Urban Pesticide Monitoring in Northern and Southern California: A Regional Look at Urban Pesticides in Surface Waters

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Outline

I. Objectives
   - Monitoring Areas and Sites
   - Pesticide Selection and Analysis

II. Monitoring Results

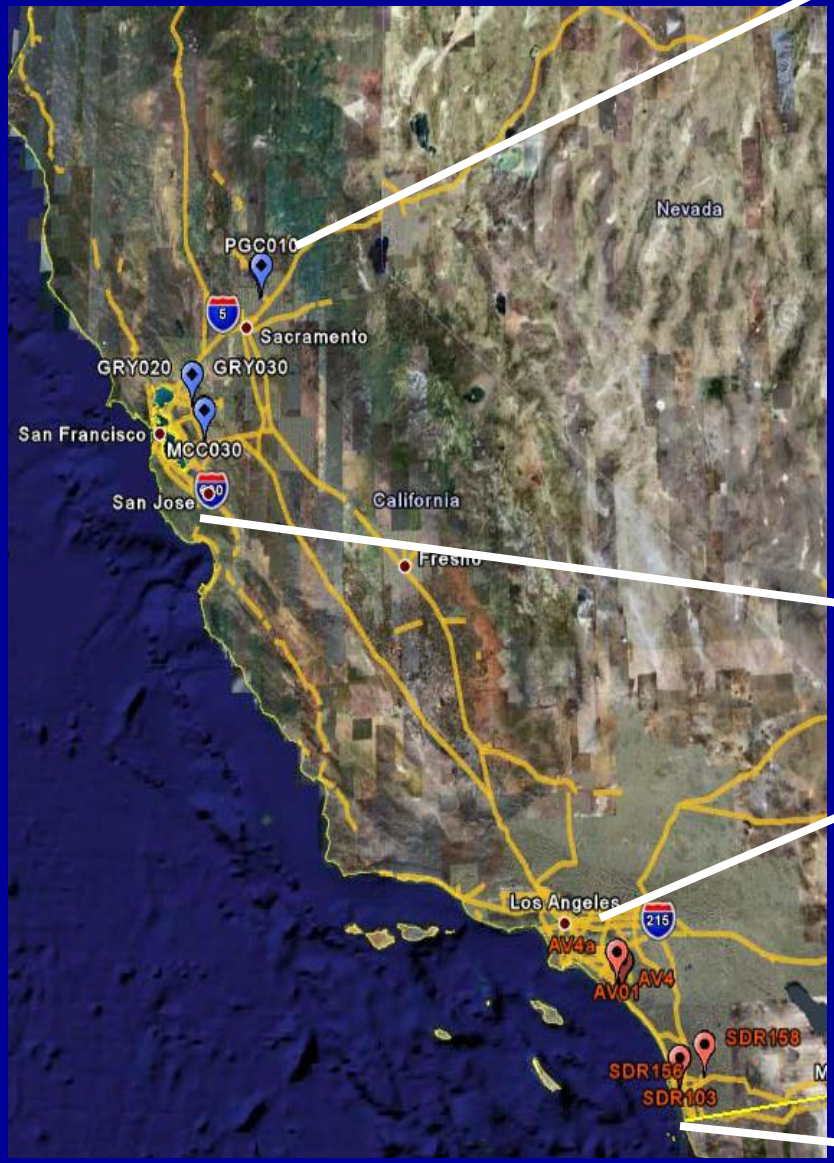
III. Summary

I. Objectives

1. What pesticides are present in urban surface waters?
2. Determine the effect of water body type
3. Determine the influence of rainfall on pesticides/concentrations
4. Compare to aquatic benchmarks

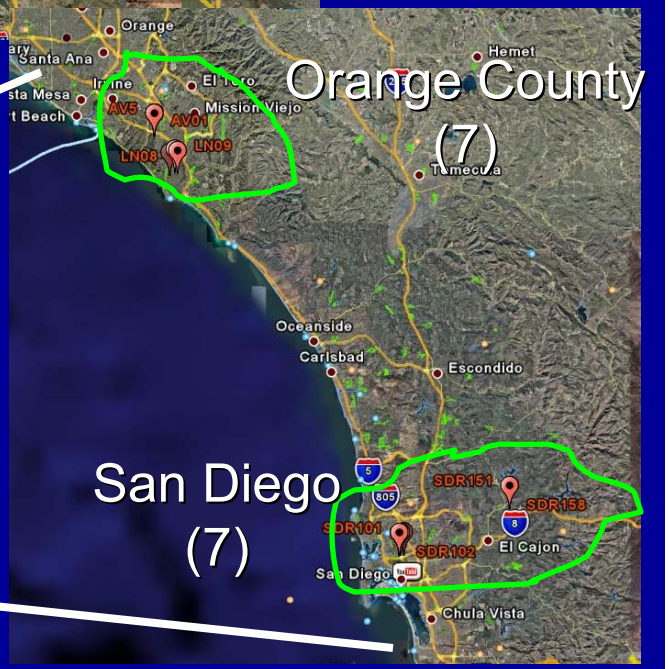
Additional information (Study 249):
http://www.cdpr.ca.gov/docs/emon/surfwtr/protocol.htm

