

Monitoring Pesticides in Urban Stormdrain and Surface Waters in Four Metropolitan Areas of California

Li-Ming (Lee) He, Michael Ensminger, Kevin Kelley
Frank Spurlock, and Kean Goh

California Department of Pesticide Regulation
Environmental Monitoring Branch
Sacramento, California

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Outline

- Objectives
- Monitoring Areas and Sites
- Pesticide Selection and Analysis
- Monitoring Results
- Summary

Objectives

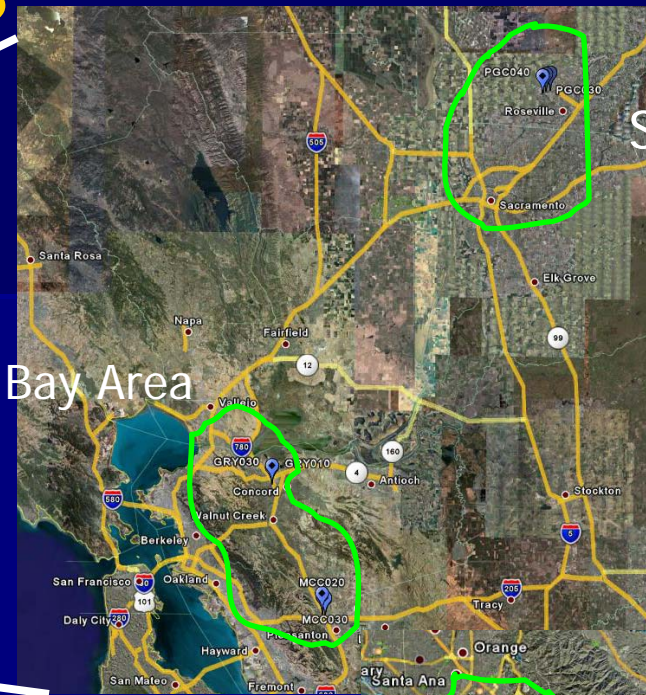
- Which pesticides are present in urban runoff?
- May these urban runoff pesticides cause toxicity to aquatic organisms?
- Are there different pesticide patterns in:
 - Stormdrain Outfall vs. Receiving Water?
 - Baseflow vs. Stormwater Runoff?

Monitoring Areas



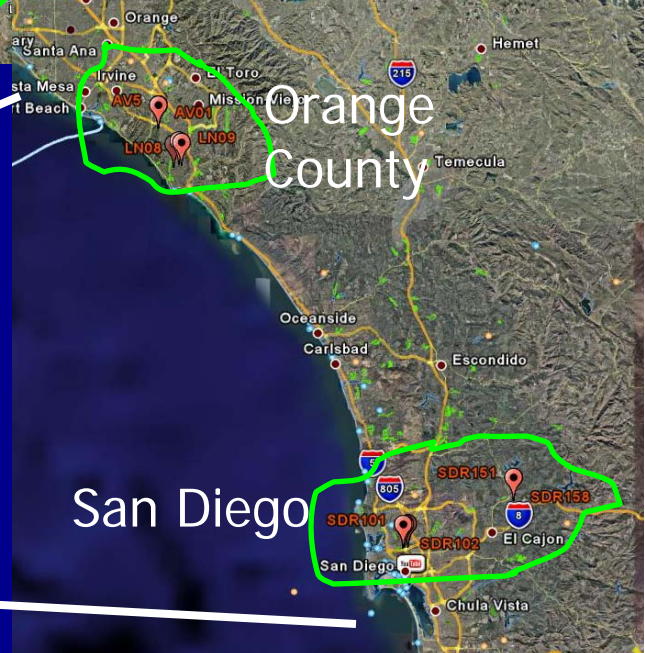
Northern California

Southern California



Sacramento

Bay Area



Orange County

San Diego

Stormdrain vs. Receiving Water



Receiving Water

Stormdrains



Monitoring Sites

Area	Stormdrain Outfall	Receiving Water	Total Sites
Bay Area	5	2	7
Sacramento Area	3	1	4
Orange County	5	2	7
San Diego Area	5	2	7
Total	18	7	25

Pesticides Analyzed

Analyte Group	Number of Pesticides Analyzed	Sample Matrix
Carbamates (CB)	9	Water
Dinitroanilines (DN)	7	Water
Fipronil & Degradates (FP)	6	Water
Organophosphates (OP)	15	Water
Phenoxys (PX)	4	Water
Pyrethroids (PY)	11	Water/ Sediment
Triazines (TR)	12	Water
Total	64	

Laboratory Analysis

- California Department of Food and Agriculture, Center for Analytical Chemistry

Analyte Group	Analytical Method	Method Detection Limit (ug/L)	Reporting Limit (ug/L)
Carbamates (CB)	HPLC	0.01 - 0.02	0.05
Dinitroanilines (DN)	GC-MS/MS LC-MS/MS (oryzalin)	0.010-0.015 0.0048	0.05
Fipronil & Degradates (FP)	GC-MSD (SIM)	0.003 - 0.005	0.05
Organophosphates (OP)	GC-FPD	0.008 - 0.0142	0.03 - 0.05
	GC-MS	0.0008 - 0.0012	0.01
Phenoxy (PX)	GC-MS	0.064	0.1
Pyrethroids (PY-W)	GC-ECD	0.001-0.008	0.005-0.015
Pyrethroids (PY-S)*	GC-ECD	0.0661 - 0.183	1
Triazines (TR)	LC-MS/MS	0.01 - 0.031	0.05

