

Frequency and Loading of Pesticides into Urban Streams from Residential Communities

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Pesticides in Urban Runoff

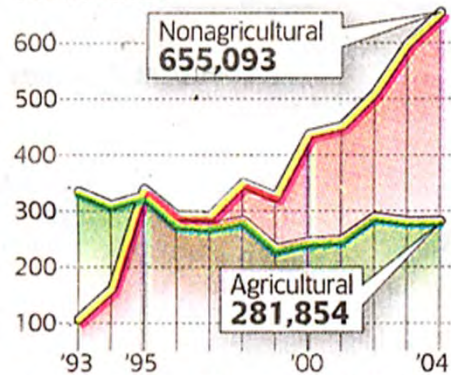
Topics

- What's the big deal?
- Landscape runoff research

Pyrethroid use in California

Commercial use of pyrethroid pesticides in California has been increasing dramatically, mainly because of urban use. The data below do not include usage of retail products by homeowners, which does not have to be reported to regulators and is suspected to be much greater.

POUNDS OF PYRETHROID-ACTIVE INGREDIENT USED ANNUALLY IN CALIFORNIA
700 (thousands)



Sources: Prof. Donald Weston, UC Berkeley
Sacramento Bee/Nam Nguyen

Sacramento Bee
July 14, 2006

State toughens rules on a household pesticide

Low levels of pyrethroid products kill aquatic life

By Matt Weiser
BEE STAFF WRITER

California next month will begin to regulate a broad class of pesticide that has become the dominant home and garden bug-killer.

The state Department of Pesticide Regulation in August will notify manufacturers of pyrethroid insecticides that they must share data on their products or those products will be banned from sale in California. The data will drive a regulatory review that could result in use restrictions or a ban on specific products.

In doing so, California steps out ahead of the federal government and other states in regulating pyrethroids, found to be deadly to aquatic life at very low concentrations.

Mary-Ann Warmerdam, director of the Department of Pesticide Regulation, said it will be the biggest pesticide regulation effort in state history, involving 600 consumer products sold in hardware stores, garden centers and pet stores.

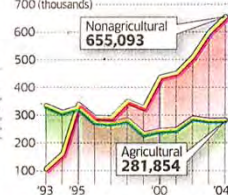
"We know we have enough caution flags, and that requires a

► PESTICIDE, Page A4

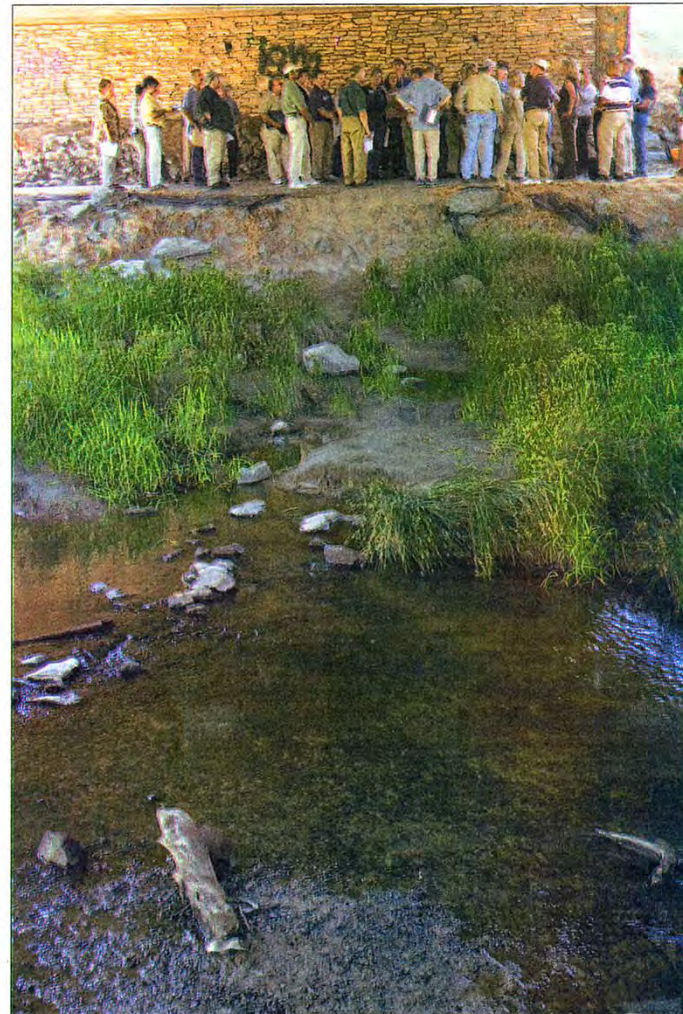
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Sacramento Bee/Jay Mather

Researchers address people from government agencies Thursday at Roseville's Pleasant Grove Creek. The pyrethroid class of pesticide has been found in stream sediment at levels toxic to tiny crustaceans.

OUR REGION

REGION IN BRIEF **B2**
REMEMBRANCES **B6**
BUSINESS **B8**
WEATHER **B10**

State labeled default risk

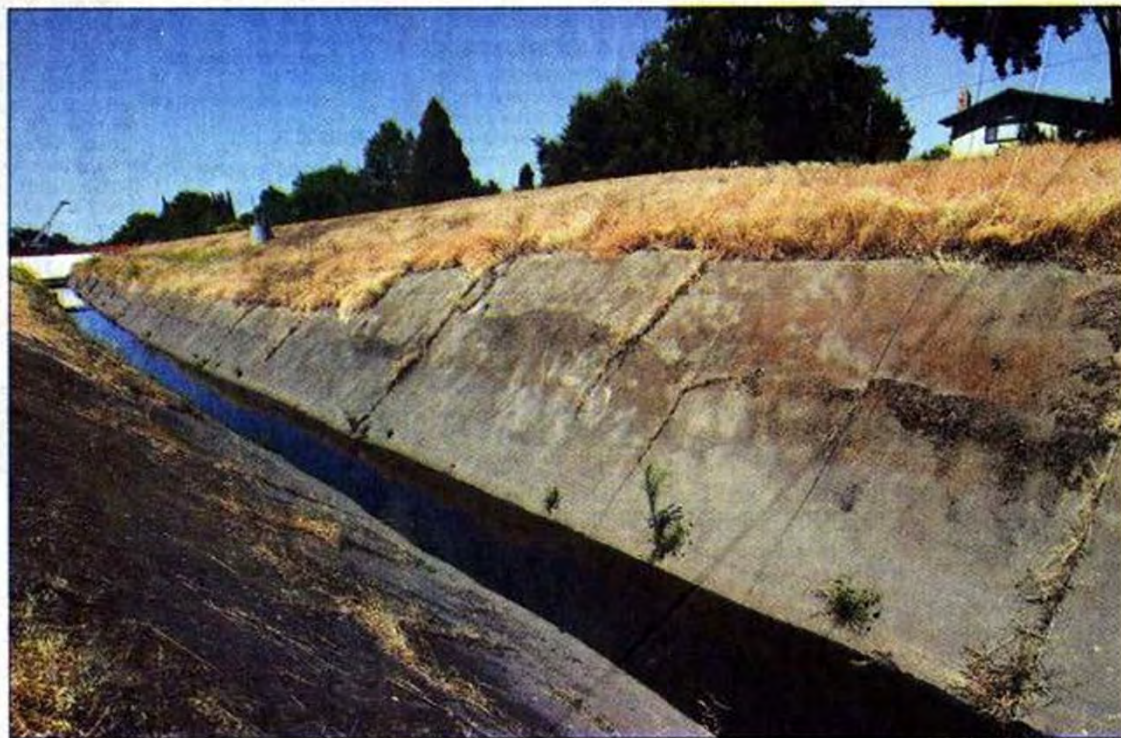
A London financial firm's global rankings rate California ninth most likely to default on its financial obligations. **Page B8**

Tuesday, July 14, 2009 | The Sacramento Bee | sacbee.com/ourregion

B1

THE ENVIRONMENT

Capital called Delta's top pesticide source



LEZLIE STERLING lsterling@sacbee.com

The Mayhew Drain in the Rancho Cordova area carries stormwater to the American River. A new study found enough pyrethroid pesticides in the American River to kill tiny shrimp – among the first links in the aquatic food chain. Much of it is coming from Sacramento's runoff, the study found.

