

UP3 Project

A graphic of a city skyline with various skyscrapers in shades of green and grey, positioned in the top right corner of the slide.

Overview of Stormwater- Related Scientific Issues and Resources

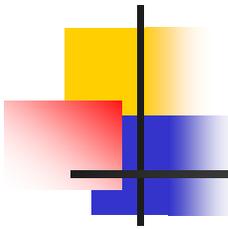
Kelly D. Moran, Ph.D.
TDC Environmental, LLC

UP3 Project



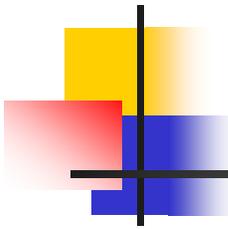
Urban Pesticide Pollution Prevention Project

- Manager: San Francisco Estuary Project
- Funding: State Water Board, Municipalities
- Goal: Prevent surface water toxicity from urban pesticide use
- Activities:
 - Science, regulatory, & other support for water quality agencies
 - Urban Pesticides Committee
 - E-mail listserver
 - Web site www.up3project.org



Acknowledgements

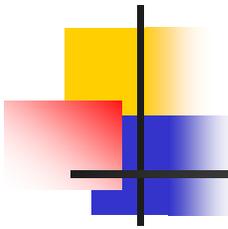
- Preparation
 - Armand Ruby, Armand Ruby Consulting
 - Laura Speare, UP3 Project Manager
- Assistance with Data
 - DPR (Larry Wilhoit, George Farnsworth)
 - Scotts Miracle-Gro



Overview Topics

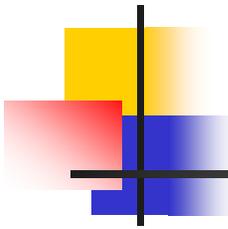
- California Urban Pesticide Use Data Sources
- Urban Runoff Pollutant Transport Processes
- Urban Runoff Monitoring Challenges

Today – Brief overview only
Follow-up forum on urban runoff
recommended by UP3 Project and CASQA



California Urban Pesticide Use Data Sources

- Pesticide Use Reporting – DPR (Cal-PIP)
- Pounds of Pesticides Sold Reports - DPR
- Residential surveys
 - Several high-quality surveys funded by DPR/conducted by UC IPM
- Shelf surveys - UP3 Project, UC IPM



Approach to Estimating Urban Pesticide Use with DPR Data

$$\text{Urban Use} = \text{Reported Urban Use} + \text{Over-the-Counter (OTC) Sales}$$

Assumption:

- *OTC Sales = Urban use that does not require reporting (i.e., residential) (overestimate)*

$$\text{Statewide OTC Sales} = \text{Statewide Sales} - \text{Statewide Reported Use}$$

Reality check:

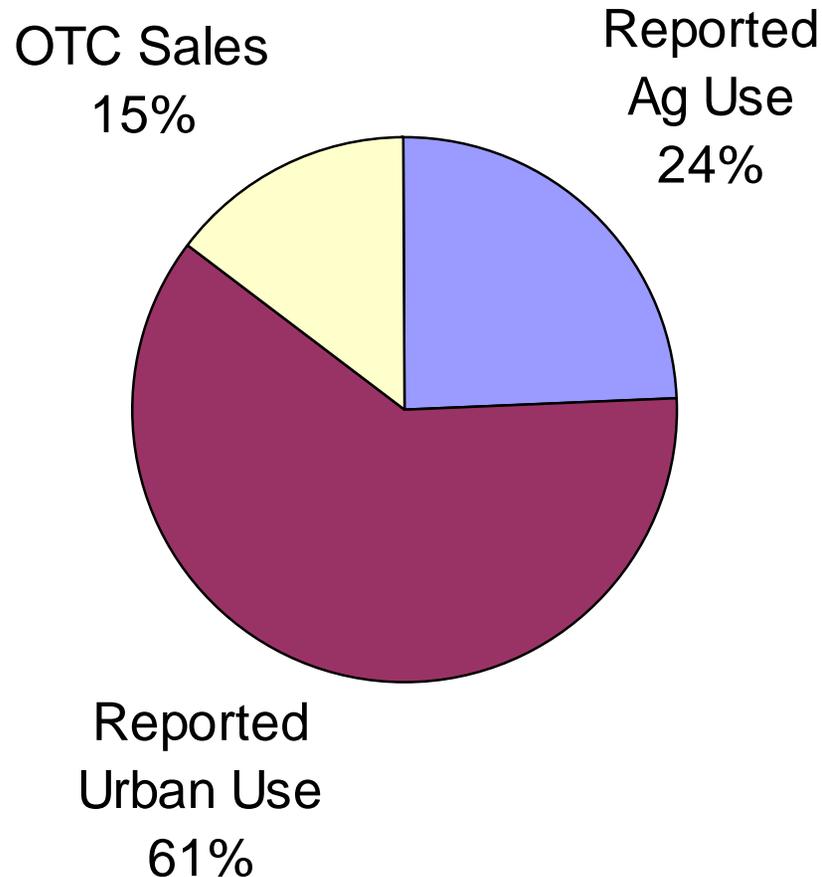
- *Estimated OTC sales of bifenthrin 2004/05 = 13,000 lb ai*
- *Scotts actual OTC sales of bifenthrin 04/05 = 11,000 lb ai*

