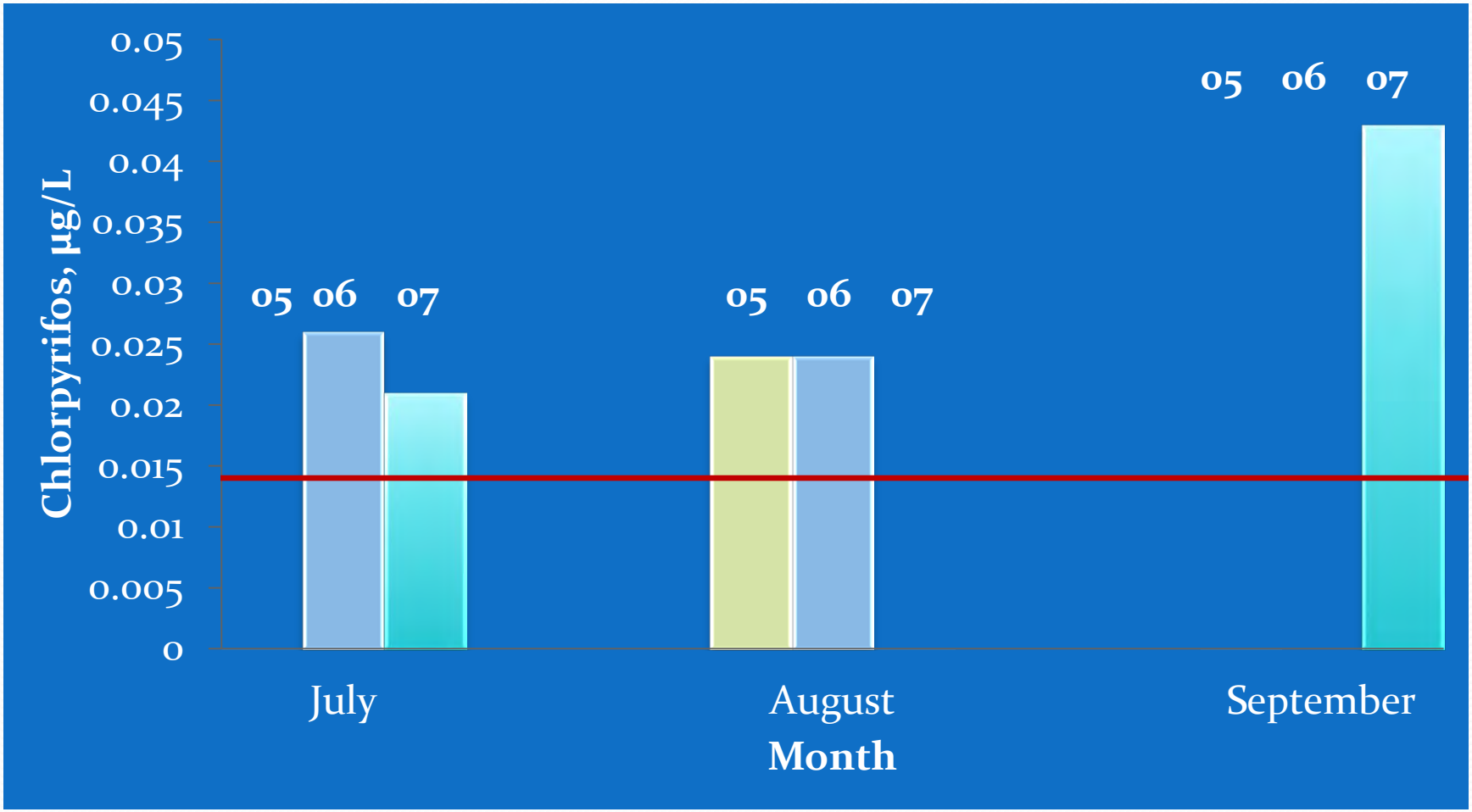
- Coalition monitoring programs
- Core monitoring vs. rotating assessment sites
- Same pesticide list as Regional Water Board
- Monthly monitoring at all sites
  - Follow-up monitoring for exceedances
- Management plans for exceedances
  - Management plan monitoring