Pesticide Application



Irrigation Management



Photos: D. Haver

“Urban Drool”







Runoff From Urban Landscapes

Evaluating BMP effectiveness
to reduce volumes and
improve quality of runoff
from urban environment



Runoff From Urban Landscapes

Evaluating BMP effectiveness

Project outline

- Controlled experiments
- Residential landscape studies
- Load estimation
- Outreach



Photo: L. Oki

Runoff From Urban Landscapes

Evaluating BMP effectiveness

Controlled experiments

- Landscape installations at SCREC
 - SCREC: UC South Coast Research and Extension Center, Irvine, CA

Controlled Experiments

Mitigating Pesticide Runoff in Urbanized Environments

Installation of three landscapes

- Irrigation Practices
- Pesticides
- Plant Selection
- Vegetative Buffers
- Porous Surfaces
- Sediment Control
- Alternative Pest Control

Funded by

California State Water Resources
Control Board PRISM program



Controlled Experiments

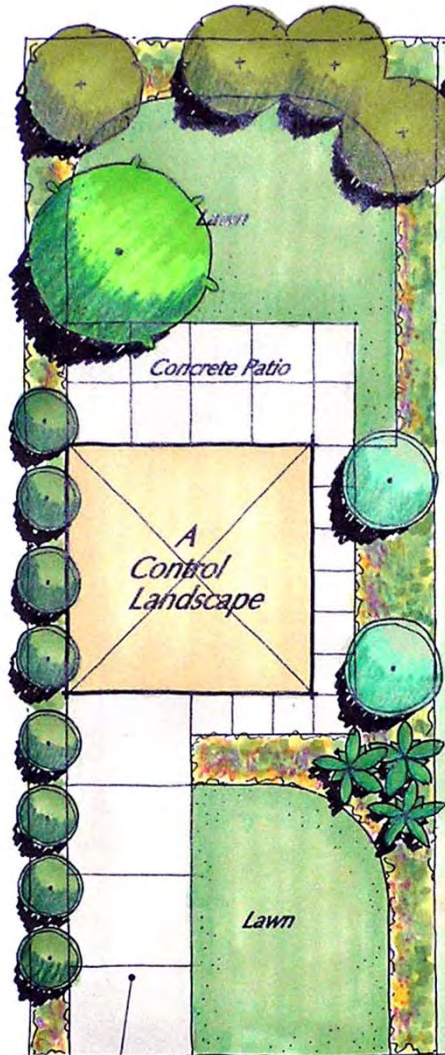
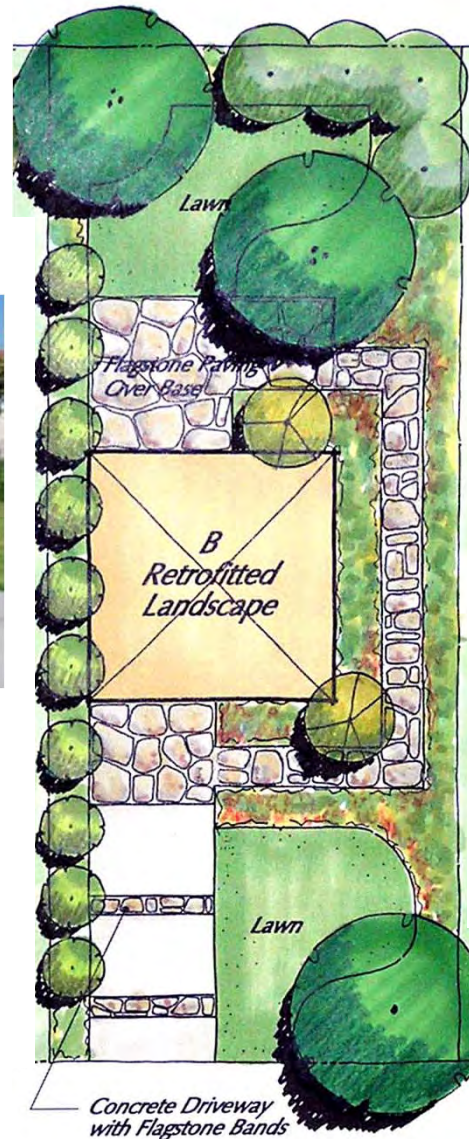


Photo: L. Oki

“Conventional” landscape

- Trees in turf, exotic species
- Cool season turfgrass
- Concrete drive, walkways, patio
- Standard solid wall drain line
- Standard spray heads
- Automatic irrigation timer on default setting

Controlled Experiments



Low Impact 1 Landscape

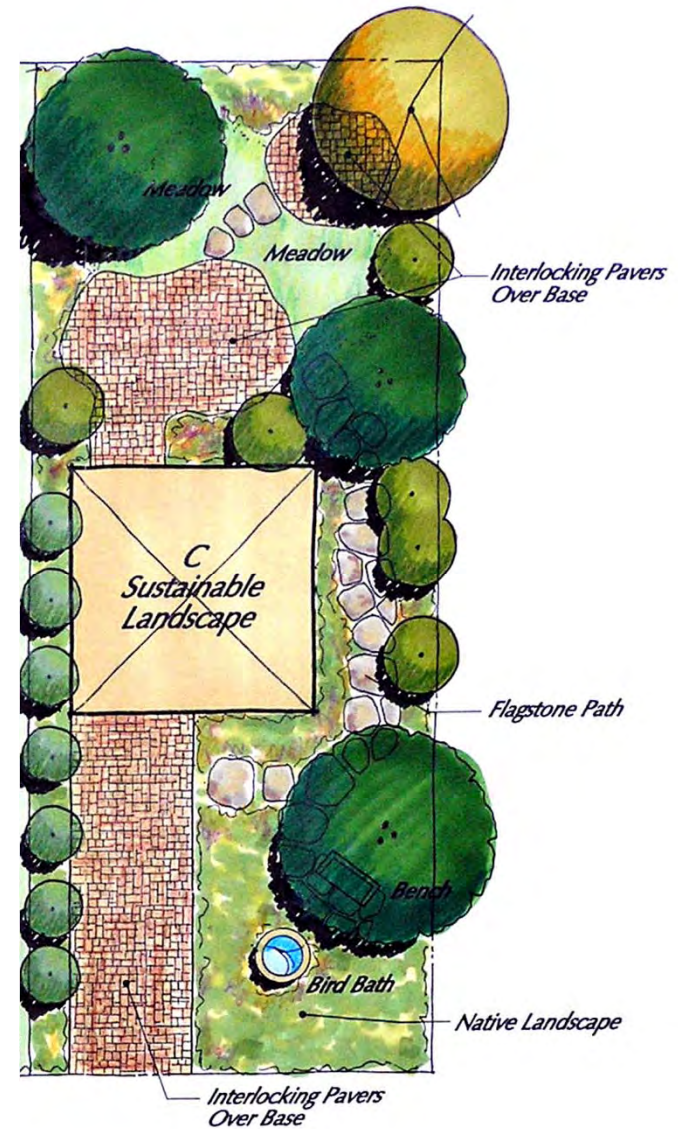
- More drought tolerant species
- Warm season turfgrass
- Slot drains added to drive
- Flagstone walkways, patio
- Rain barrel collection
- Low flow spray heads
- Soil moisture -based irrigation controllers
- Hydrozones