* Sediment in ug/kg

Monitoring Results

- Data Presented below Are Based on:
 - Three Baseflow Events for Water
 - Up to Three Stormwater Events for Water
 - One Baseflow Event for Sediment

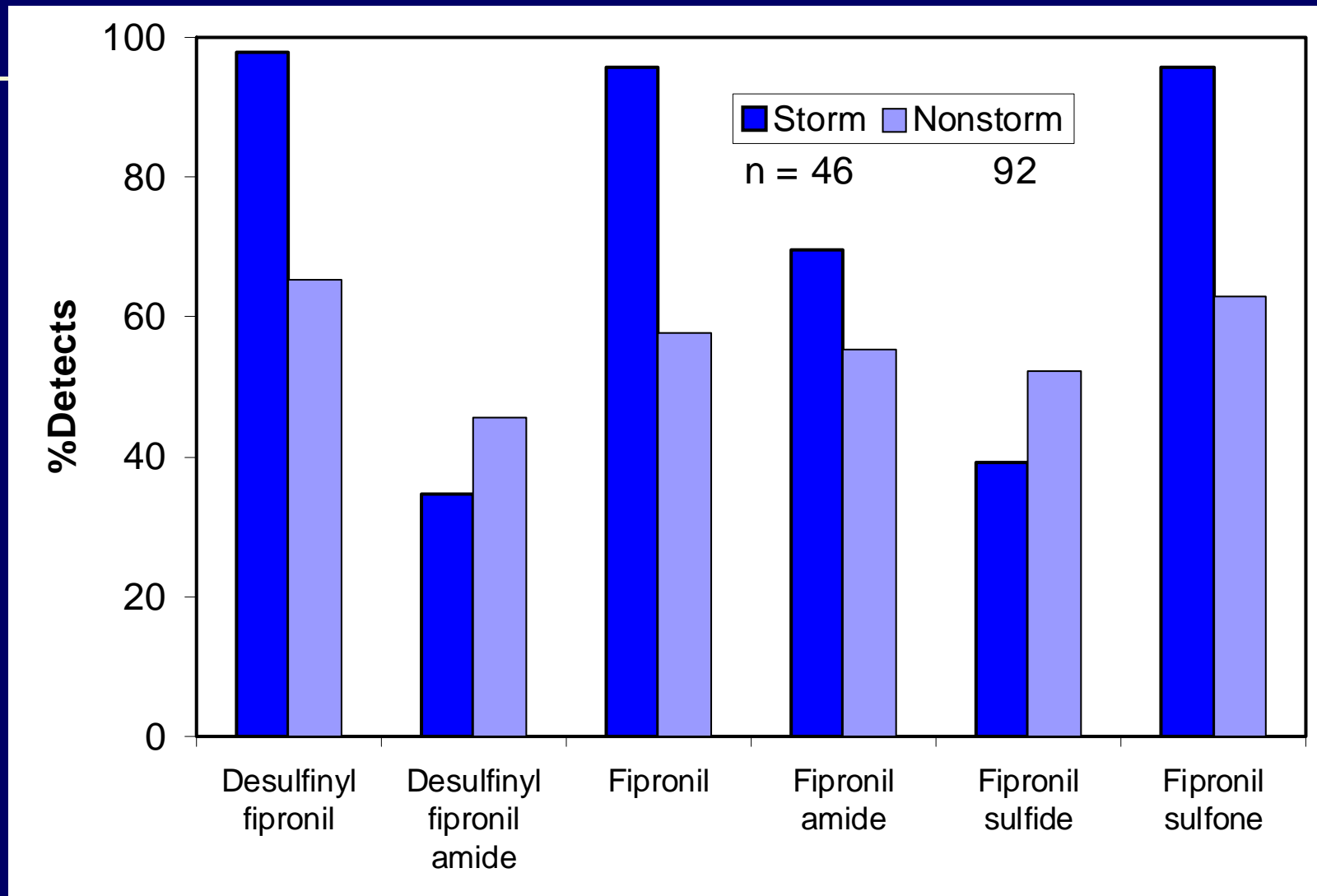
Overall Detections

Insecticides	Samples (>RL)	Samples (MDL-RL)	Samples (<MDL)	Total Samples	% Detects
Bifenthrin	17	0	0	17	100
Desulfinyl fipronil	21	84	33	138	76
Fipronil sulfone	36	66	36	138	74
Fipronil	40	57	41	138	70
Fipronil amide	8	75	55	138	60
Fipronil sulfide	0	66	72	138	48
Permethrin trans&cis	3	0	14	17	18
Desulfinyl fipronil amide	5	53	80	138	42
Carbaryl	28	7	99	134	26
Malathion	11	9	85	105	19
Chlorpyrifos	7	0	98	105	7
Diazinon	7	0	98	105	7

Herbicides	Samples (>RL)	Samples (MDL-RL)	Samples (<MDL)	Total Samples	% Detects
2,4-D	68	8	38	114	67
Triclopyr	56	10	48	114	58
Diuron	29	33	55	117	53
Dicamba	28	20	66	114	42
MCPA	22	10	81	113	28
Pendimethalin	12	21	93	126	26
Simazine	6	19	92	117	21
Prodiamine	4	21	102	127	20
Oryzalin	5	10	111	126	12
Prometon	2	7	108	117	8