Monitoring Areas



Bay Area
(7)

Sacramento
(4)



Orange County
(7)

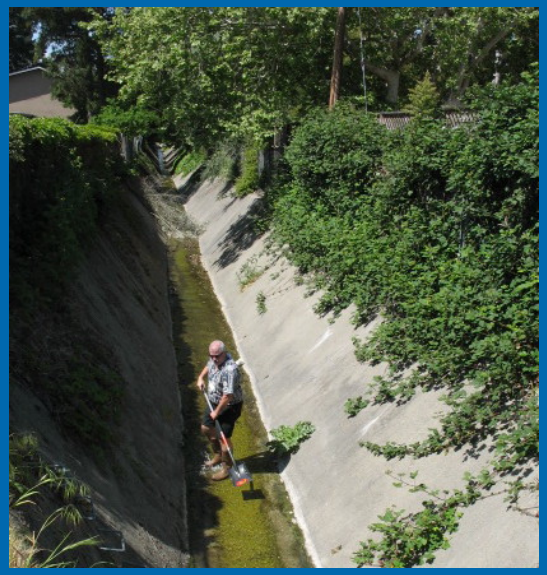
San Diego
(7)

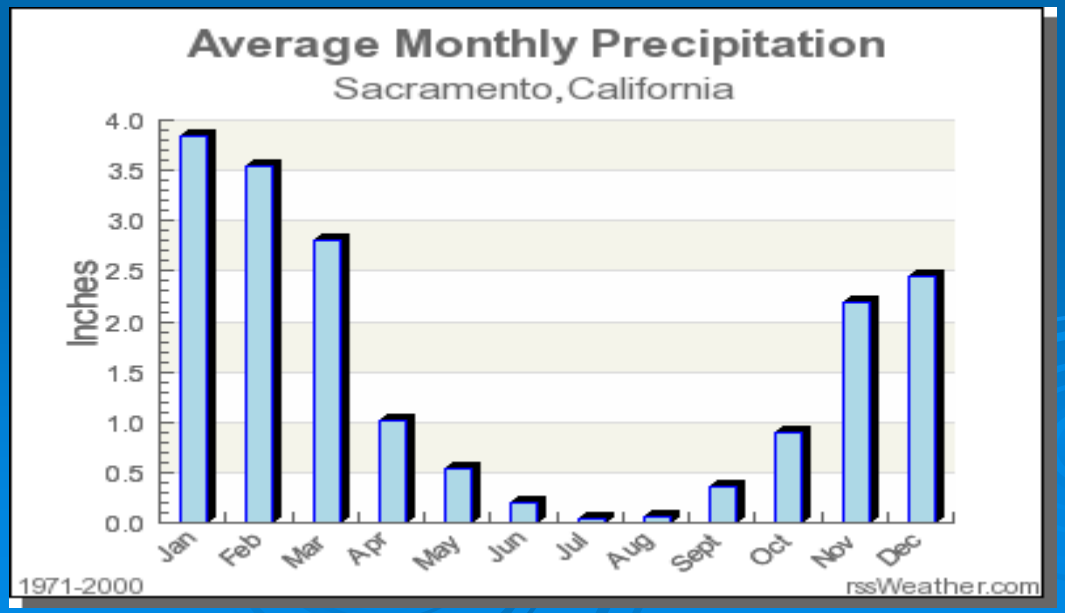
Stormdrain vs. Receiving Water

Receiving Water

Stormdrains

Baseflow vs. Rainstorm Sampling



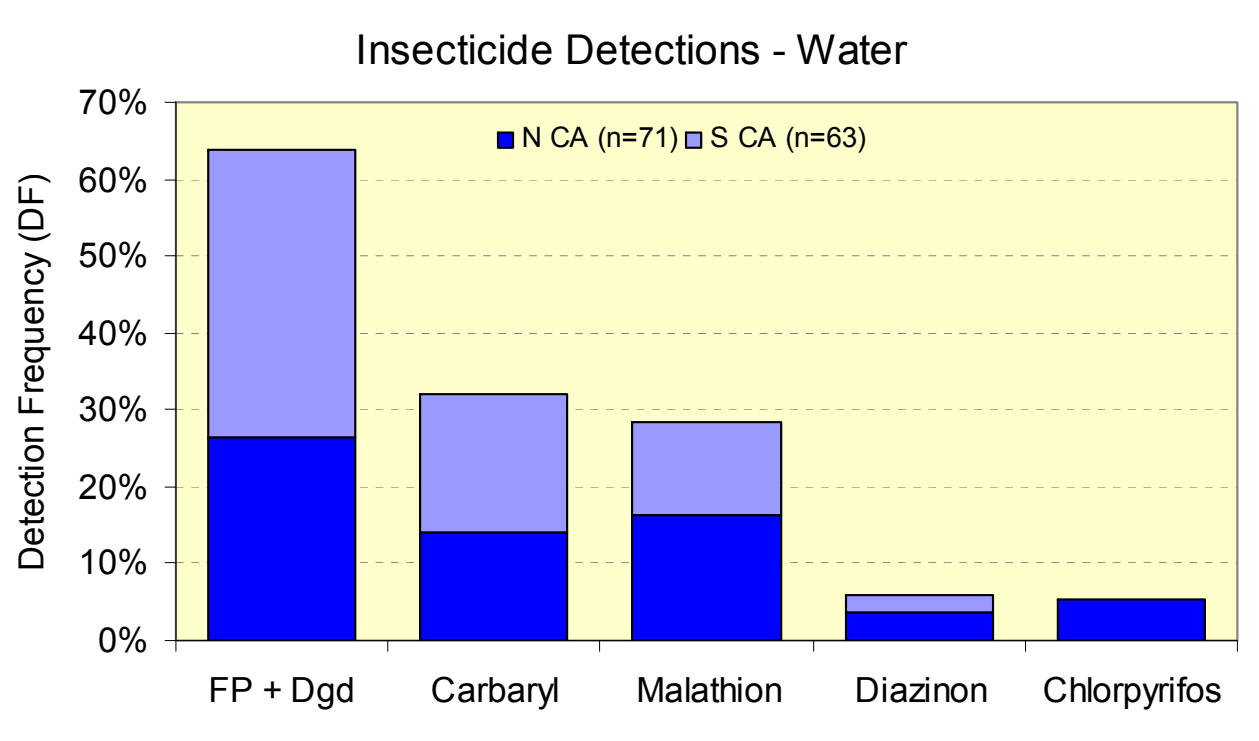


Pesticide Analysis

Pesticide Type	Analyte Group	No. Pesticides/ Degradates	Sample Matrix
Insecticide	Carbamate	9	Water
	Fipronil(s)	6	Water
	OP	15	Water/Sediment
	Pyrethroids	11	Water/Sediment
Herbicide	PS II Inhibitors	11	Water
	Dinitroanilines	6	Water
	Synthetic Auxins	4	Water
	Membrane Disr/Bleachers	2	Water
	Total	64	