Bifenthrin Example

Data Notes

- Example based on 2-year averages for 2004/05
- DPR data have significant uncertainties
 - DPR PUR data include errors from non reporting (variable; estimated to average about 10%) and data handling (estimated <1-2%)
 - DPR Sales data include errors from non-reporting, incorrect reporting, data entry, and annual variations – uncertainty likely >10%
- Use of DPR and Scotts data does not constitute endorsement of this analysis

About 75% of 2004-2005 California Bifenthrin Use was in Urban Areas

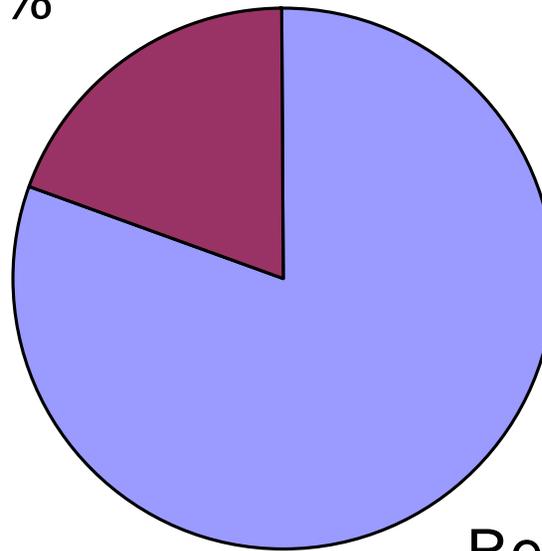


Source: California DPR Pesticide use reporting data & Scotts sales data.

Note: Data accuracy warrants only one significant figure. Additional digits provided to simplify category tracking.

Most 2004-2005 California Urban Bifenthrin Use Was by Professionals

OTC Sales
19.5%

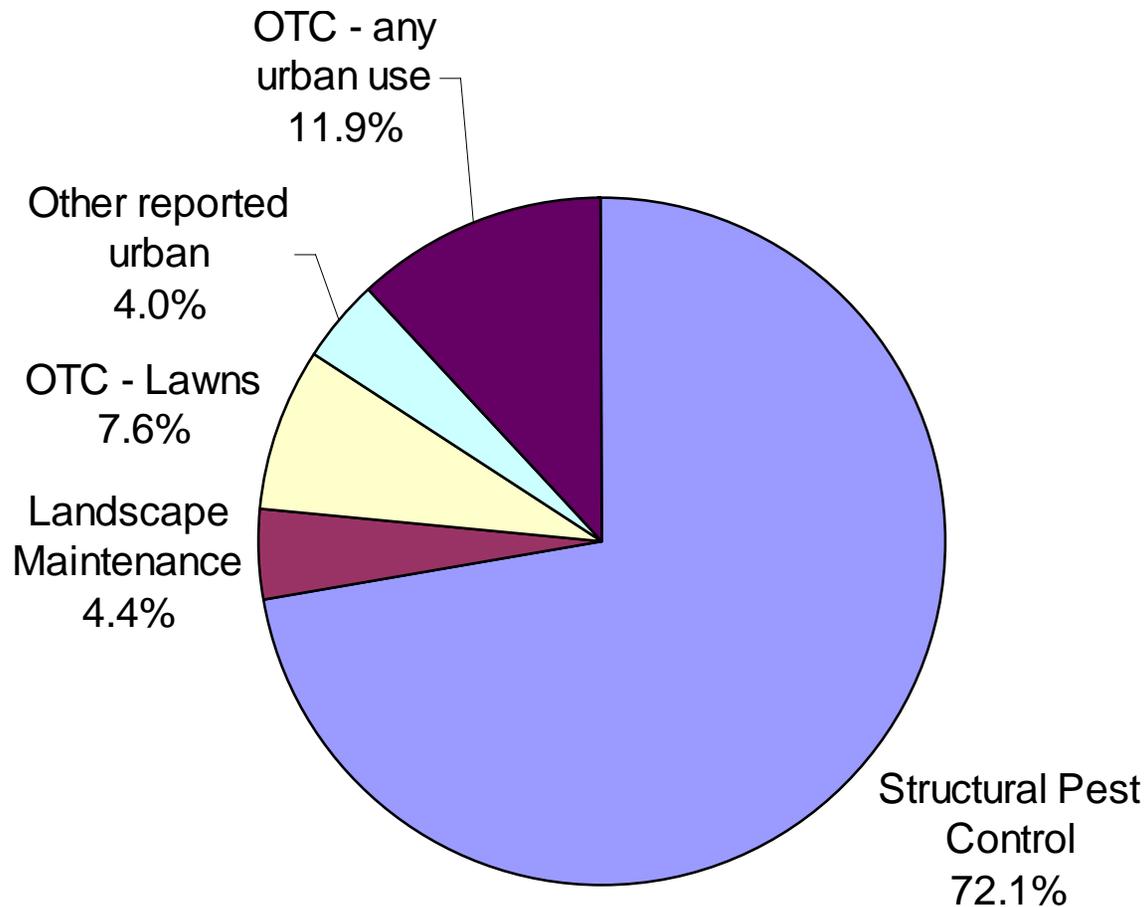


Reported
Urban Use
80.5%

Source: California DPR Pesticide use reporting data & Scotts sales data.

Note: Data accuracy warrants only one significant figure. Additional digits provided to simplify category tracking.