Irrigated Lands Regulatory Program
Coalition Groups
DRAFT
(zone boundary modifications pending)
Revised on 20 April 2009
Goose Lake Water Quality Coalition (Goose Lake WQC)
Sacramento Valley Water Quality Coalition (SVWQC)
California Rice Coalition (CA Rice C)
San Joaquin County & Delta Water Quality Coalition (ESJWQC)
East San Joaquin Water Quality Coalition (ESJWQC)
Westside Water Quality Coalition (Westside)
Westlands Coalition (Westlands)
Southern San Joaquin Valley Water Quality Coalition (SSJVWQC)
LEGEND
Coalitions
Westside
SJCDWQC
ESJWQC
Goose Lake WQC
CA Rice C
SVWQC
SSJVWQC
Westlands
Region 5
N
40 20 0 40
Miles

Outcome of Monitoring

- Management Plans for 24 watersheds in ESJWQC alone
  - Plan to eliminate exceedances
  - Monitoring for 2 additional years
  - Prioritized implementation
- Outreach strategy
  - Use DPR PUR database to identify pesticide applications
  - Met individually with growers to discuss management practices

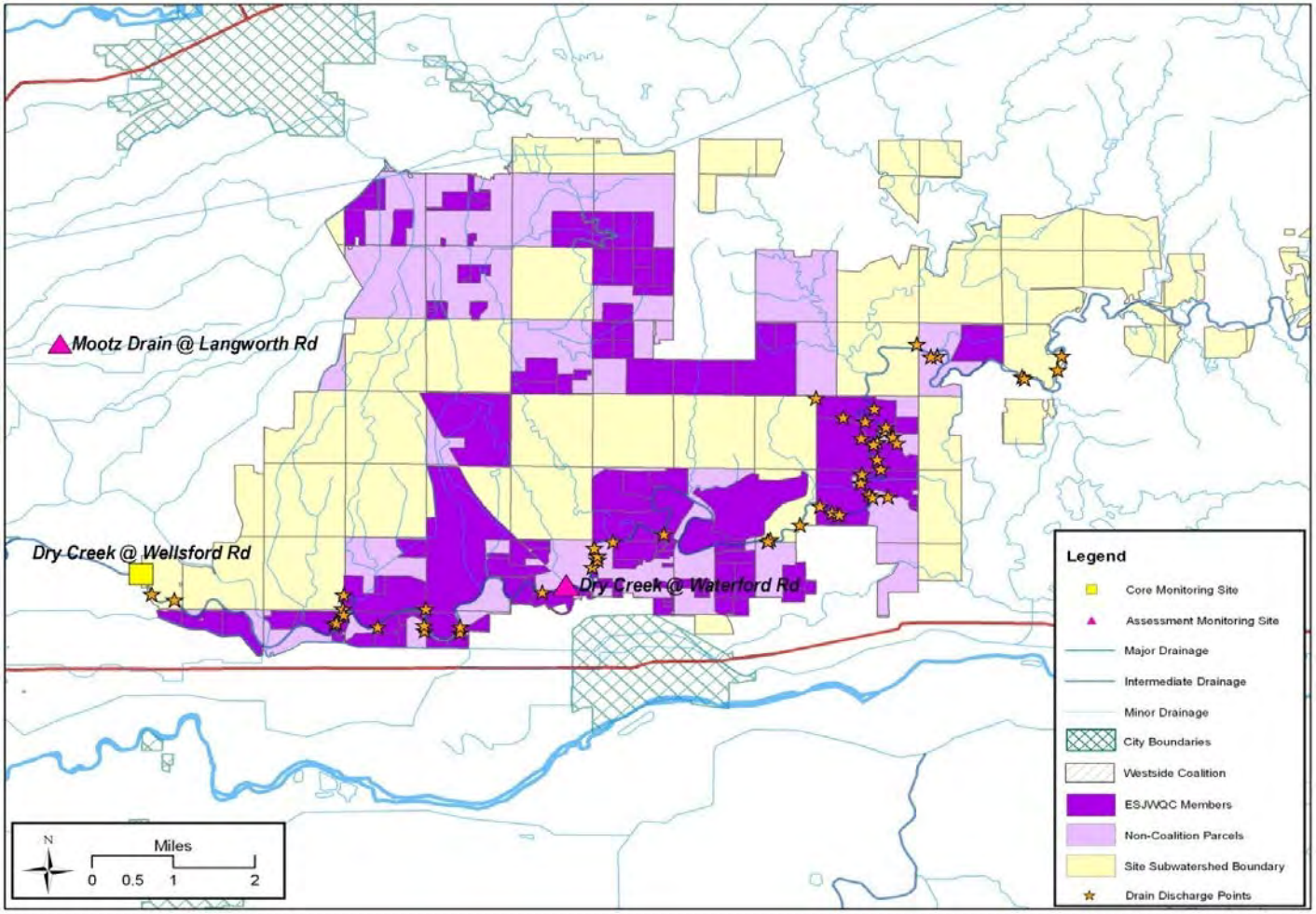
Dry Creek @ Wellsford Rd 2005 - 2007



Exceedances
Dry Creek @ Wellsford Rd

Date	Diuron (2 µg/L)	Thiobencarb	Lead	Copper	Water flea toxicity	Algae toxicity	Sediment toxicity
15-Feb-05					toxic		
11-May-05							toxic
14-Sep-06		0.1			toxic		
11-Feb-07	37					toxic	
28-Feb-07	4			8.4 (7.2)		toxic	
7-Mar-07						toxic	
17-Apr-07				5.1 (5.0)			
26-Feb-08			1.8 (1.6)	11 (6.0)		toxic	
4-Mar-08							toxic
28-Aug-08							toxic

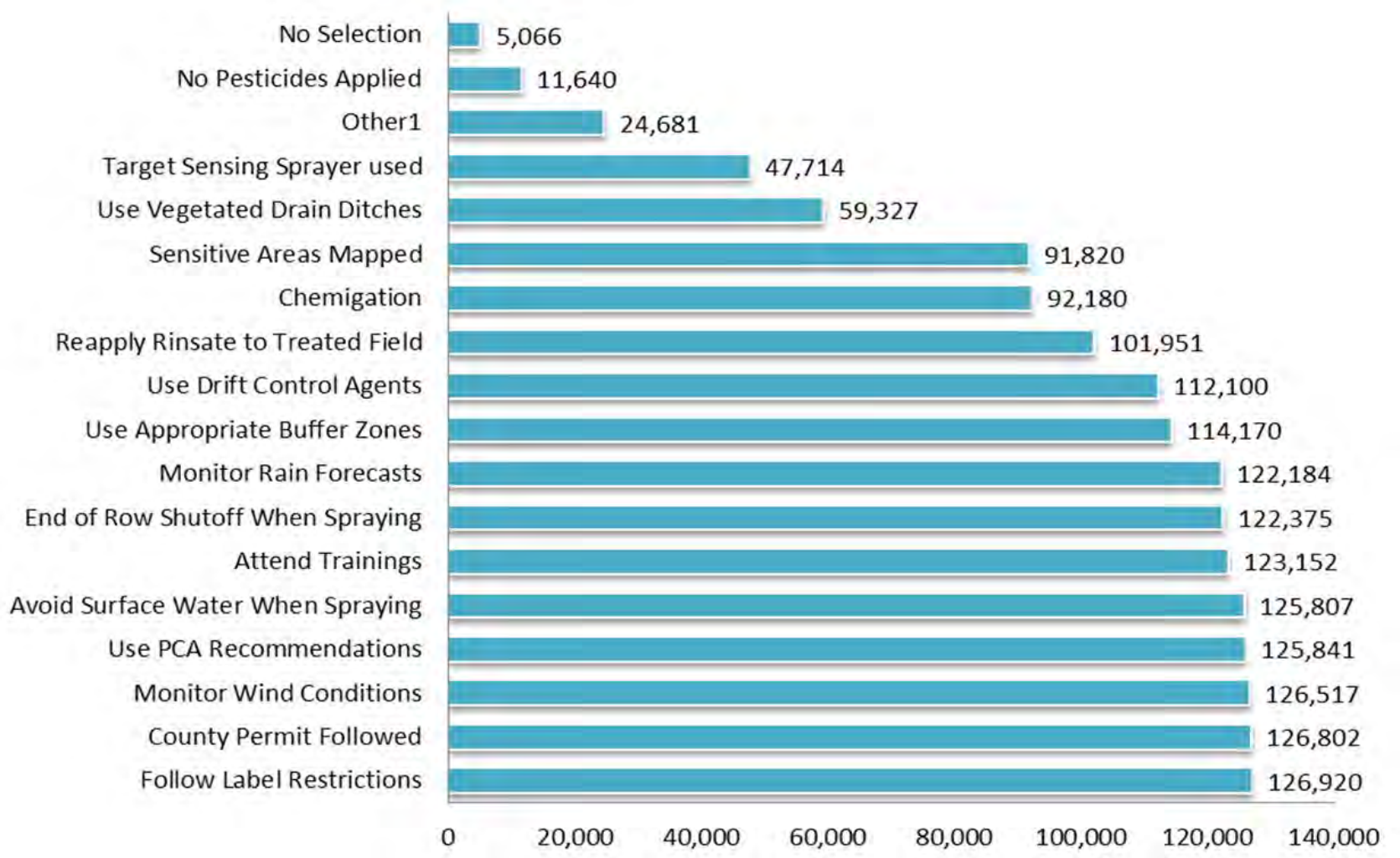
Chlorpyrifos Use 2004 - 2007



Irrigated Lands Regulatory Program Waste Discharge Requirements (2012 – present)