Controlled Experiments



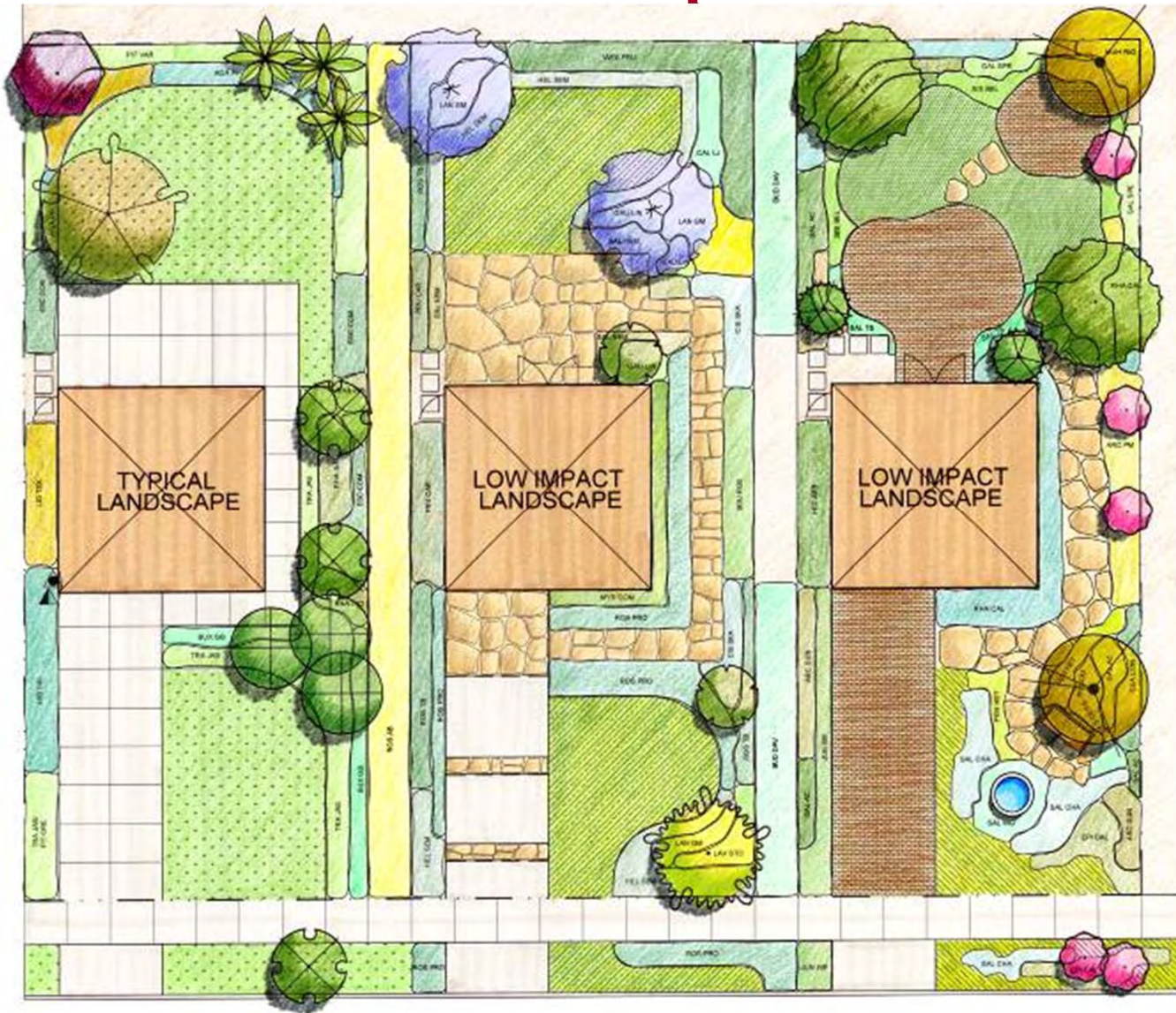
Low Impact 2 Landscape

- Predominantly native species
- Meadow (*Carex sp.*)
- Interlocking pavers
- Flagstone walkway
- Dry well
- Drip irrigation
- ET based irrigation controller
- Hydrozones



Graphics: Clark & Green

Controlled Experiments



Runoff From Urban Landscapes

Evaluating BMP effectiveness

Project outline

- Controlled experiments
- Residential landscape studies

Residential Landscape Studies

Study Site Selection

- 8 sites
 - 4 each in Sacramento (N. Cal) and Orange (S. Cal) Counties
- Criteria
 - Single family homes
 - 4-20 years old
 - Lot size
 - Demographics



Residential Landscape Studies

Study Site Selection

- Storm drain maps
 - Locate outfalls
 - Delineate drainsheds
 - Identify lots
 - Verify land use
- Visit outfalls
 - Safe access



Residential Landscape Studies

Runoff Monitoring

- Continuous Data Collection
 - Flows (depth & velocity)
 - Temperature
 - pH
 - Electrical conductivity
 - Rainfall
- Automated Stormwater Sampling
- Remote Communication



Residential Landscape Studies

Runoff Monitoring

- Continuous Data Collection
 - Flows (depth & velocity)
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Water Sample Collection

Sampling Schedule

	Q1	Q2	Q3	Q4
2006		Weekly*	Weekly*	Weekly
2007	Biweekly	Weekly	Weekly	Weekly
2008	Biweekly	Biweekly	Biweekly	Weekly
2009	Monthly	Monthly*	None	None
2010	None	Monthly	Monthly	Monthly

- Sampling by UC Master Gardeners in Sac Co
- Up to 5 early storms of each season