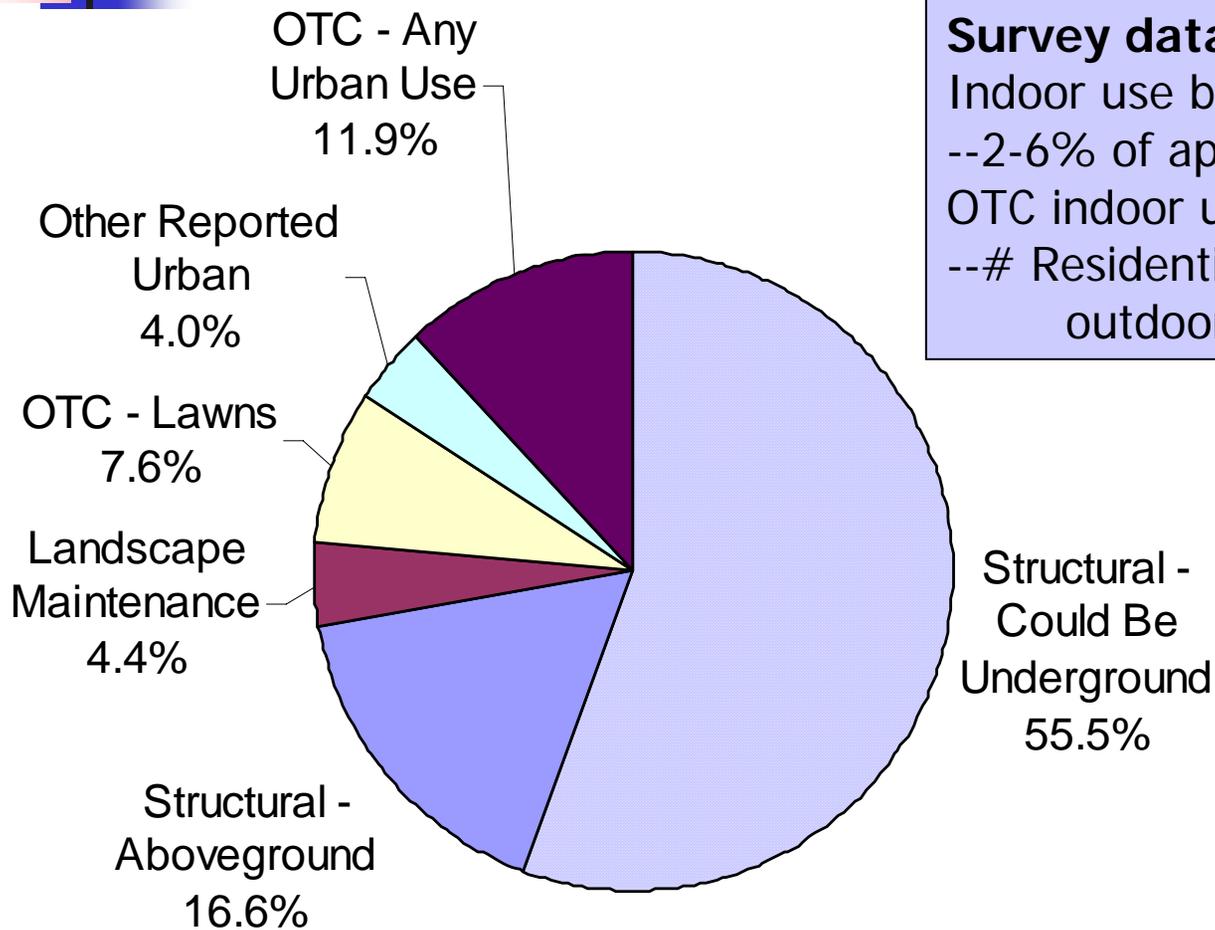
Most 2004-2005 California Urban Bifenthrin Use Was for Structural Pest Control



Source: California DPR Pesticide use reporting data & Scotts sales data.

Note: Data accuracy warrants only one significant figure. Additional digits provided to simplify category tracking.