- Reduced monitoring
  - Six core sites
  - Numerous Represented sites
- Same list of pesticides as under the Conditional Waiver
- Continue outreach
- Document grower practices

Pesticide Application Management Practices (Acreages)



Third-Party (Coalition) Boundaries
1
2
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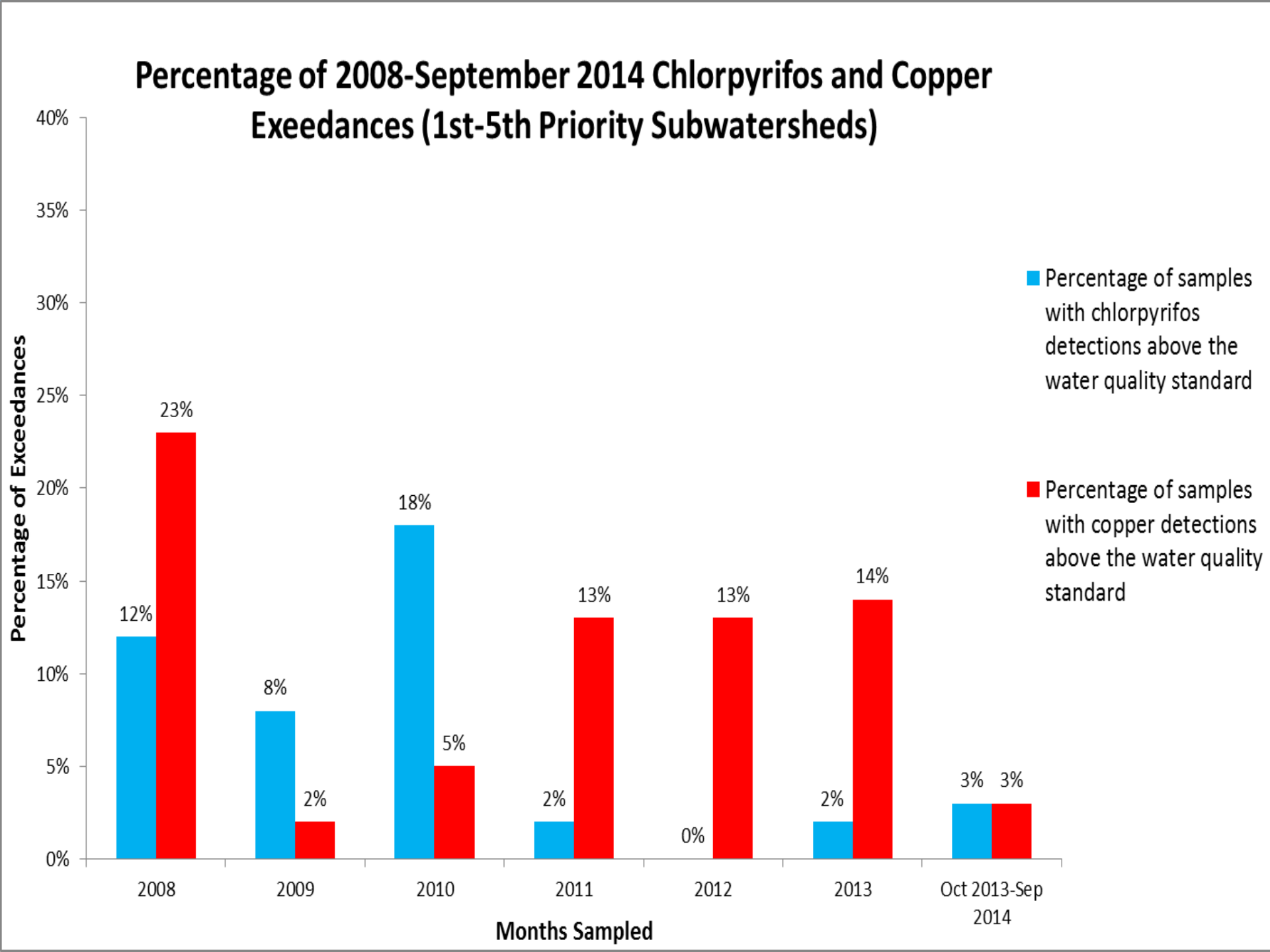
13
14