Water Sample Collection

Sacramento County UC Master Gardeners



Water Sample Analyses

UC Riverside

Gan Lab

Nutrients

Nitrate, TKN,
Phosphate, Total P

Pesticides

diazinon, chlorpyrifos,
pyrethroids (9), fipronil

Drinking Water COCs

TOC, DOC, Br⁻, Cl⁻,
TDS, TSS, turbidity

Yates Lab

Pathogen indicators

E. coli

Total coliforms

Somatic coliphages

Male-specific coliphages

Enterococci

Clostridium perfringens

Pathogens

Giardia

Cryptosporidium

Arden Creek Area Survey

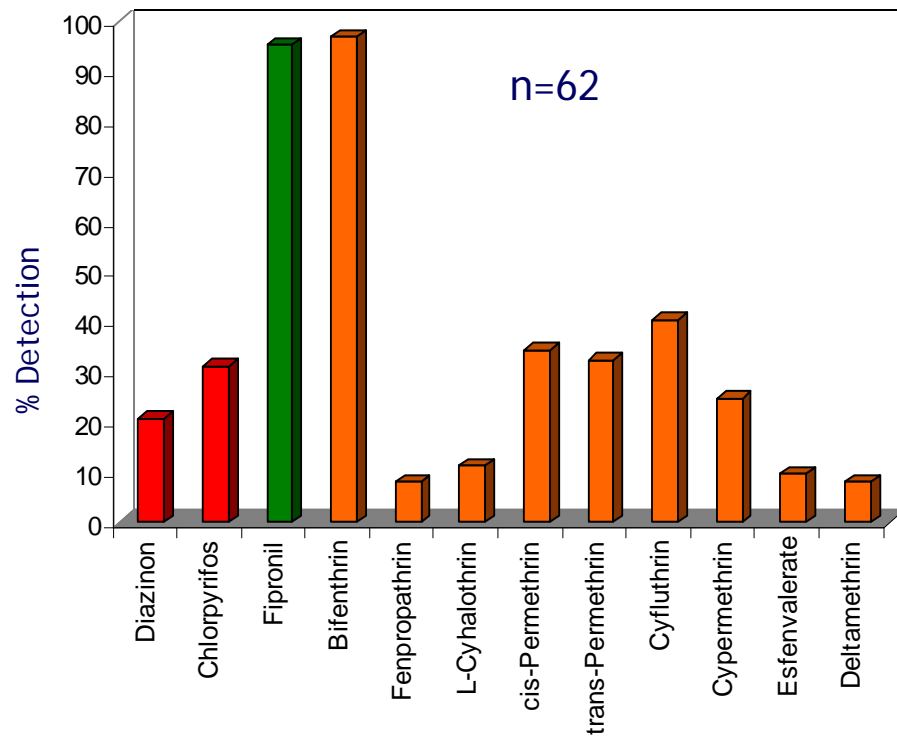
Use of pest control products

	Frequency	Percent
Ants	42	66.6%
Spiders	13	20.6%
Termites	9	14.2%
Rats or mice	6	9.5%
Fleas	4	6.3%
Wasps, bees, or stinging insects	3	4.7%
Cockroaches	2	3.1%
Other	2	7.9%

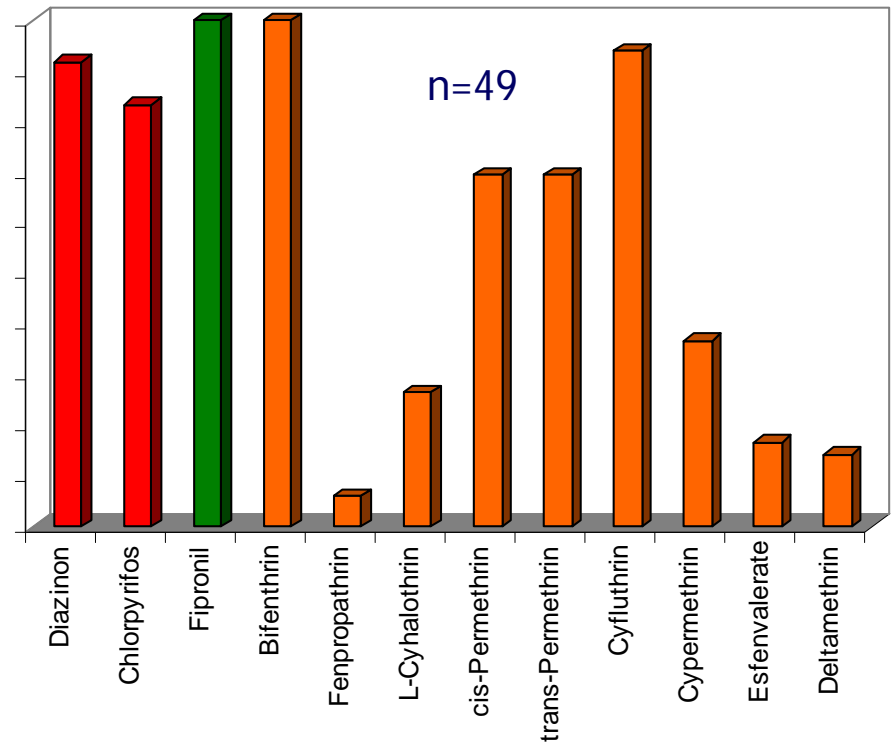
From: Residential pesticide use in California, M.L. Flint, UC Statewide IPM Program, CA DPR contract 01-0219C, March 15, 2003