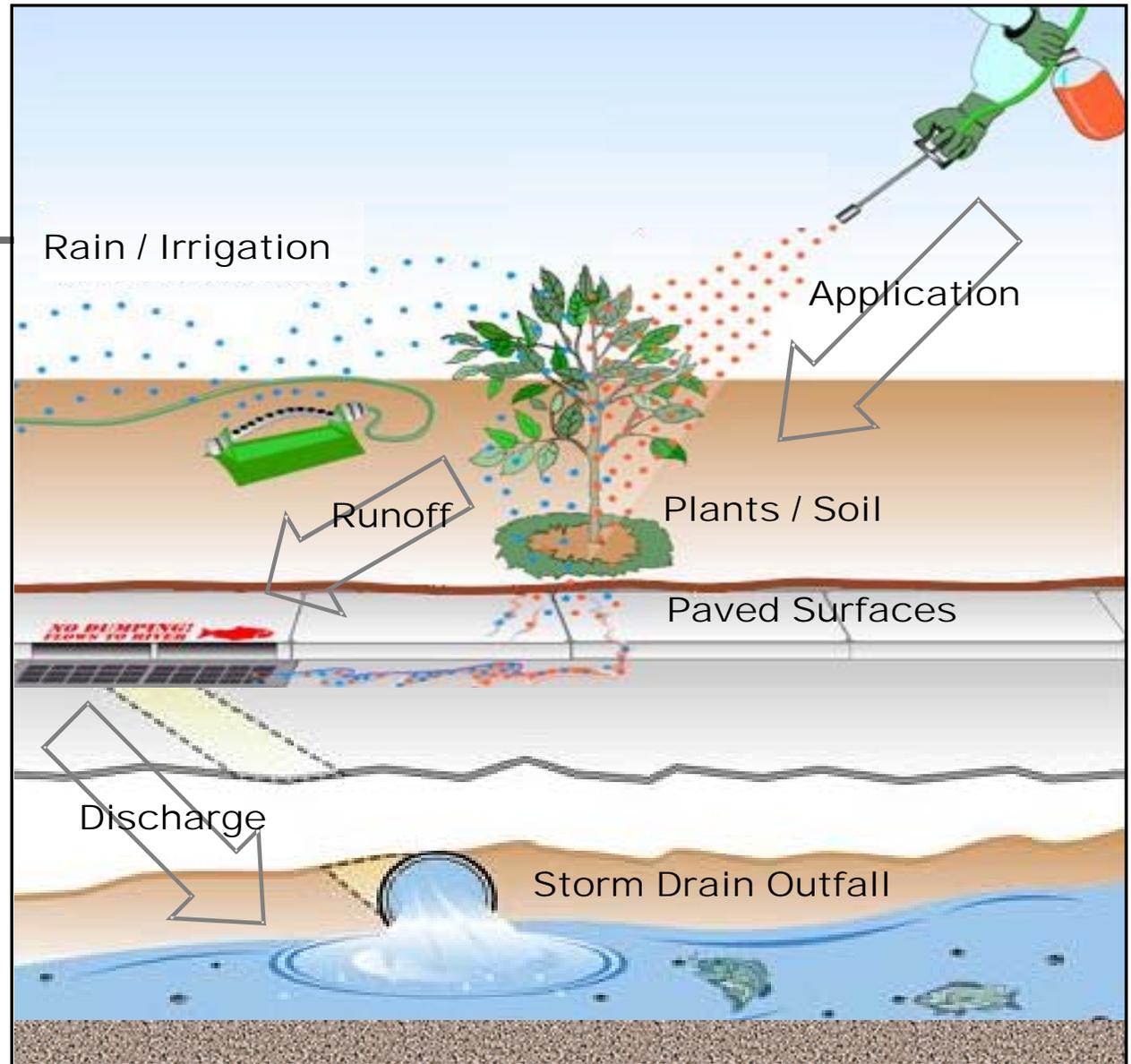
Structural Pest Control Includes Some Underground & Indoor Applications

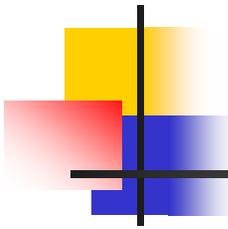


Survey data on indoor pesticide use:
Indoor use by professionals likely small
--2-6% of applications at residences
OTC indoor use may be meaningful
--# Residential indoor applications >
outdoor

Source: California DPR Pesticide use reporting data, Scotts sales data, and analysis of product labels.
Note: Data accuracy warrants only one significant figure. Additional digits provided to simplify category tracking.