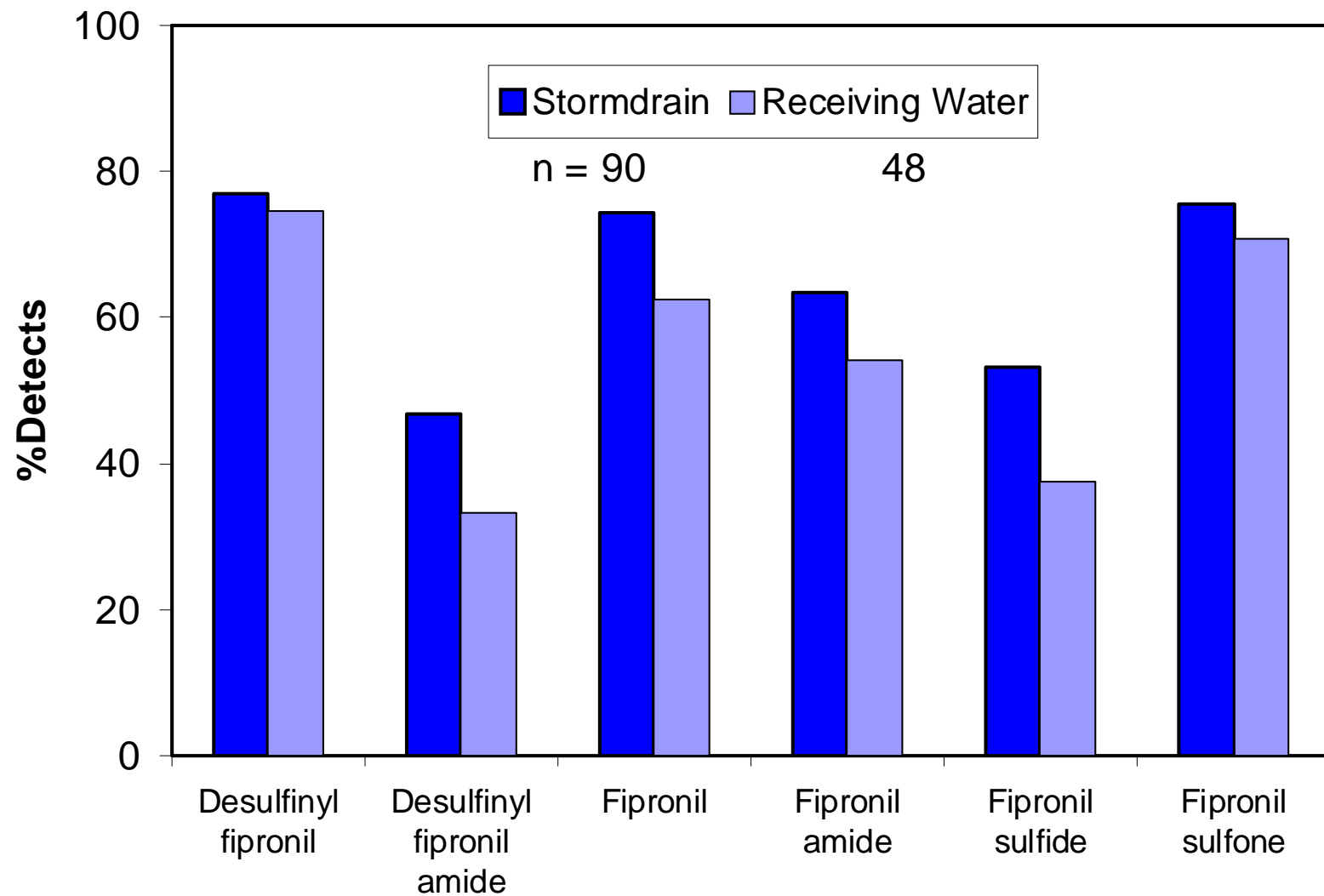
Fipronil and Degradates

- Storm > Nonstorm for DF, FP, and FSN



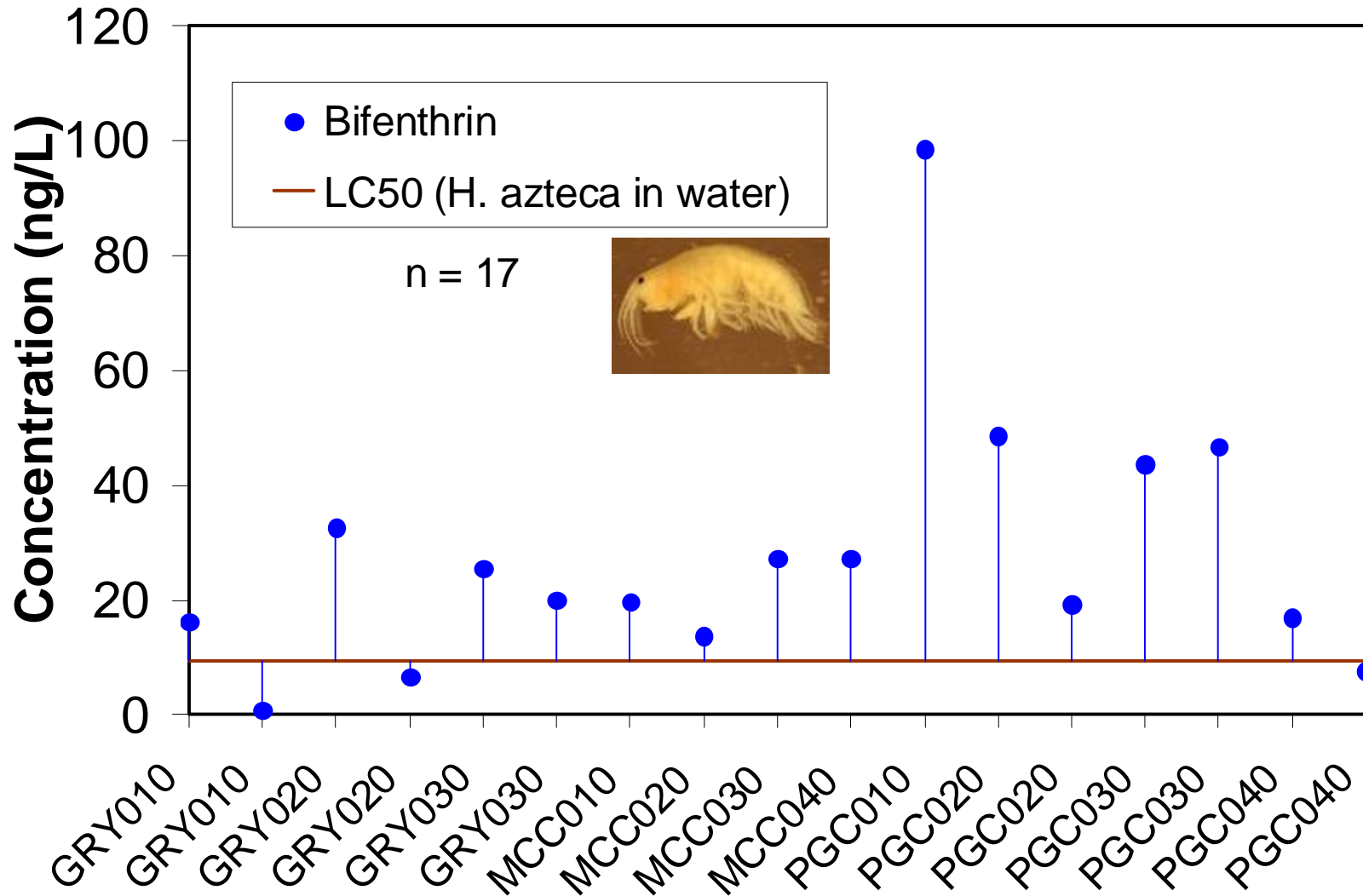
Fipronil and Degradates

■ Stormdrain ~ Receiving Water



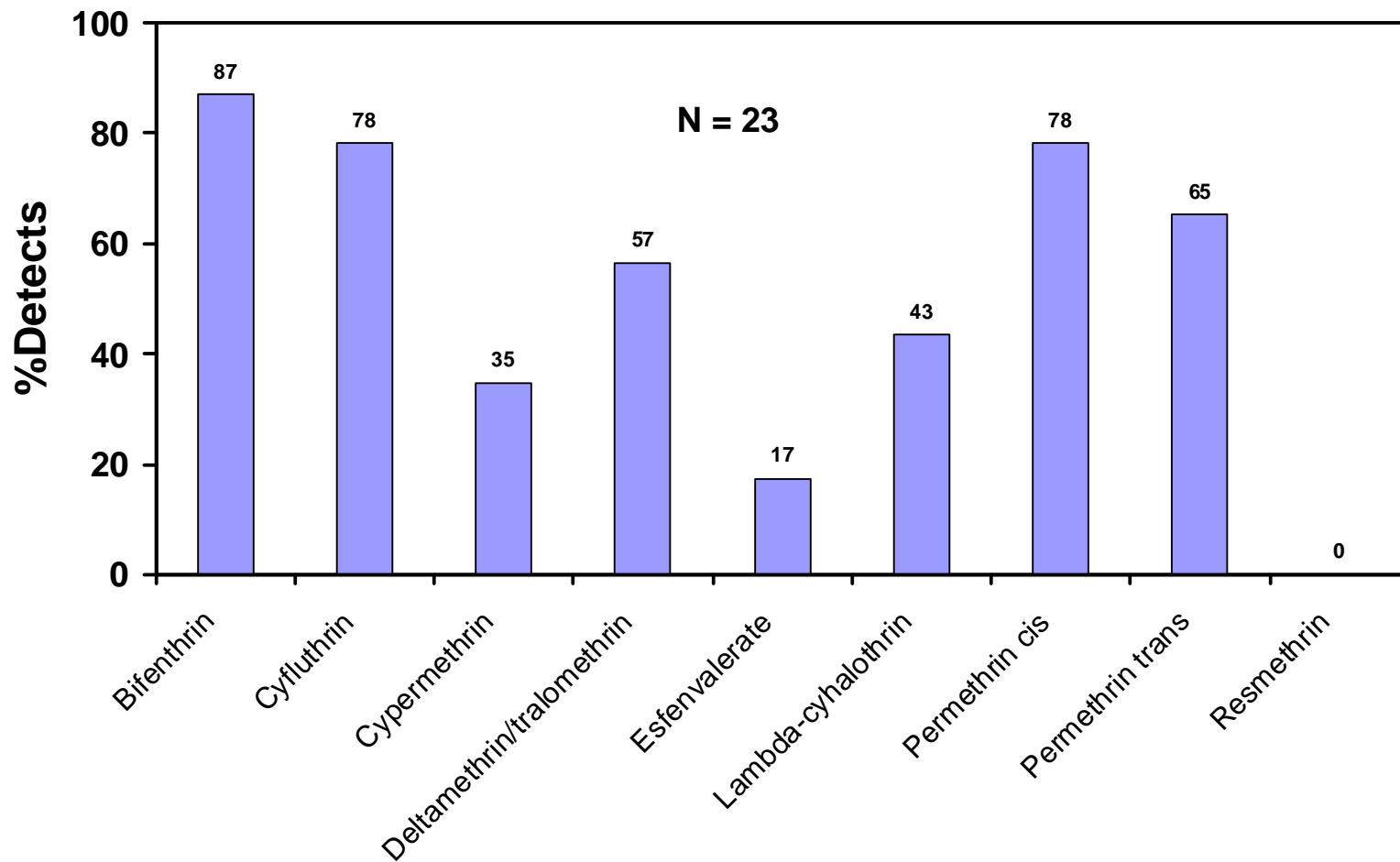