Pesticide Detection Rates

Sacramento County

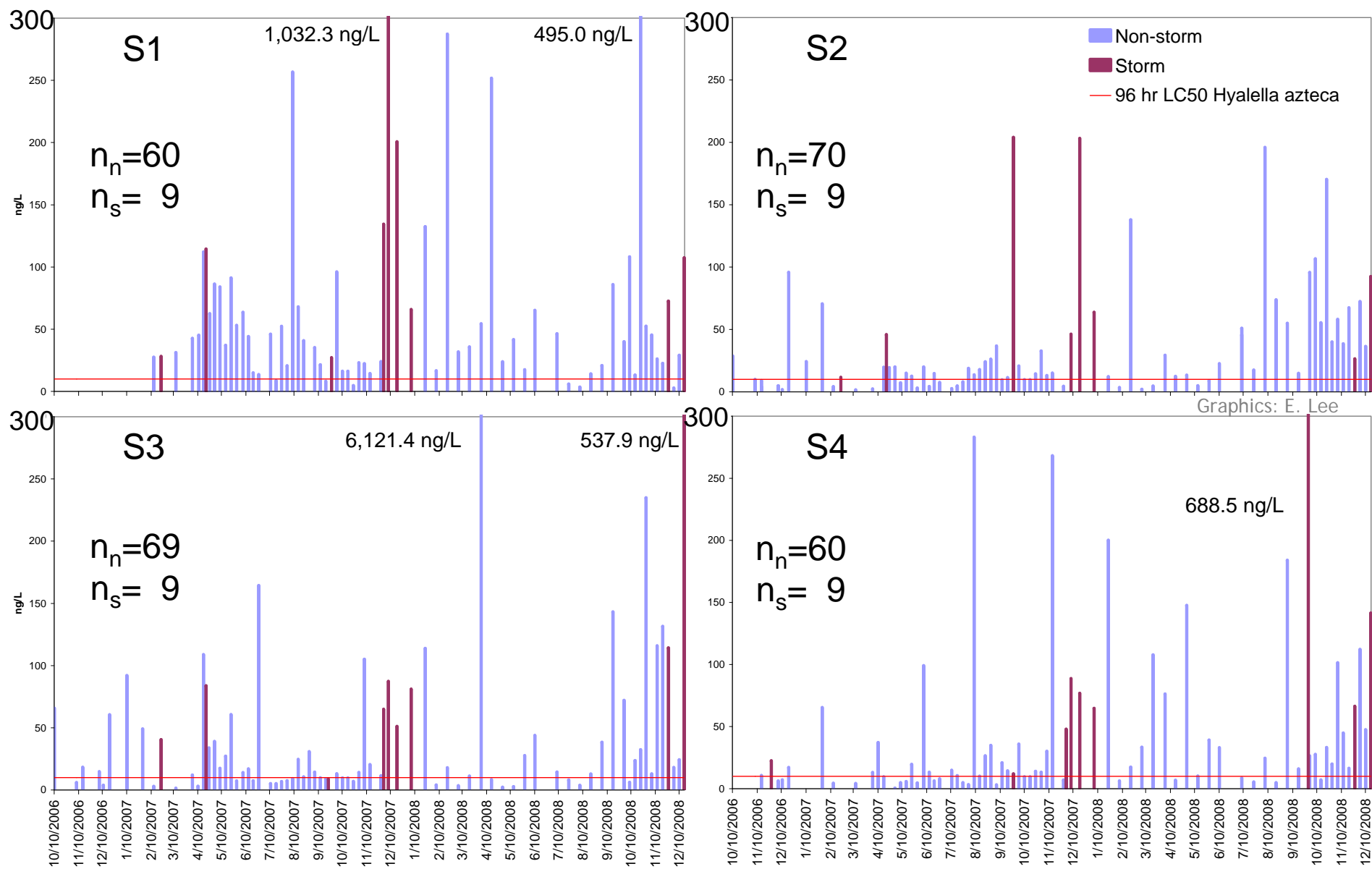


Orange County

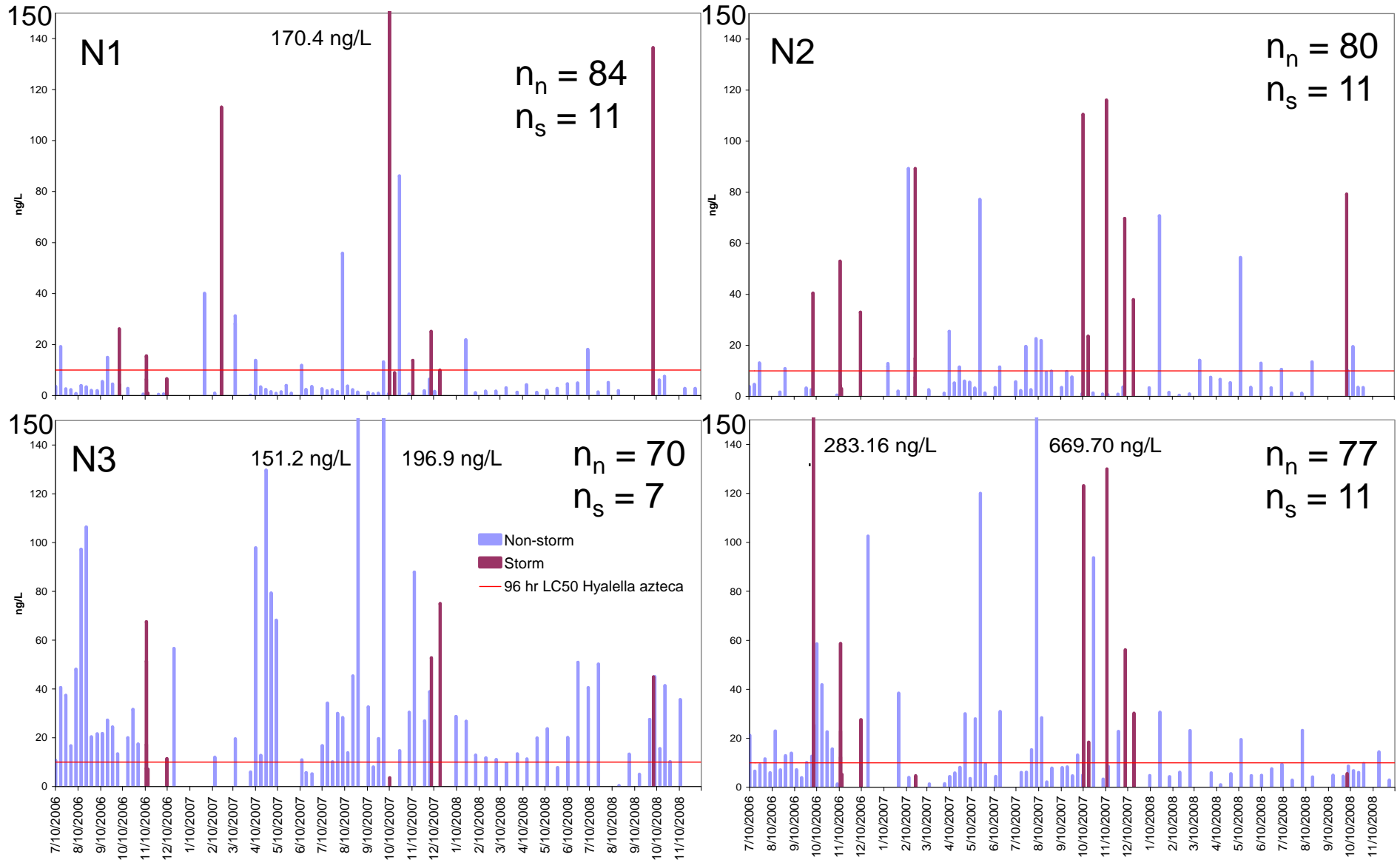


Graphics: S. Bondarenko

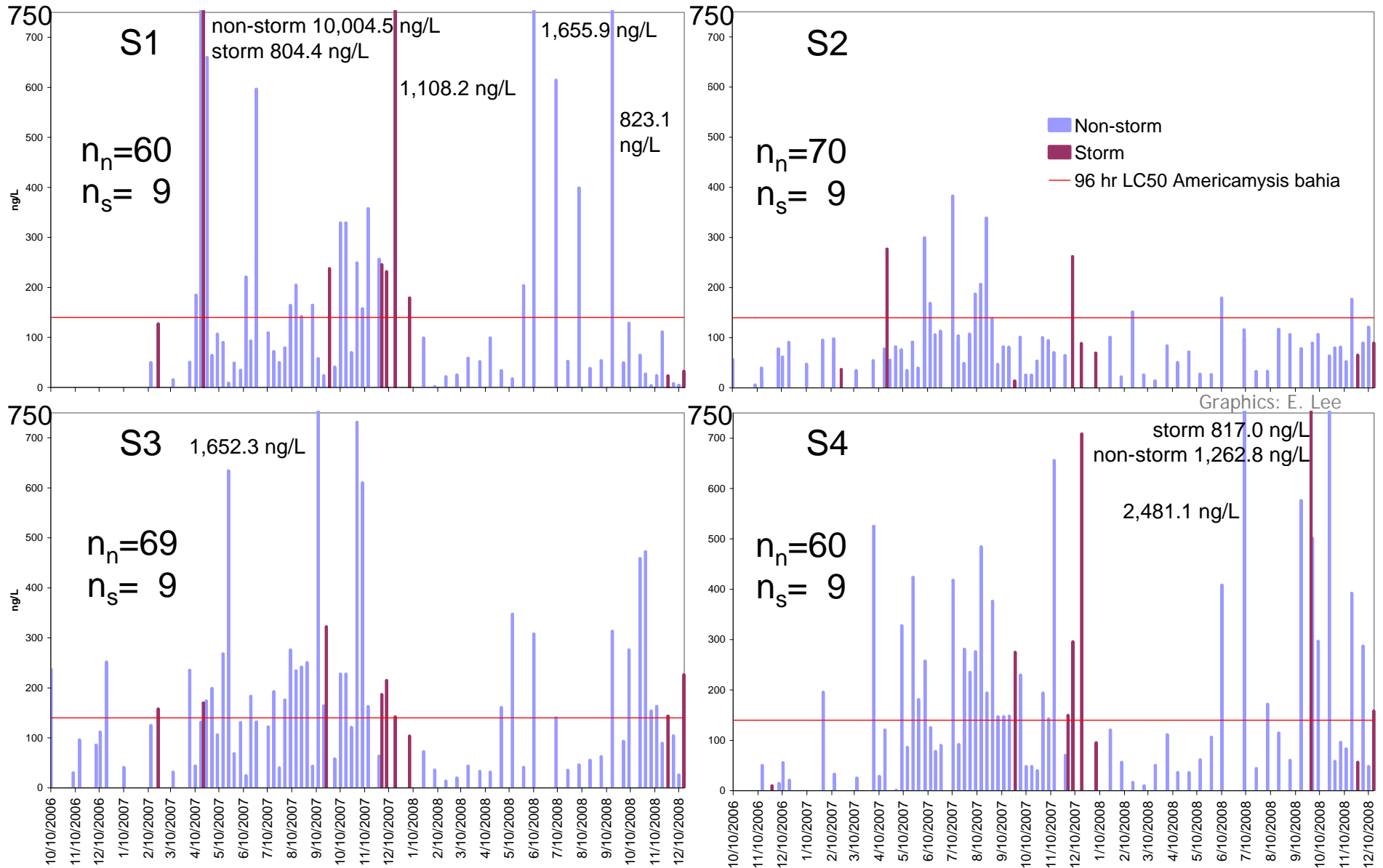
Bifenthrin Concentration- S Cal



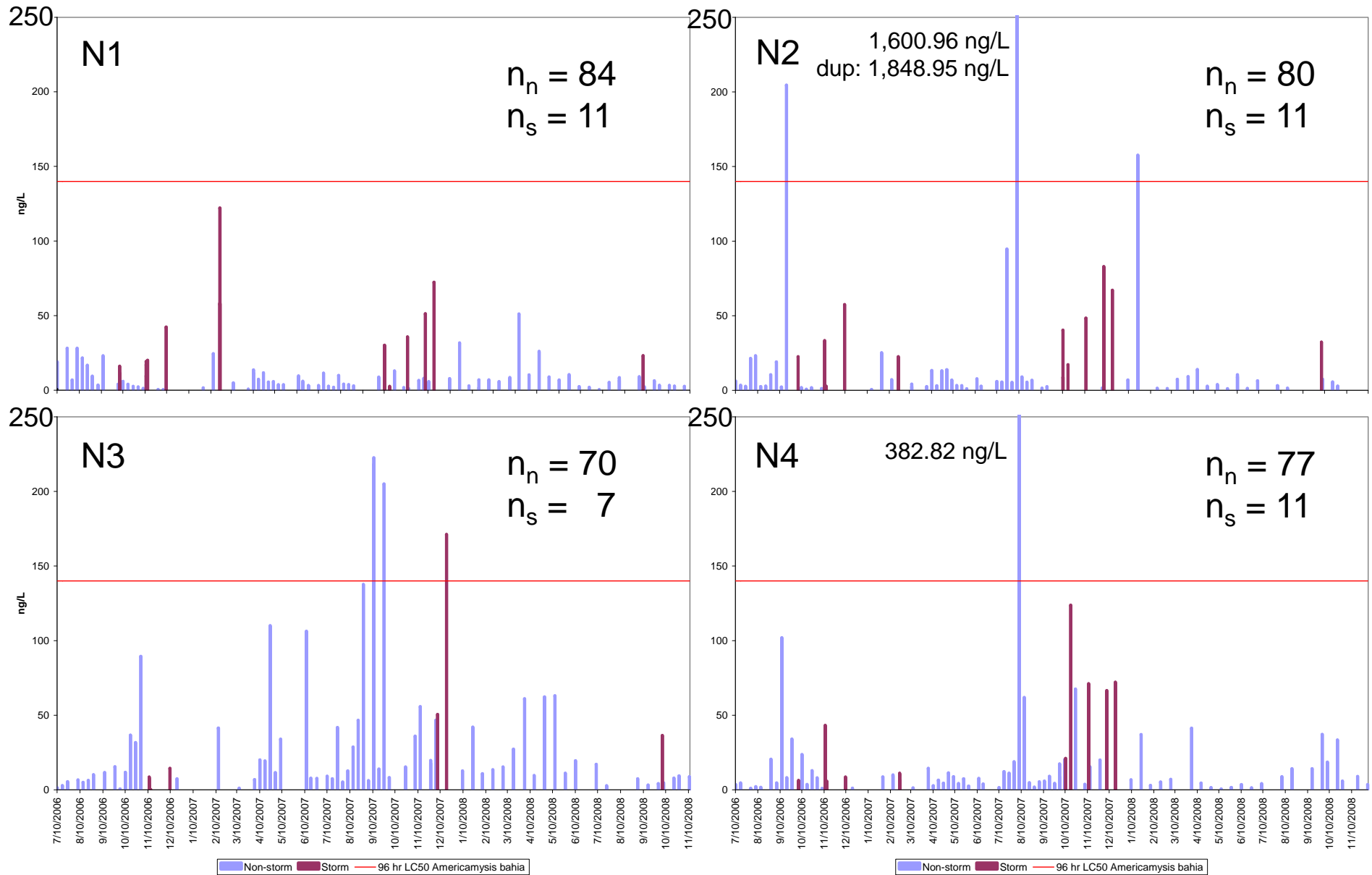
Bifenthrin Concentration- N Cal



Fipronil Concentration- S Cal



Fipronil Concentration- N Cal



Residential Landscape Studies

Dry Weather Sampling

- Dry weather grab sampling issues
- Sampling
 - N. California- Tuesdays, 11:00-2:00
 - S. California- Wednesdays, 7:00-11:00
- Arrival
 - UC Riverside Wednesdays, before noon
- How representative are these samples?

Residential Landscape Studies

Dry Weather Sampling

Intensive dry weather grab sampling

- Hourly sampling for 7 days
- S. California Site
 - June 16- 23, 2008
 - Aug 9-15, 2010
- N. California Site
 - July 23-30, 2008
 - Aug 24-31, 2010

Sample Collection & Analyses

Intensive Dry Weather Sampling

12 sample composite

Diazinon
Chlorpyrifos
Fipronil
Bifenthrin
Fenpropathrin
L-Cyhalothrin
cis-Permethrin
trans-Permethrin
Cyfluthrin
Esfenvalerate
Deltamethrin