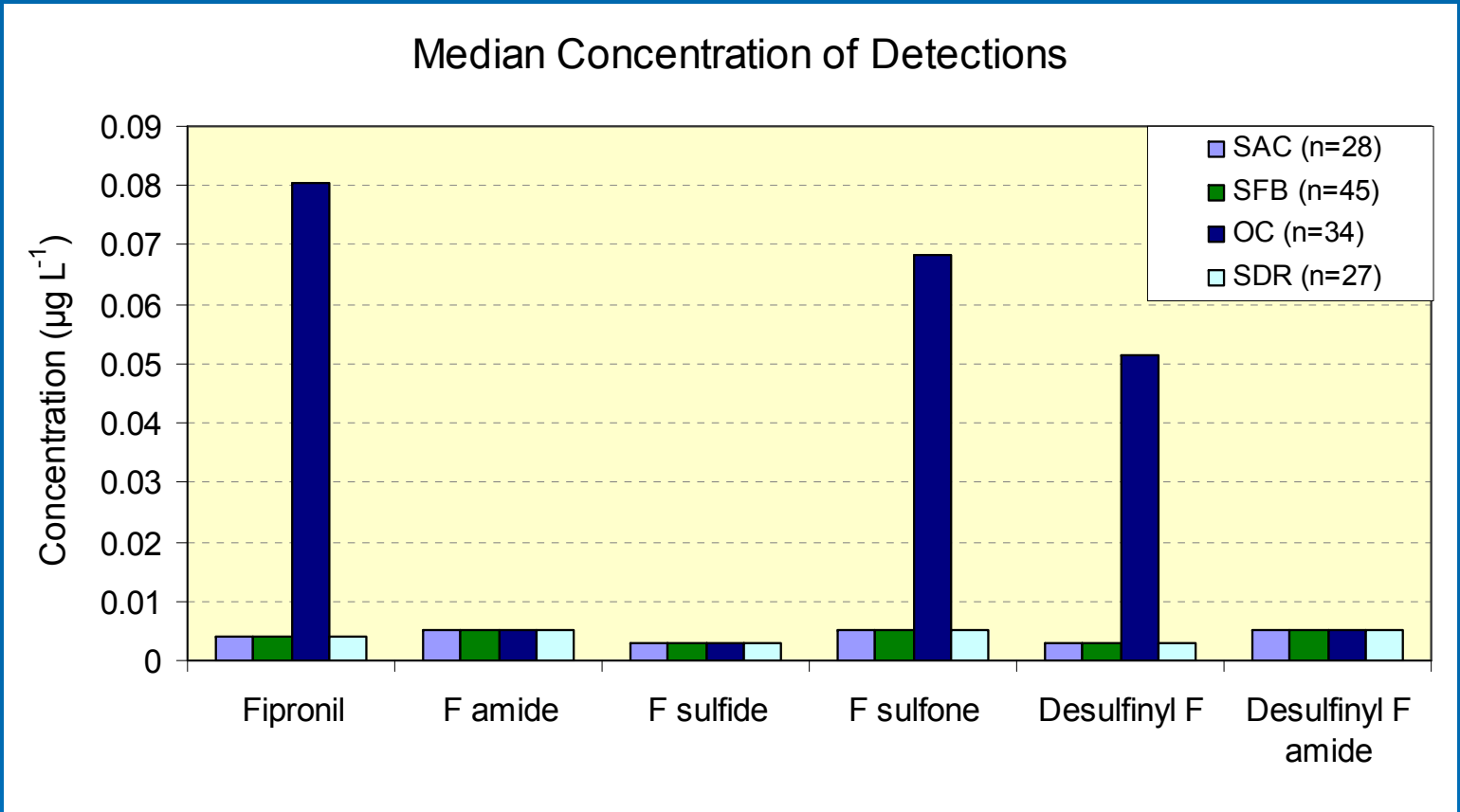
Insecticide Detections - Water

Insecticide Detections - Water



- FP: OC ~ 100% detection frequency (df)
- Carbaryl df > in OC
- Malathion, SAC > OC > SFB
- Chlorpyrifos only in N CA