Pyrethroids in Stormwater

- Bifenthrin > Permethrin



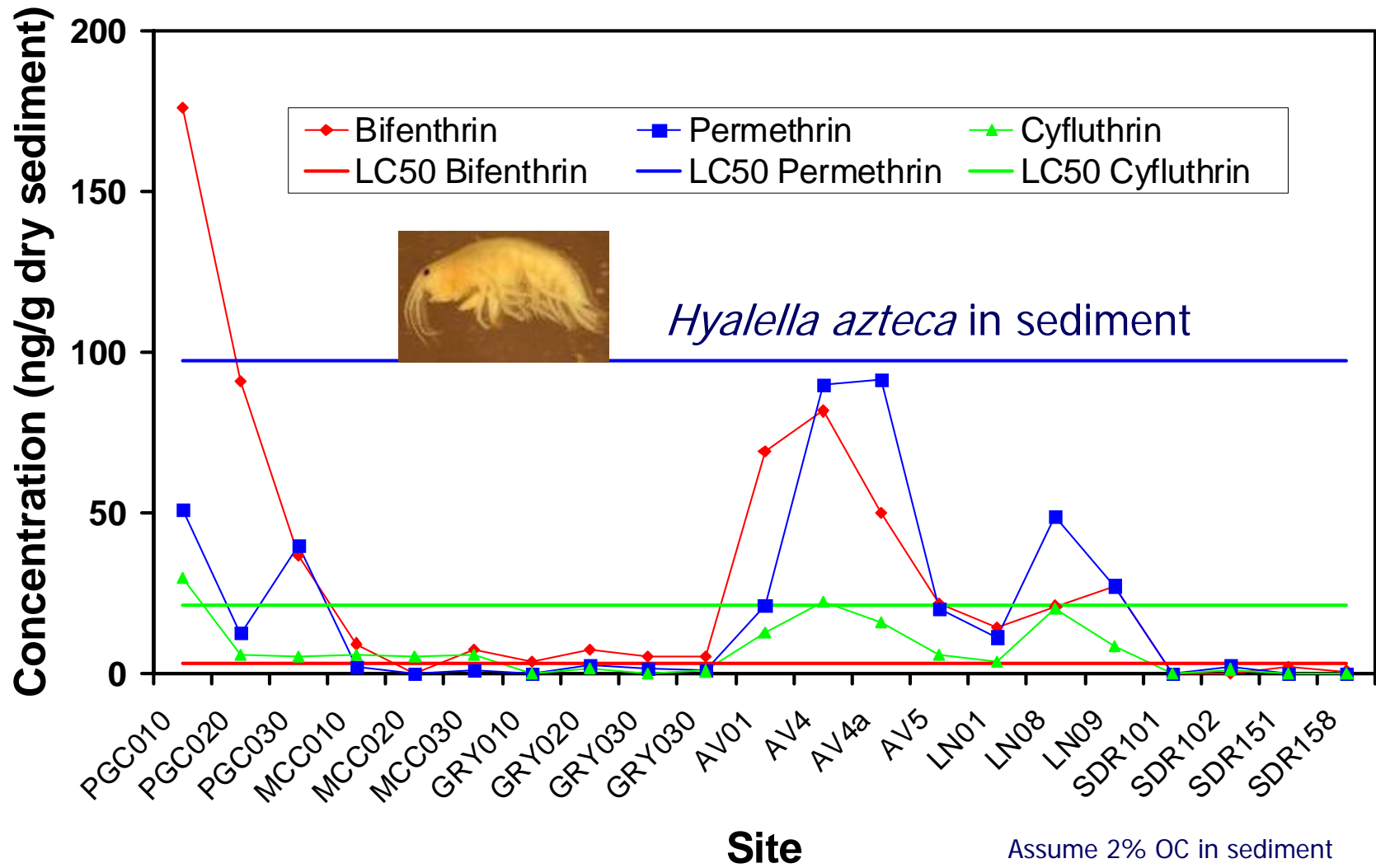
Pyrethroids in Sediment

- Bifenthrin > Permethrin = Cyfluthrin



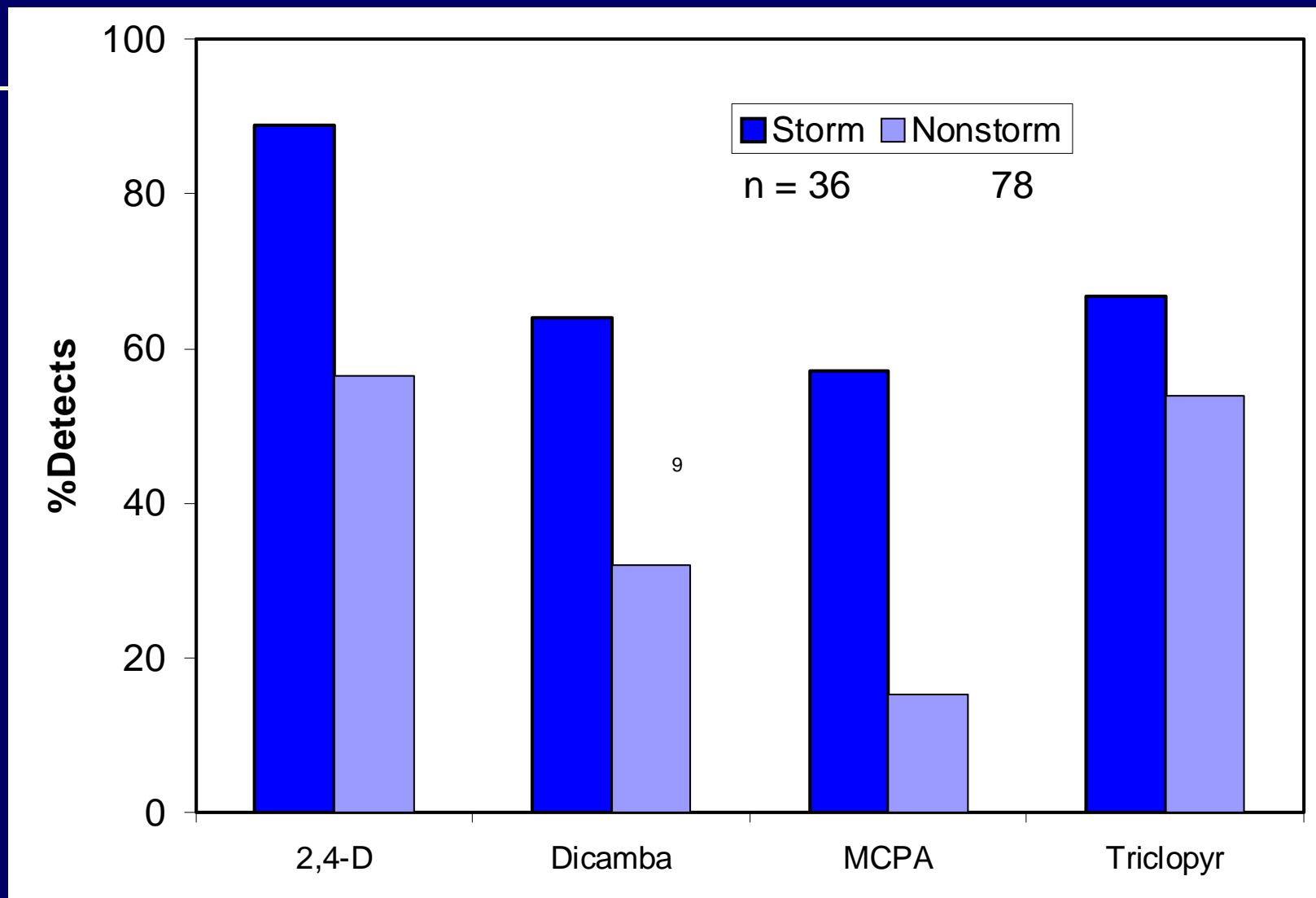
Pyrethroids in Sediment