Urban Runoff Pollutant Transport Processes



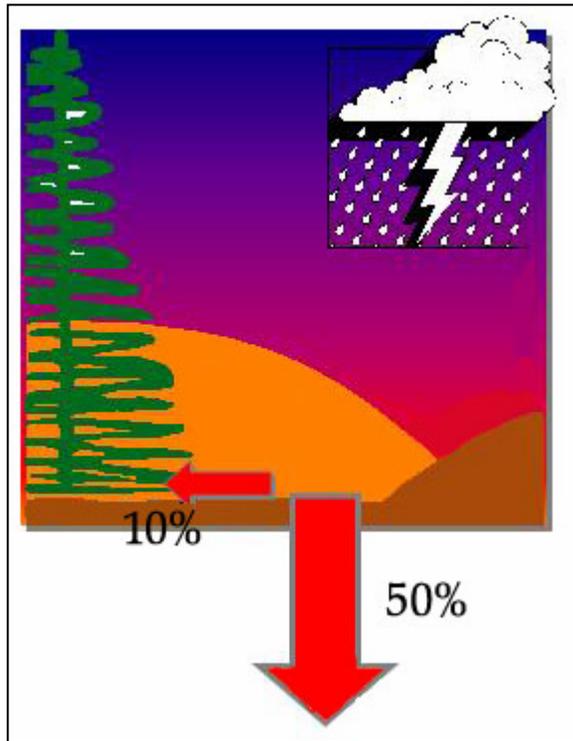


Impervious Surfaces Change Pollutant Transport Processes

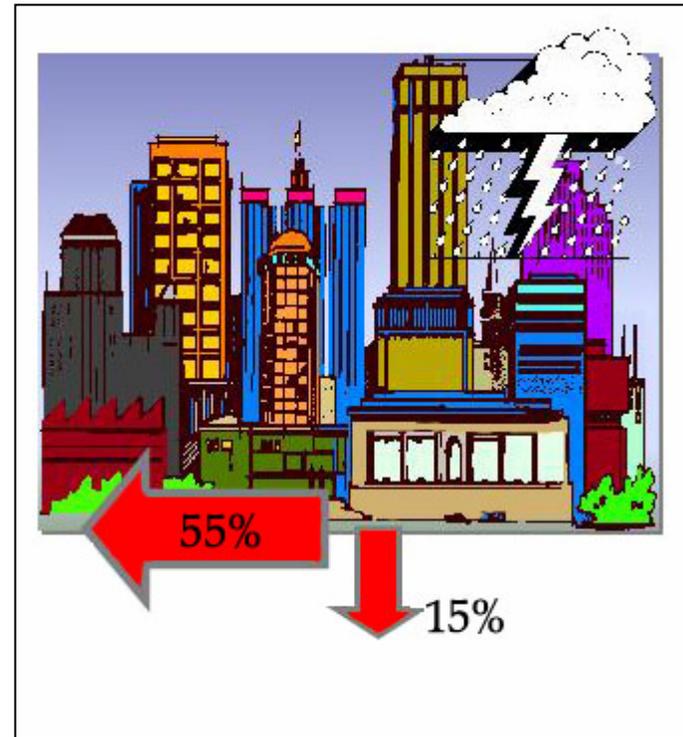
- Pollutant transport in urban runoff depends on:
 - Physical characteristics of watershed/runoff conveyances
 - Chemical properties of pollutants
- Pollutant transport related to many factors, including:
 - Runoff intensity (larger flow/larger particles transported)
 - Rainfall/Runoff volumes
 - Surface characteristics
 - Pollutant chemical properties (fate, solubility)
 - Pollutant release patterns
- Topic of engineering research since early 1980s

Impervious Surfaces Increase Runoff Quantities

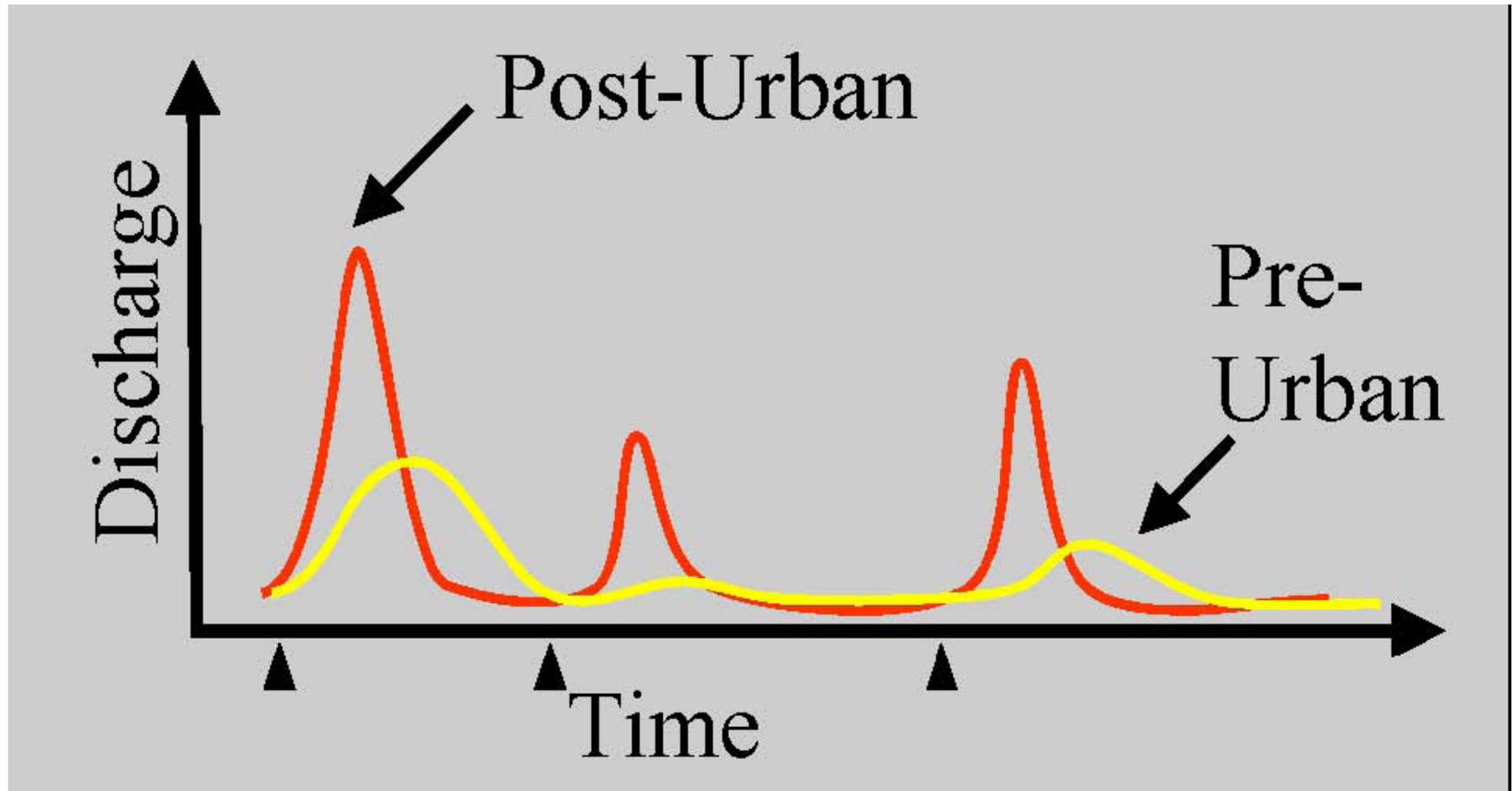
Pre-Development



Post-Development



Impervious Surfaces Increase Runoff Intensity



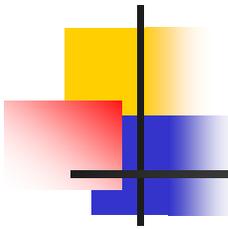
Pollutant Washoff Differs Between Impervious & Pervious Surfaces