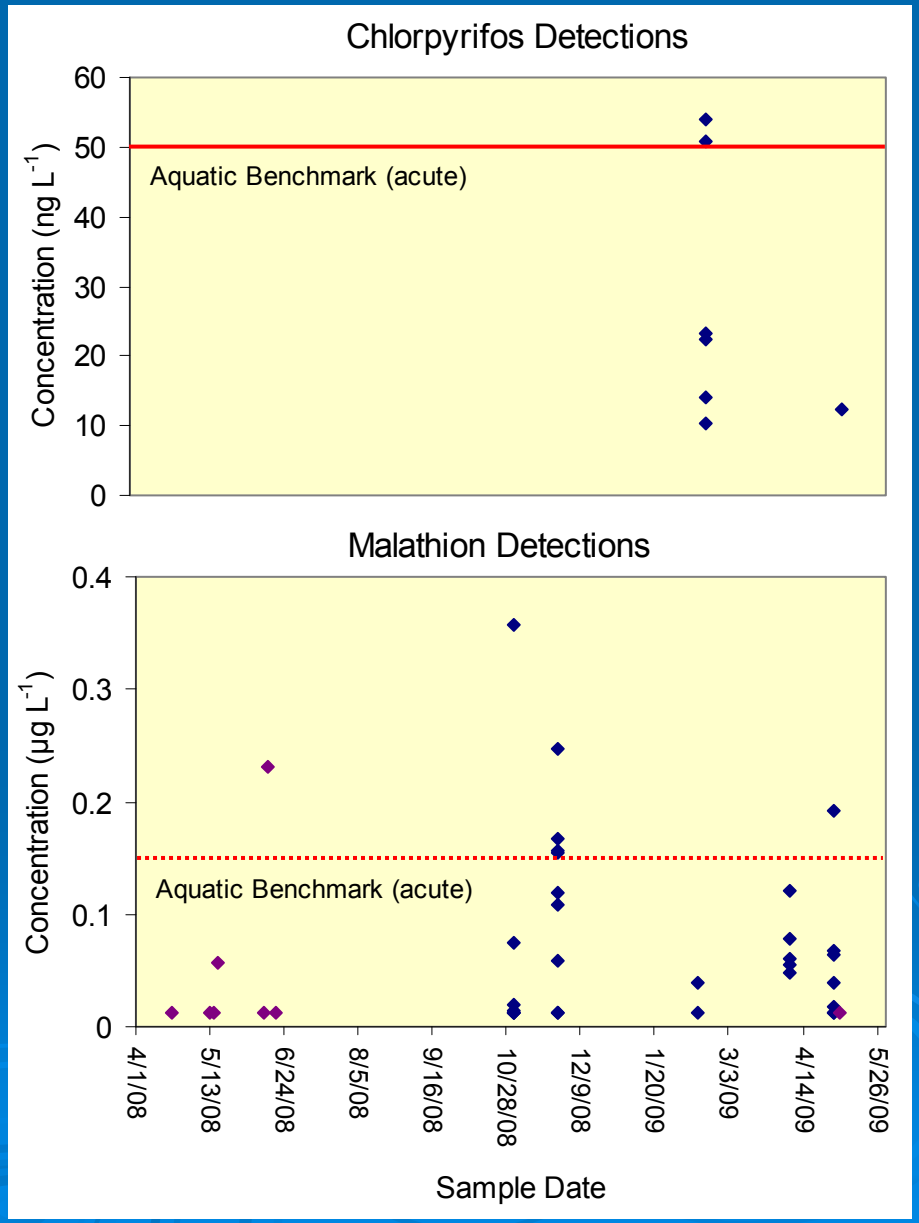
Insecticide Detections - Fipronil



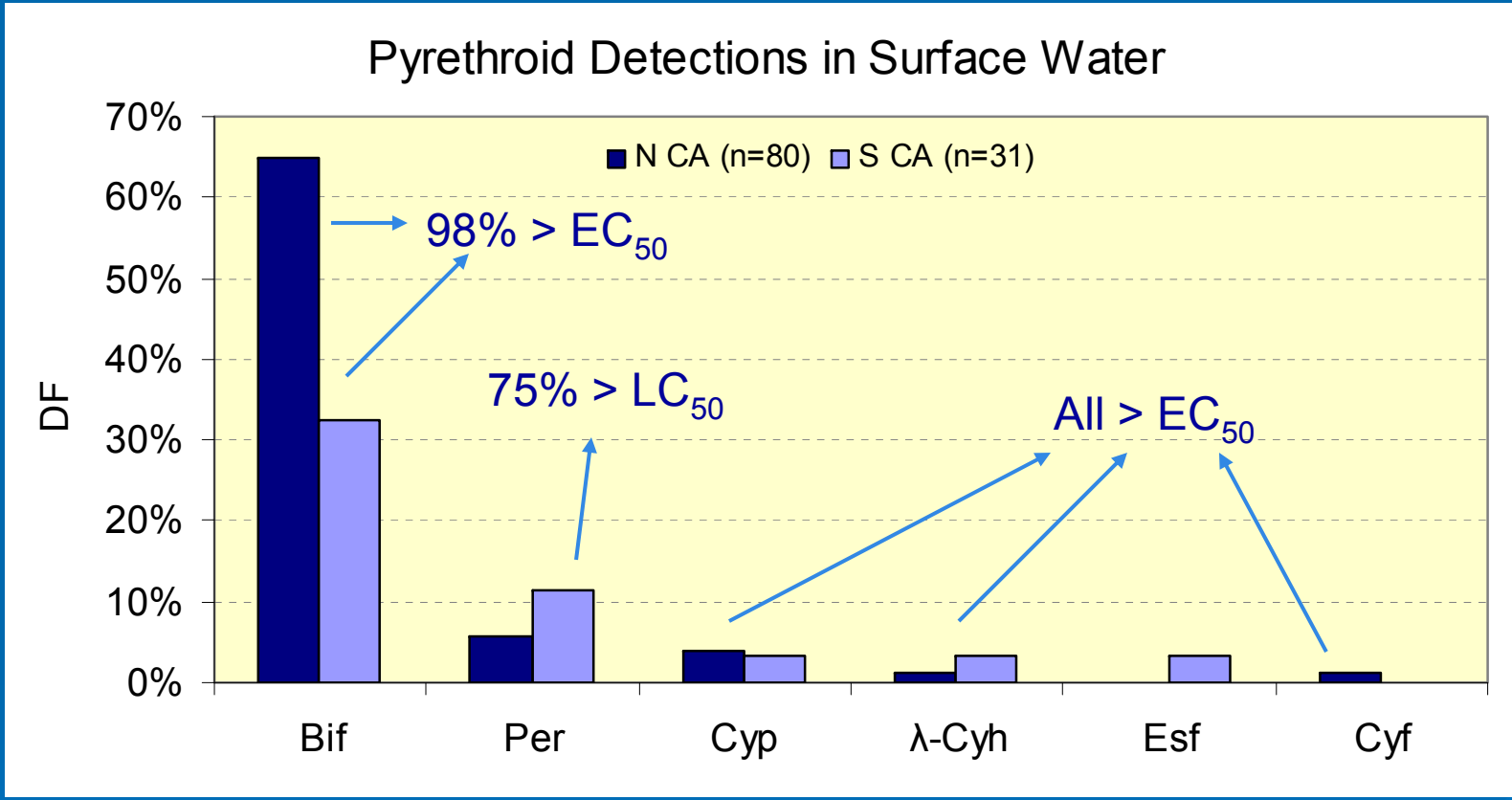
- Higher concentrations in OC
  - Fipronil, F sulfone, desulfinyl F
  - No detections > acute aquatic toxicity

Insecticide Detections – Toxicity

- Few detections > EPA OPP aquatic benchmarks
  - Malathion – "draft" benchmark (18% > benchmark)