Pyrethroids in Sediment



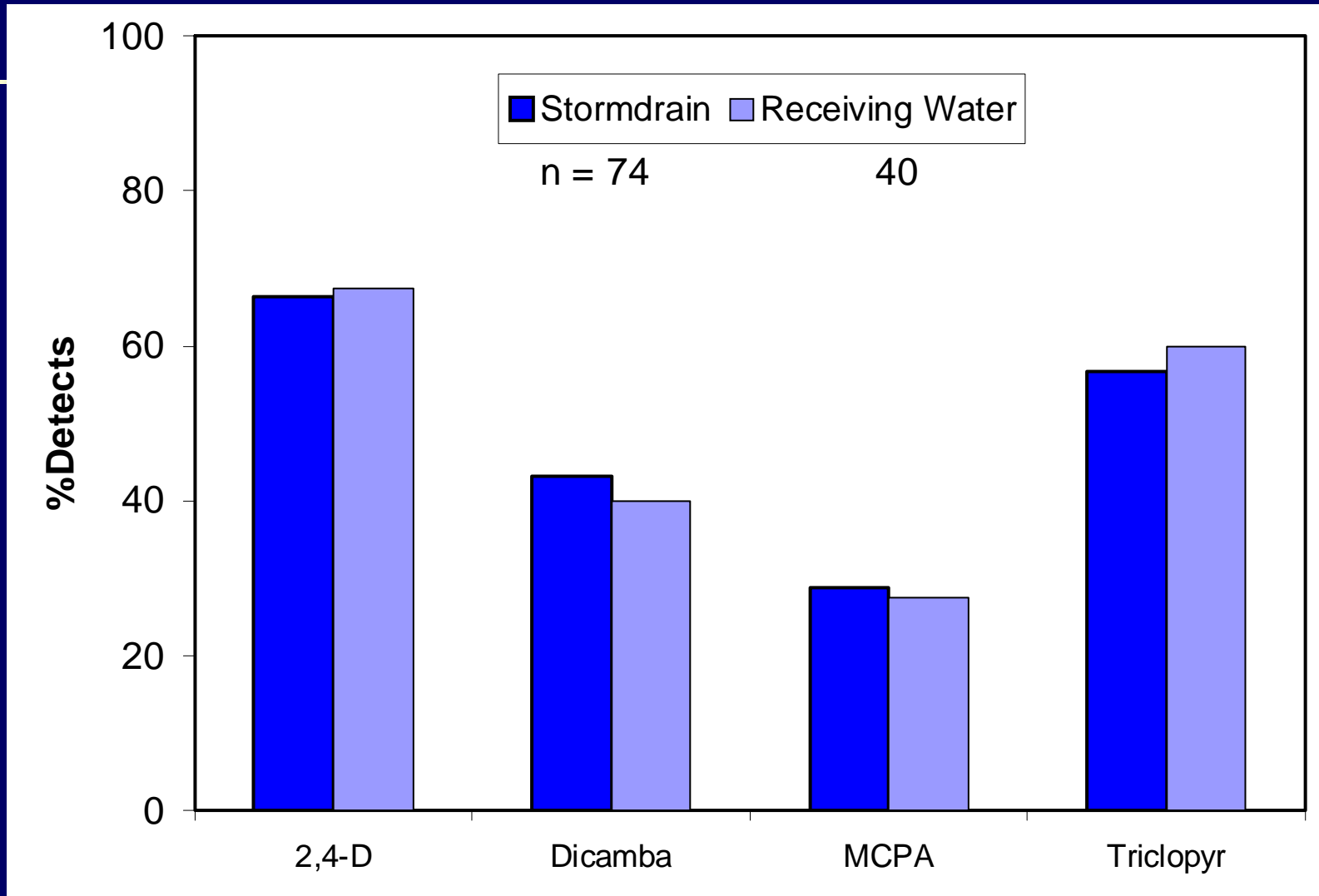
Phenoxy

- Storm > Nonstorm



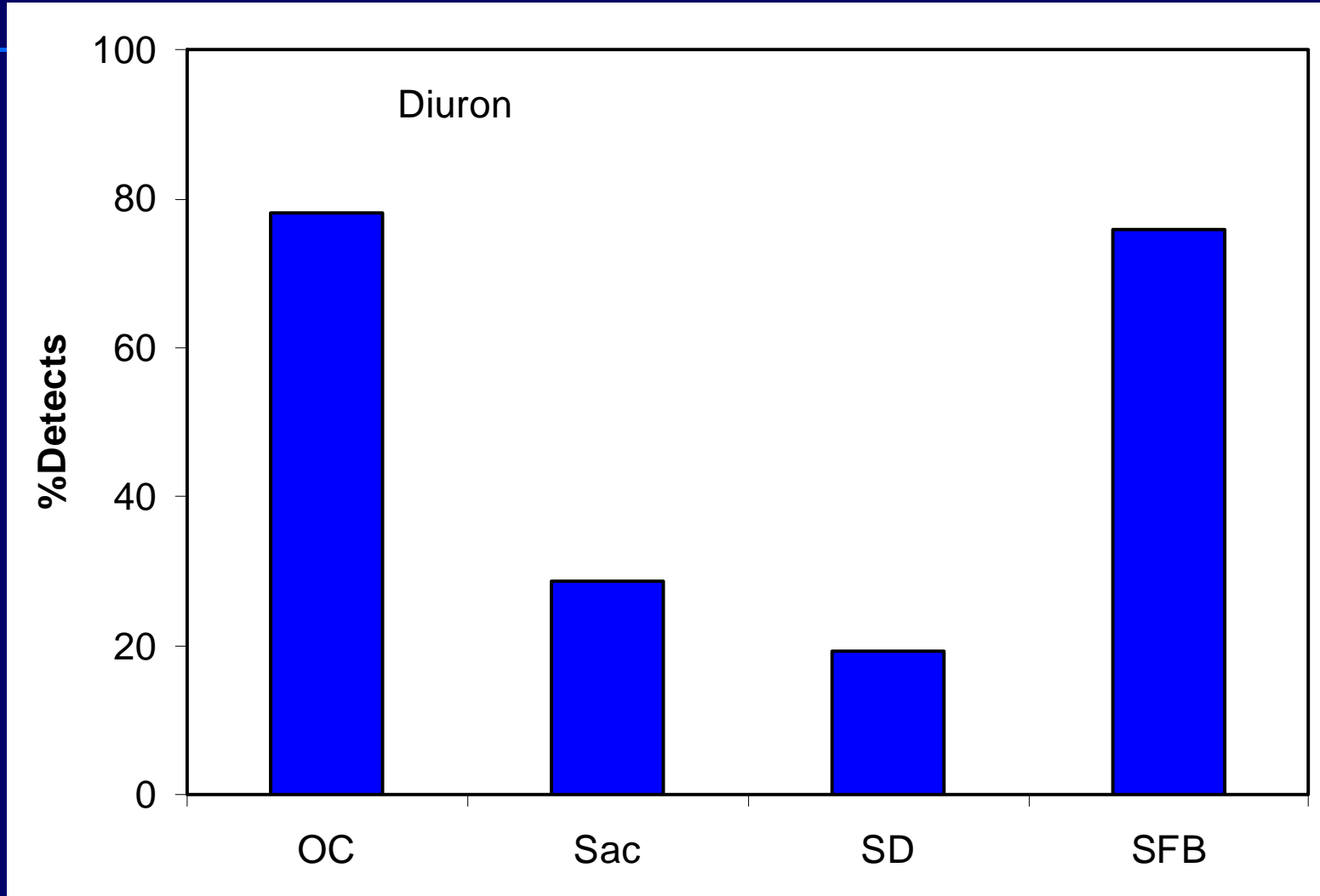
Phenoxy

- Stormdrain ~ Receiving water

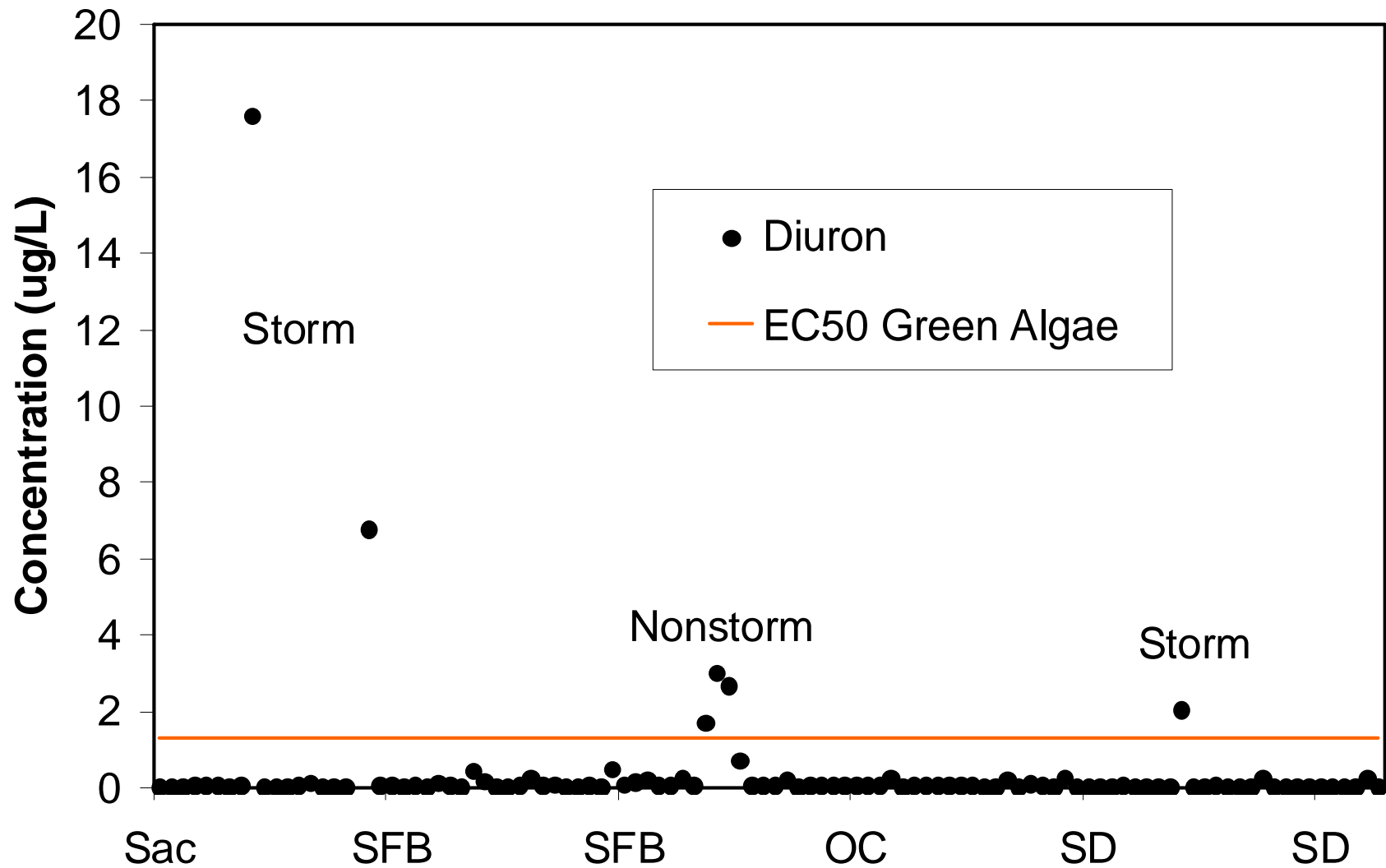


Diuron Detection

- OC ~ SFB > Sac ~ SD



Diuron Concentration



Summary

- Top Detects of Insecticides in Water:
 - Pyrethroids > Fipronil & Degradates > Carbaryl
- Pyrethroids in Water:
 - Bifenthrin > Permethrin
 - 82% of bifenthrin water samples > LC50 *H. azteca* in water (9.3 ng/L)
- Pyrethroids in Sediment:
 - Bifenthrin > Permethrin ~ Cyfluthrin
 - 81% of bifenthrin sediment samples > LC50 *H. azteca* in sediment (3.6 ng/g sediment)

Summary

- Top Detects of Herbicides:
 - 2,4-D > Triclopyr > Diuron > Dicamba
 - A few diuron samples > EC50 green algae
- Detections of Fipronil and Phenoxy in Stormwater > Nonstormwater
- Pesticide detections in Stormdrain outfall similar to Receiving Water

Thanks!