Typical California urban stormwater conveyance system – Street gutter
Water & pollutants efficiently moved to creeks

Alternative stormwater conveyance system example – Vegetated swale
Slower flow & infiltration reduces pollutant discharge (e.g., TSS removal about 80%)

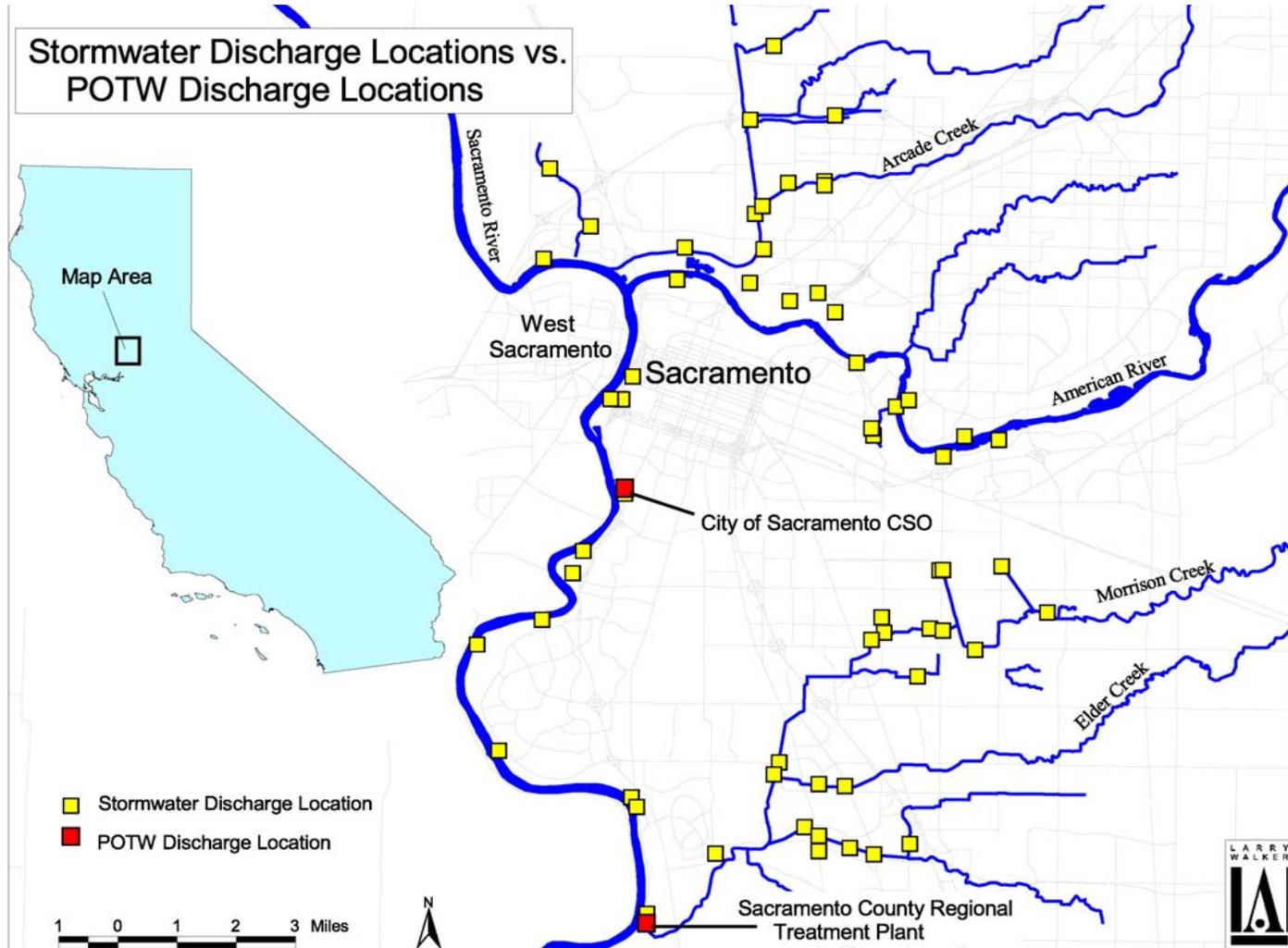