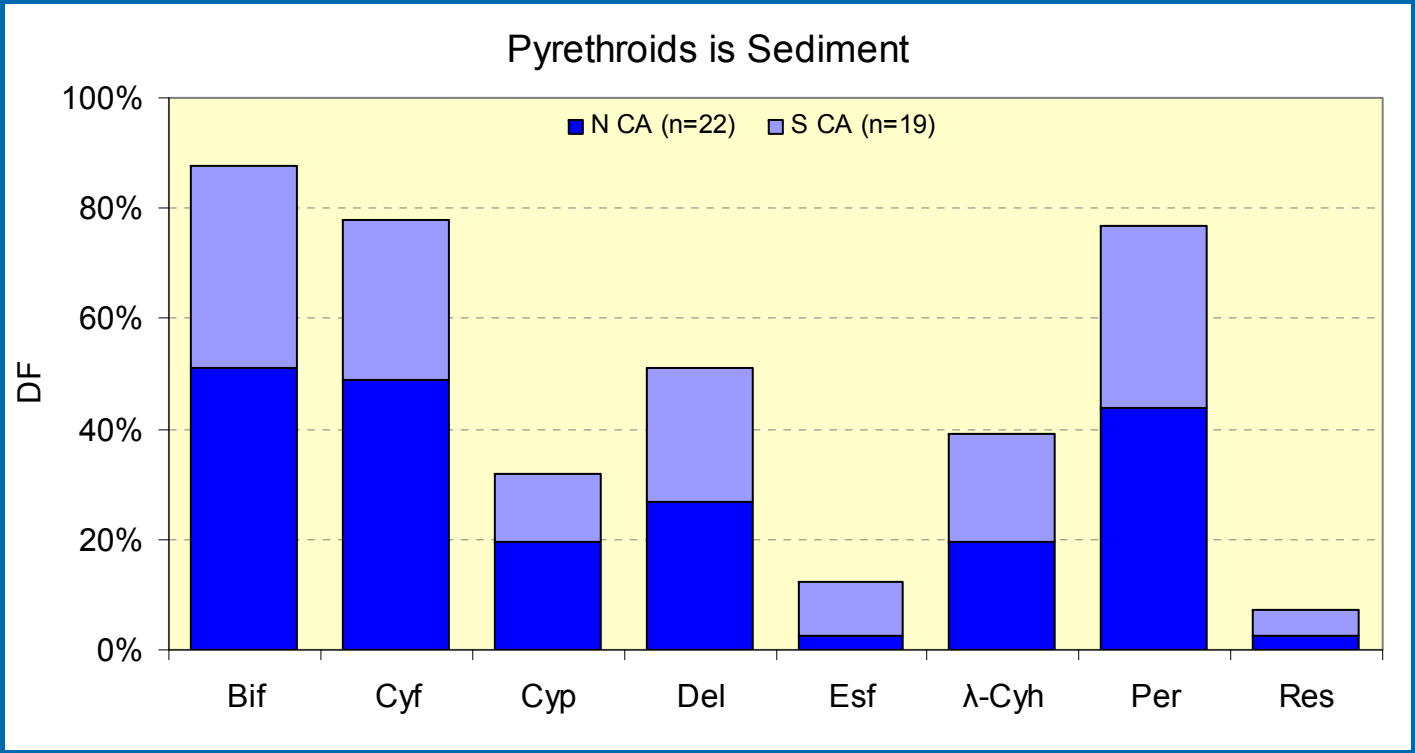


Pyrethroid Detections - Water



- It's a Bifenthrin world, after all!
- Pyrethroid detections usually > EC or LC_{50} (*H. azteca*)

Pyrethroid Detections - Sediment

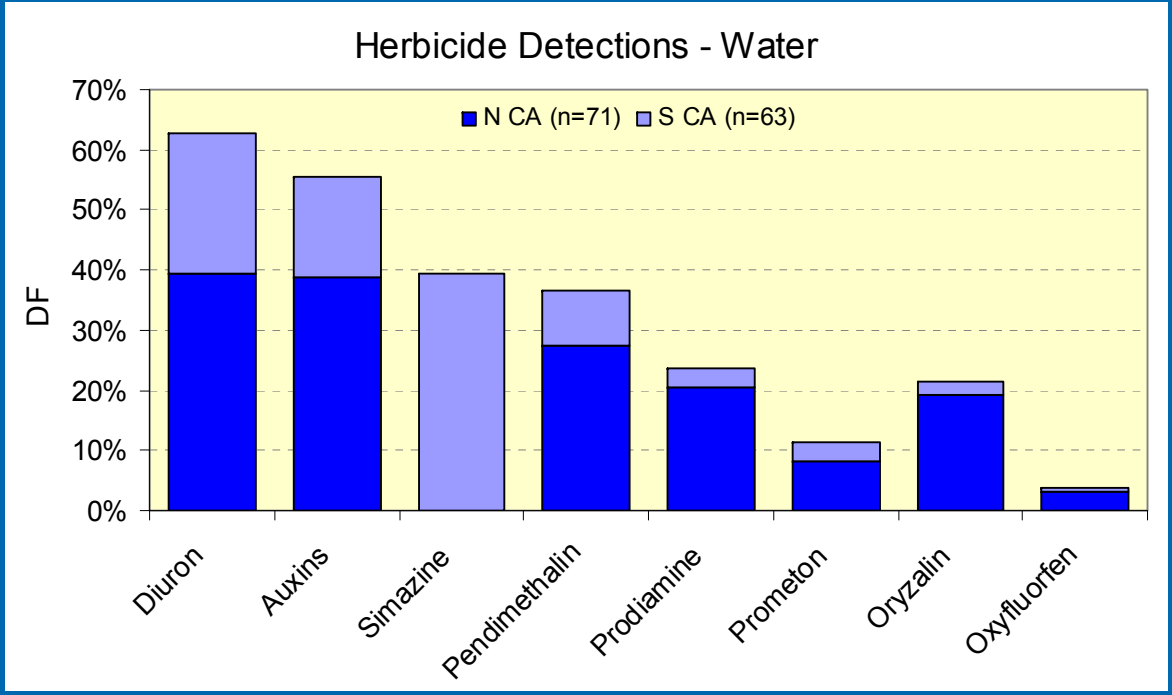


- 40 of 41 sediments contained pyrethroids
- Over half contained > 4 pyrethroids
- Overall, N CA ~ S CA
  - Bifenthrin, cyfluthrin df > N CA