Time

0:00

1:00

2:00

3:00

4:00

5:00

6:00

7:00

8:00

9:00

10:00

11:00

12:00

3 sample composite

TOC

TSS

Nitrate

Orthophosphate

pH

EC

Turbidity

1 grab sample every 24 hrs for biologicals

Sacramento County Location



Photos: L.Oki

Orange County Location

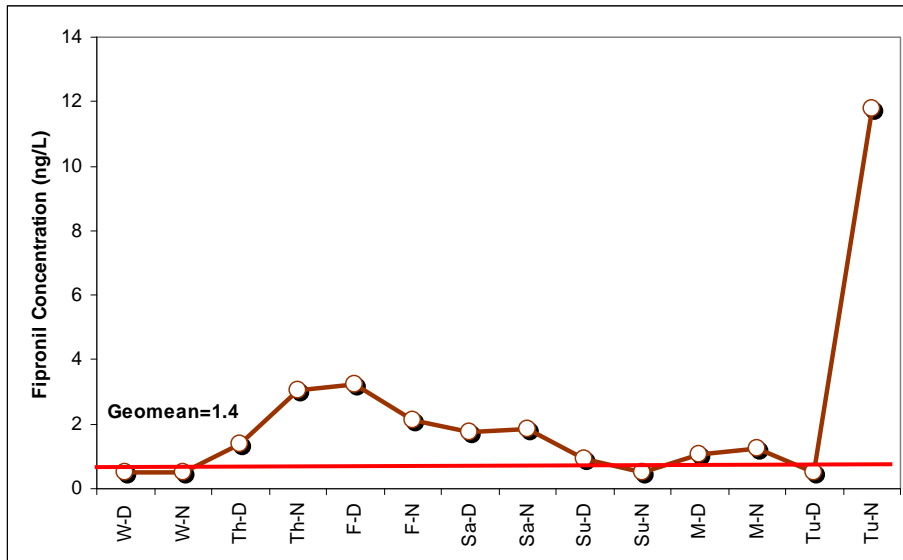


Photos: T. Majcherek

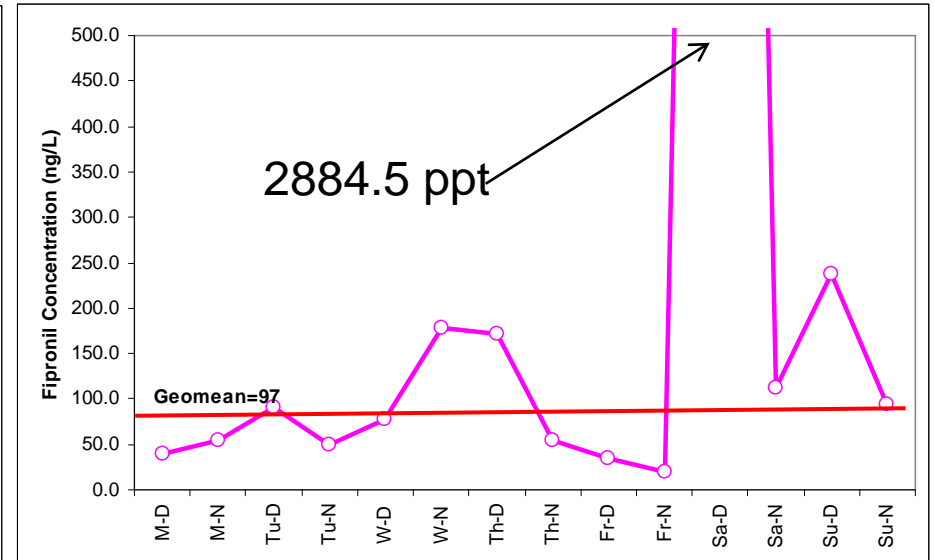
Fipronil

Intensive Dry Weather Sampling

Northern California Neighborhood Site



Southern California Neighborhood Site



Runoff From Urban Landscapes

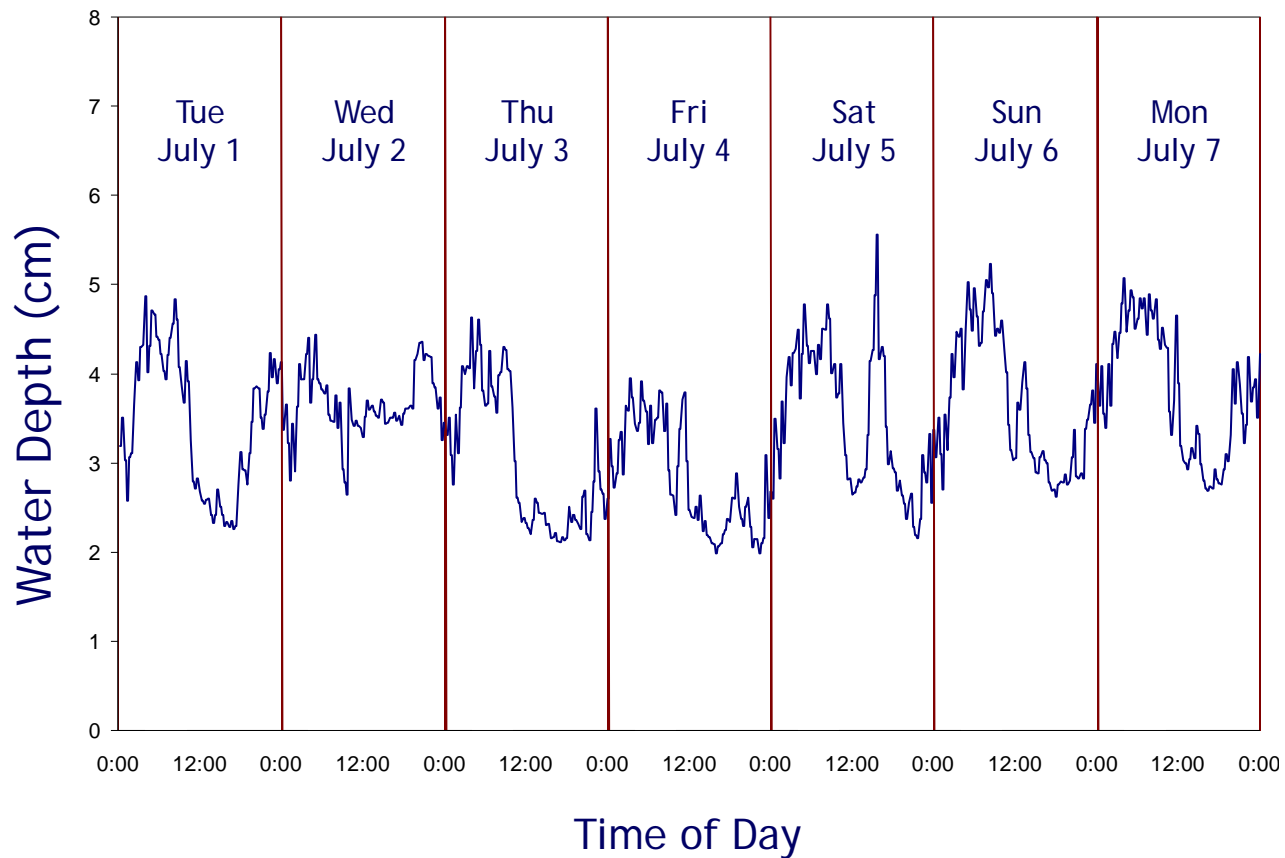
Evaluating BMP effectiveness

Project outline

- Controlled experiments
- Residential landscape studies
- Load estimation
 - Concentrations
 - Flow volumes