Percentage of 2008-September 2014 Chlorpyrifos and Copper Exeedances (1st-5th Priority Subwatersheds)
Percentage of Exceedances
40%
35%
30%
25%
20%
15%
10%
5%
0%
12%
23%
8%
2%
18%
5%
2%
13%
0%
13%
2%
14%
3%
3%
2008
2009
2010
2011
2012
2013
Oct 2013-Sep 2014
Months Sampled
Percentage of samples with chlorpyrifos detections above the water quality standard
Percentage of samples with copper detections above the water quality standard

October 2014 –September 2015 Exceedances

Subwatershed	Pesticides			Metals			Toxicity	
	Chlorpyrifos	Dimethoate	Malathion	Molybdenum	Arsenic	Copper	Water Flea	Sediment toxicity
Duck Slough @ Gurr Rd	1		1					
Highline Canal @ Hwy 99	1							
Highline Canal @ Lombardy Rd						1		
Livingston Drain @ Robin Ave						1		
Howard Lateral @ Hwy 140						1		
Prairie Flower Drain @ Crows Landing Rd	6			9			5	1
Unnamed Drain @ Hogin Rd		1						
Mustang Creek @ East Ave						1		

New Pesticide Selection Process

- Developed approach pioneered by Sacramento Valley Coalition
- Stakeholders in Region to develop process by which pesticides are selected for monitoring
- Modeled on DPR Surface Water Protection Monitoring Program constituent selection process

REVISED 1-19-15 – STRAWMAN FOR DISCUSSION - Step 3

3A: Available Monitoring Data

Obtain all reliable monitoring data for the pesticide in the watershed (Coalition, CEDEN, USGS, DPR). Examine data quality, detection limits relative to reference values, sample timing relative to application and runoff timing. Select only high quality data (exclude non-detects when detection limits > reference values) and samples timed to capture drift or discharge/runoff.

(1) Do **sufficient** samples exist to characterize the pesticide in the watershed at all vulnerable time periods? (**DPR defines "sufficient" as 20 in a county.**)
(2) Has sampling occurred in last 5 years?
(3) Are any measured values ≥ 10% of reference value? [*303(d) listing issue*]

If yes to (1) and (2) and no to (3) – decision is complete = not a monitoring priority.

3B: Environmental Fate

Eliminate pesticides likely to partition into sediments, except pesticides toxic at very low concentrations, i.e., eliminate chemicals with Koc > 100,000 unless lowest reference value <1 µg/L

3C: Establish Cutoff Ranking

Drop lowest ranked pesticides = < 10 lbs used or ratio <0.1 (lbs used divided by toxicity in µg/L)

3D: Site-Specific or Regulatory Basis for Exclusion

<u>Optional considerations</u>:
--Recent (last 3 years) new EPA or DPR regulatory controls established and demonstrated to prevent water pollution
--Growers have terminated or greatly reduced use in last 3 years
--Successful management plan, with outcome documented by sufficient samples
--Not used in a particular subwatershed

3E: Chemical Analysis Method

Current availability of analytical methods with sufficiently sensitive/environmentally relevant detection limits. If costly, document and consider in 3F. **If none available, document – decision is complete = not a monitoring priority at this time.**

3F: Final Selection

Evaluate list to identify which pesticides to monitor and when to monitor. Prioritize:

(1) pesticide with detections >10% of reference value, unless sampling frequency during vulnerable time periods has been statistically sufficient to capture peak concentrations
(2) pesticides without monitoring data in the entire watershed, particularly pesticides conditionally registered by DPR due to potential for surface water pollution

Provide scientific explanation for decisions to not monitor pesticides with enforceable drinking water standards, water quality objectives, EPA water quality criteria, or on 303(d) list.

Delta Regional Monitoring Program Role of Agriculture

- Participation by four Agricultural Coalitions
- Required contribution of monetary support to RMP
- Receive a monitoring swap
- USGS conducting the analyses of pesticides
  - Give number of pesticides
  - Status of monitoring

Bottom Line – ILRP Monitoring

- Monitoring has been successful in identifying locations with impaired beneficial uses
- Focus has changed from intensive monitoring to focused outreach with follow-up monitoring
- Dramatic improvement in water quality since 2008 in ESJWQC and SJCDWQC