Herbicide Detections

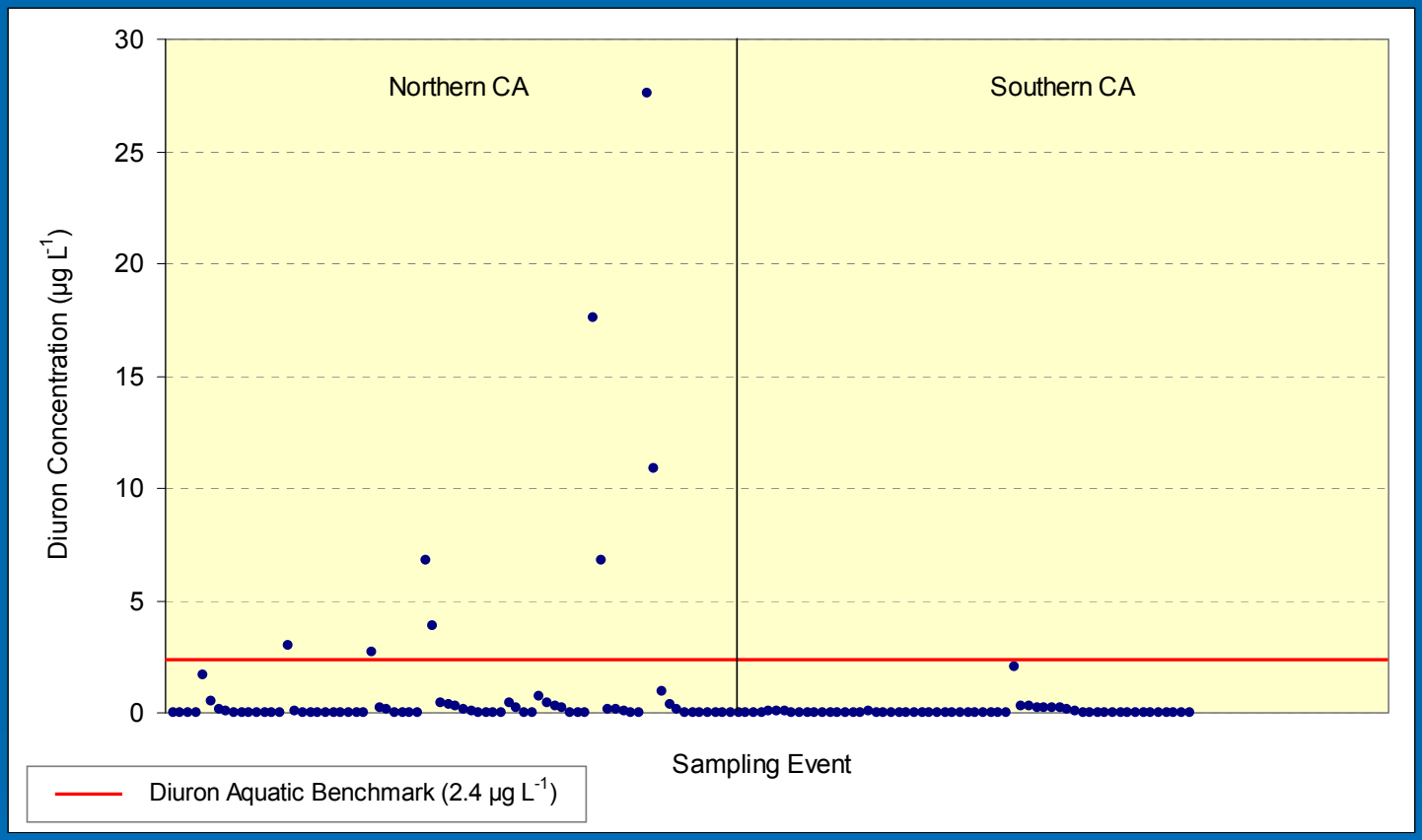
Herbicide Detections - Water

- Highest df: 2,4-D, diuron



- N CA > S CA
  - Due to low SDR detection rate
  - N CA ~ OC: diuron, auxins
- Generally, concentrations of detections N CA ~ S CA
  - SAC: > pendimethalin, dicamba, 2,4-D
  - SFB: > diuron, oryzalin