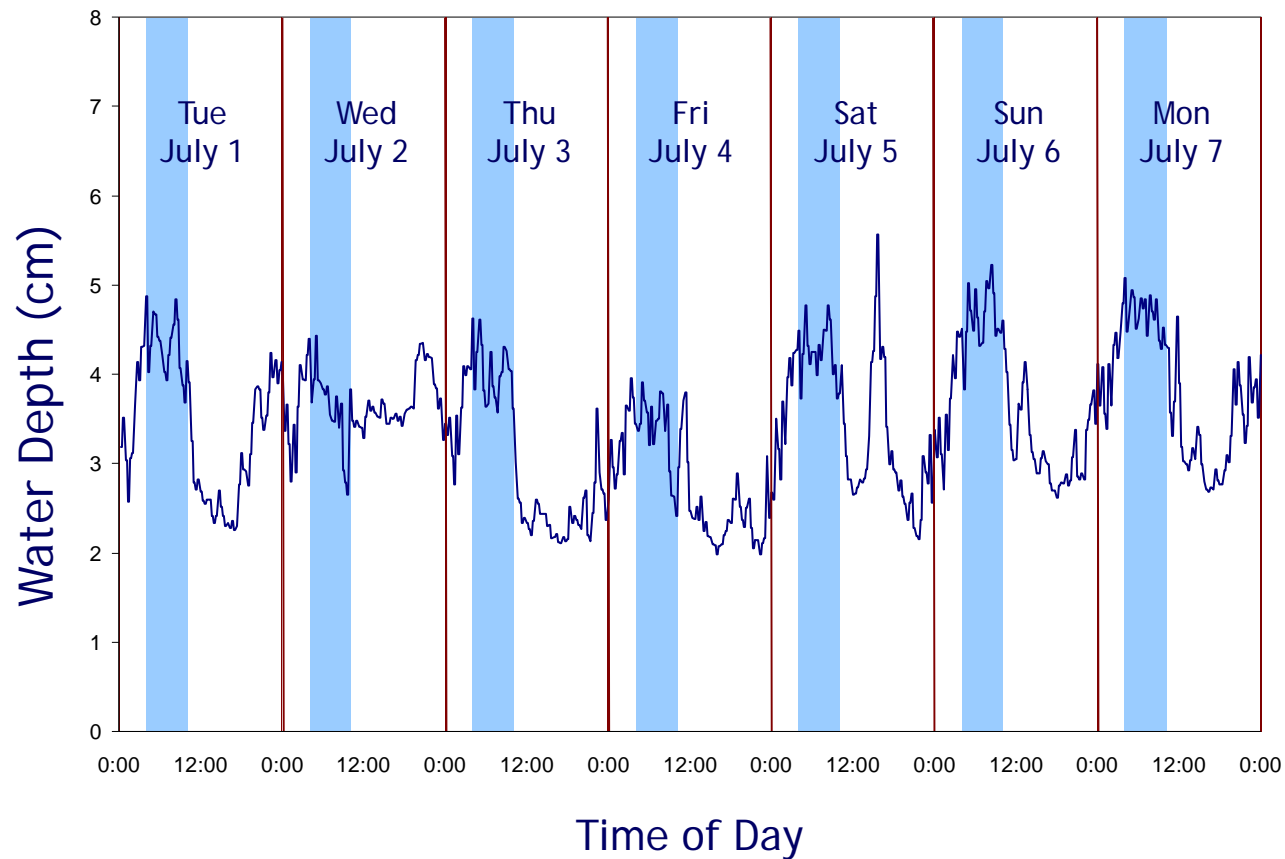
Dry season runoff patterns

Daily Periodicity



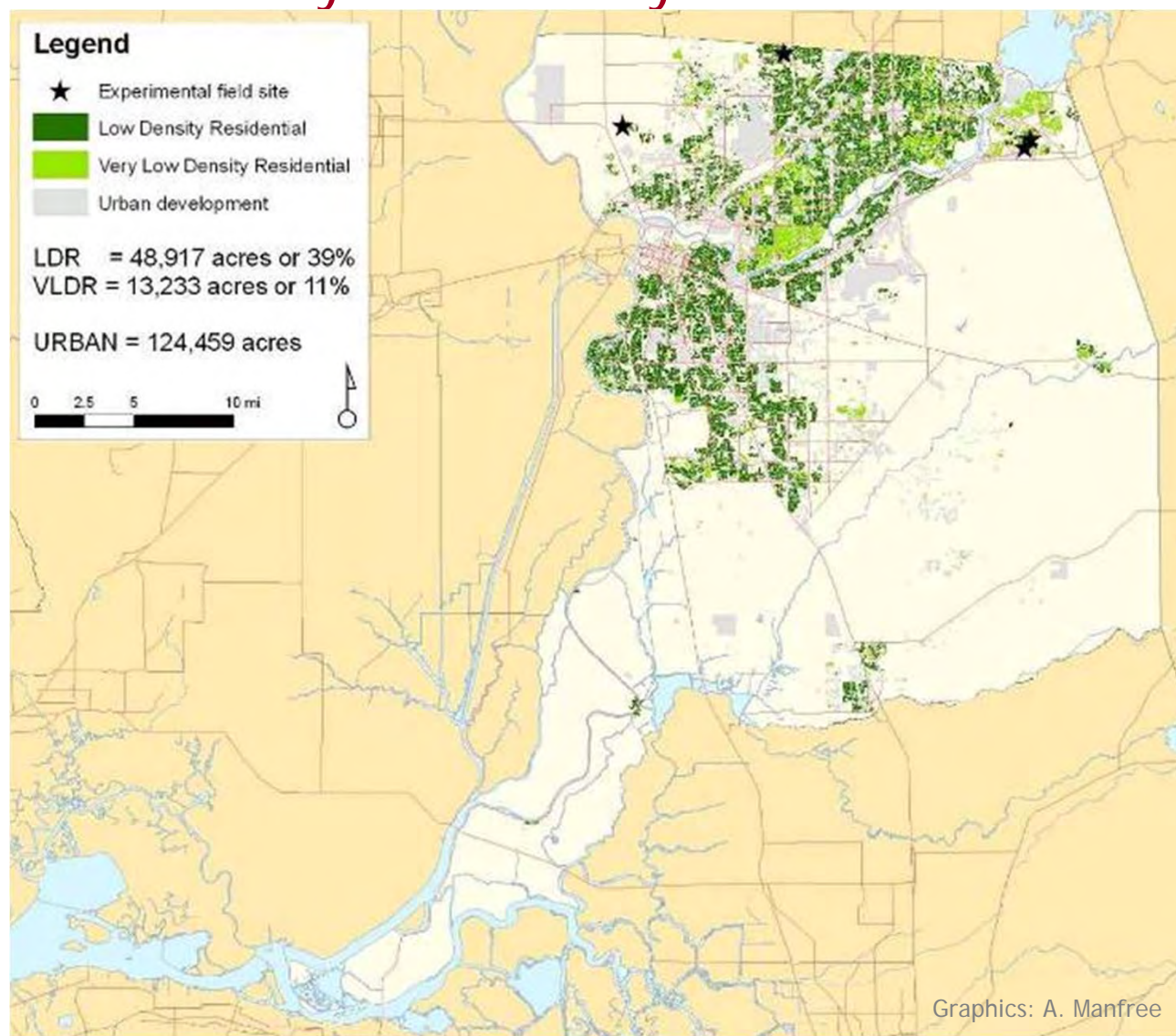
Dry season runoff patterns

Daily Periodicity



Pollutant Load Modeling

Low & Very Low Density Residential Zones



Pesticides in Urban Runoff

Topics

- What's the big deal?
- Landscape runoff research



Thank you

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Photo: L. Oki

Controlled Experiments