Understanding Impervious Surfaces Is Usually Key to Loads

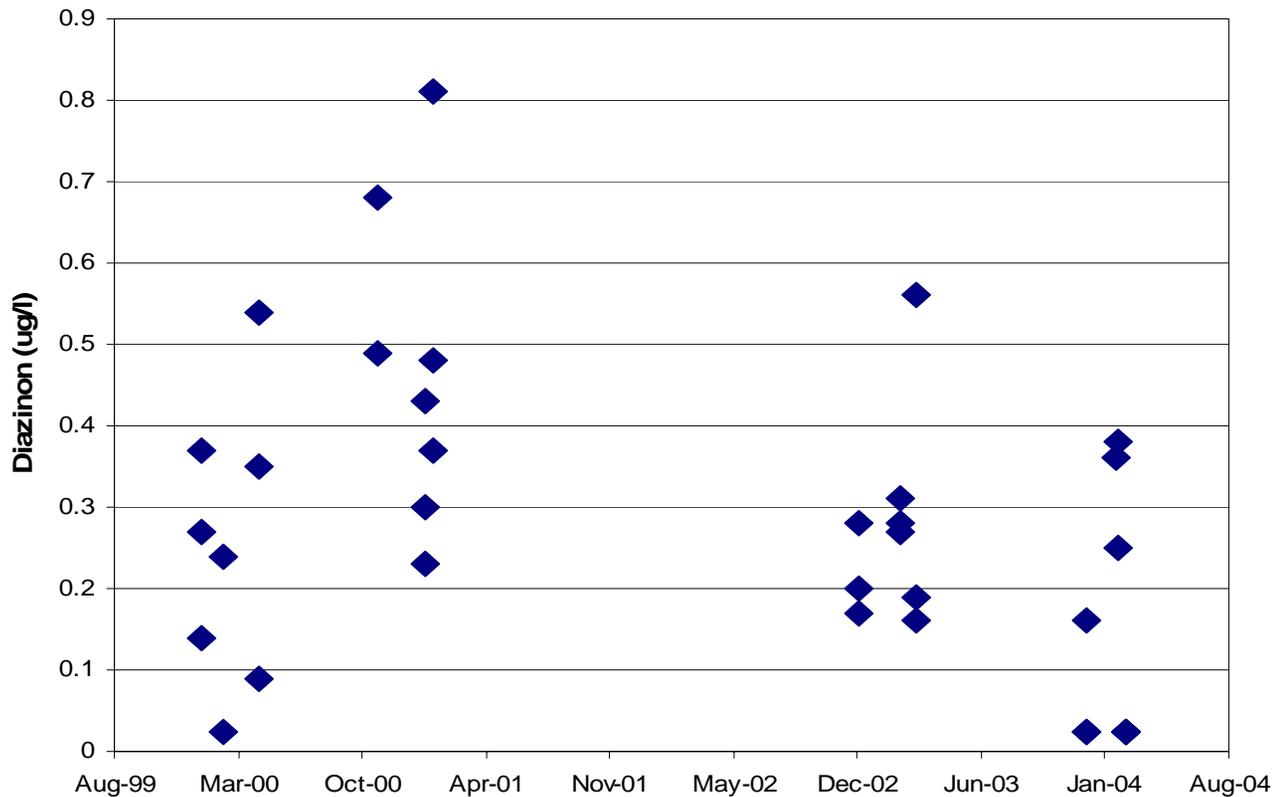
For most pollutants, loads are dominated by runoff from impervious surfaces

Urban Runoff Monitoring Challenges: Many Discharge Points



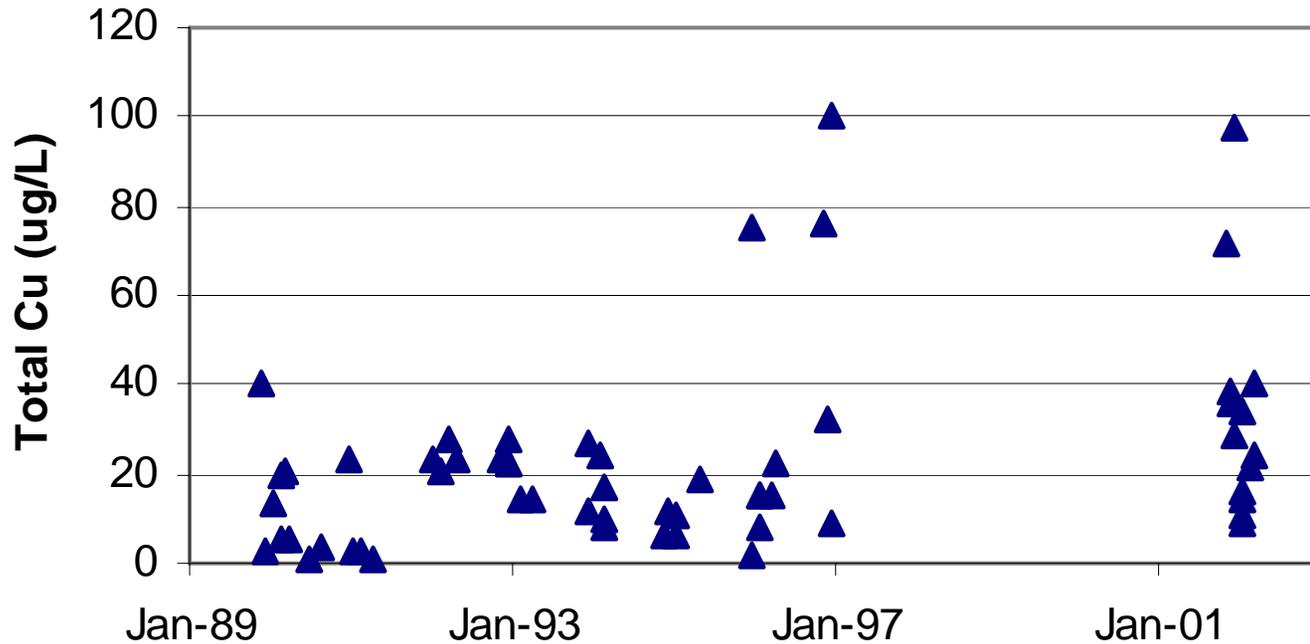
Urban Runoff Monitoring Challenges: Data Variability