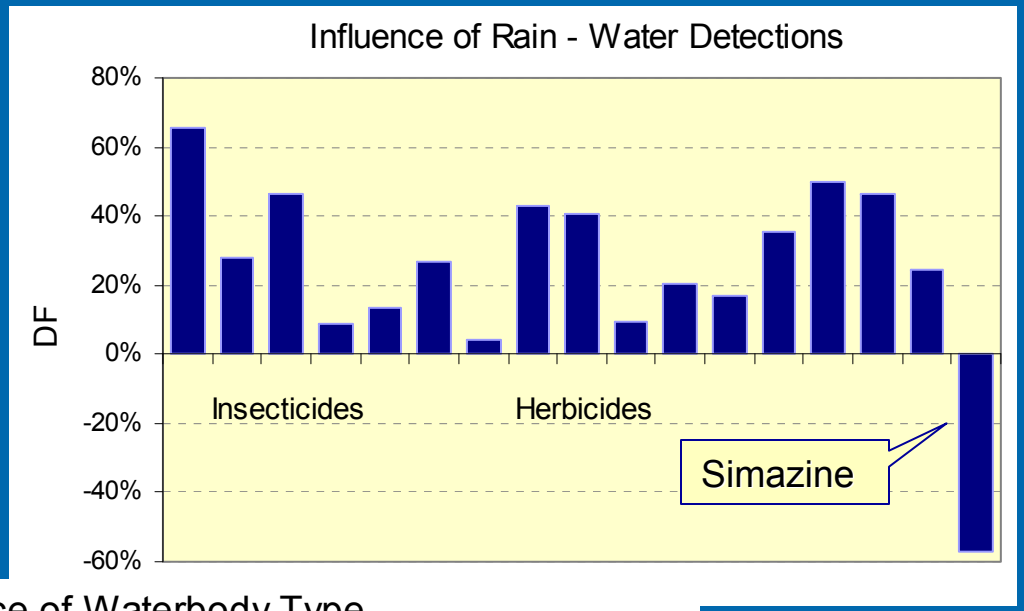
Herbicide Detections – Toxicity

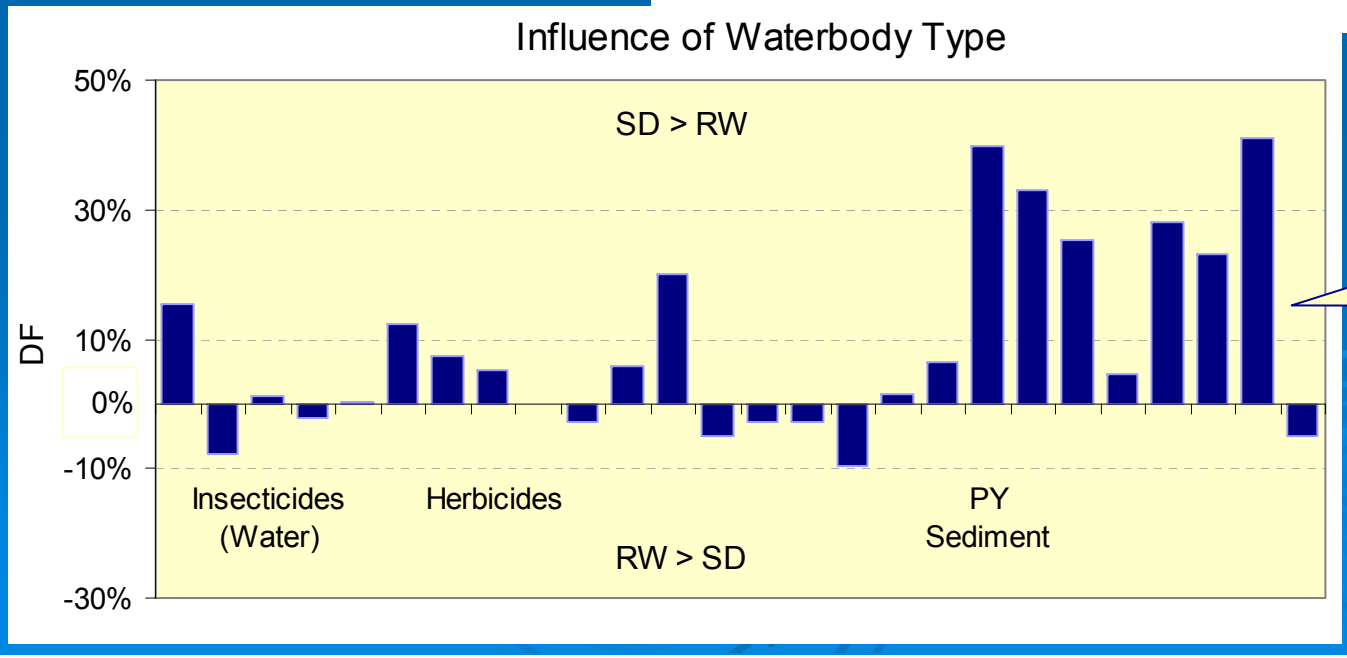


- N CA – 8 detects > benchmark
- Oxyflourfen 1 of 5 detects > aquatic toxicity

Pesticide Detections – Influence of:

- Rain
- Waterbody Type
- Waterbody Type





Summary

- Water & sediment monitoring, 25 sites in S and N CA
- Detected 16 insecticides (water), 11 herbicides, 8 pyrethroids (sediment)
- Insecticides (Water): Fipronil ~ Bifenthrin > Carbaryl ~ Malathion
  - Chlorpyrifos, Diazinon infrequently detected
- Pyrethroids (water) detected > EC/LC_{50}
  - Malathion > Chlorpyrifos infrequently detected above aquatic invertebrate benchmarks

Summary

- Herbicides: Synthetic Auxins, Diuron
  - Auxins: 2,4-D, Triclopyr, Dicamba
- Diuron infrequently detected above aquatic non-vascular plant benchmark
- Rain increased df
  - Simazine – dry only
- Detections in storm drains ~ receiving waters
  - In sediment, SD >> RW

Questions?

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