Event Mean Diazinon Concentrations, Sacramento CA



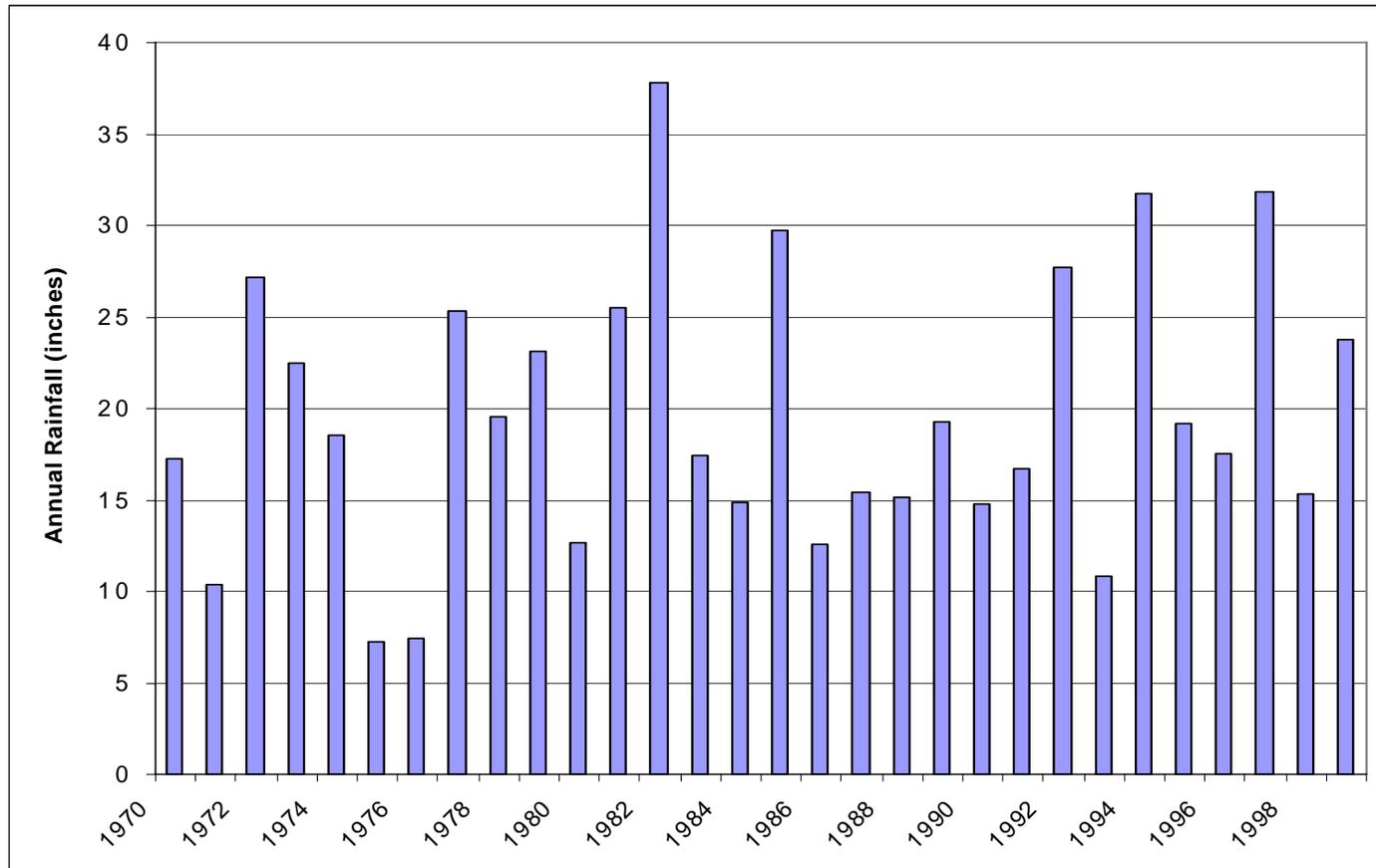
Urban Runoff Monitoring Challenges: Data Variability

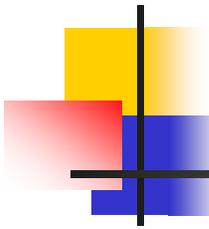
Event Mean Copper Concentrations, Castro Valley CA



Urban Runoff Monitoring Challenges: Weather

Annual Rainfall Sacramento California 1970-1999

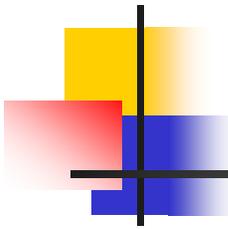




Urban Runoff Monitoring Challenges: Need Large # Samples for Conclusions

- **EXAMPLE: Long-Term Effectiveness, Sacramento County Stormwater Program**
 - If the actual quality of stormwater runoff were improved by 30%, to demonstrate that change via traditional monitoring would require approx. 6 samples per year over 20 years
- **EXAMPLE: Before and After Studies, Copper in Urban Runoff**
 - Based on the known variability of copper urban runoff data in the San Francisco Bay Area, the # samples required to show a statistically significant difference:
 - 25% change – 40 samples “before” + 40 samples “after”
 - 50% change – 10 samples “before” + 10 samples “after”

Before and after studies of pollutants in urban runoff are rarely successful.



Next Steps

UP3 Project and CASQA would like to work with DPR to set up a follow-up forum specifically on urban runoff