

Pesticides in Urban Runoff & Waterways




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Pesticide Use in Urban Areas

- Is there really that much use in urban areas?
- DPR's PUR is great for assess. Ag. uses but not urban
- How much urban compared to Ag. use?
 - Urban Use = reported urban use + OTC sales
 - OTC sales = total sales – total reported use
- ~ 1/2 of pesticide use in CA occurs in urban areas
- Urban pesticide use = small but countless applications





Organophosphorus Pesticides (OPs)

- OP Monitoring in 1990's & early 2000's
 - Urban-use pesticides can end up in urban creeks (early work in Alameda Co.)
 - Creek levels > W.Q. standards for protection of aquatic life
 - Toxicity to aquatic invertebrates (*Ceriodaphnia dubia*) linked mainly to two OPs – diazinon & chlorpyrifos
- Main suspect - Outdoor residential pesticide use
- Regional Boards began regulating discharges of these OPs to urban waterways
- Registrants voluntarily canceled residential outdoor uses
 - Diazinon & chlorpyrifos levels dropped
 - Water column toxicity subsided

DPR Urban Pesticide Monitoring Project





DPR Urban Pesticide Monitoring Project

- In 2008, DPR initiated a monitoring study to assess the occurrence & magnitude of pesticides in urban runoff & waterways
- Dry-weather & wet-weather samples
- Areas of focus: Sacramento, S.F. Bay Area, Orange Co. & San Diego Co.
- 7 receiving water & 18 storm drain sites
- 64 insecticides, herbicides & degradates (7 groups)

Types of Sampling Sites

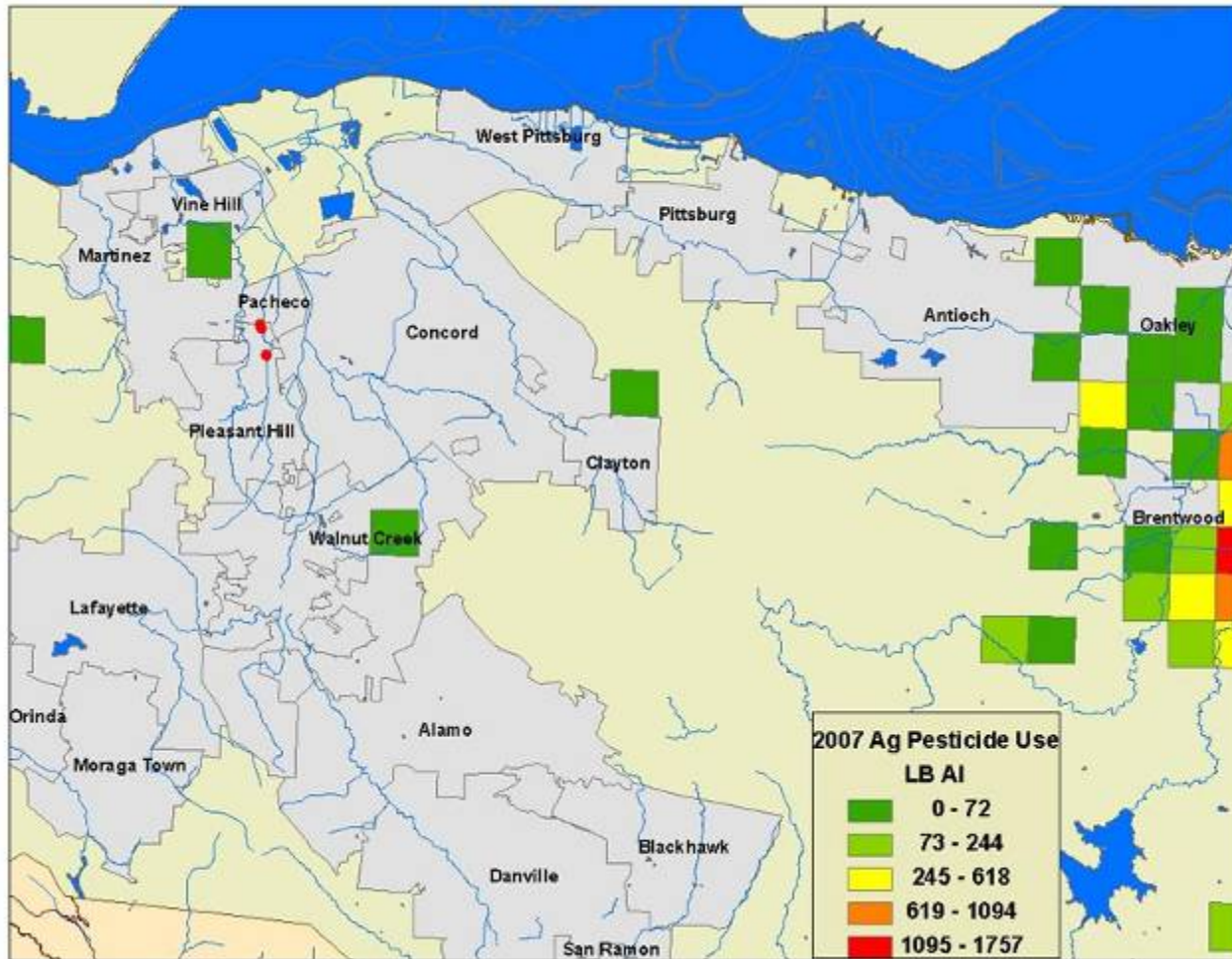


Martin Canyon/Big Canyon Cr. & 680

Dublin Storm Drain MCC010



Urban Areas w/ Ag. Sources Omitted





Lots of Urban Products & A.I.'s

- What active ingredients are used?
 - PUR's reported urban use
 - Residential-Use & Shelf Surveys
- How do we determine which pesticides could be a concern for water quality in urban waterways?
 - Use Amount
 - Number of Products
 - Application Rate
 - Site of Application
 - Formulation
 - Toxicity
 - Physico-Chemical Characteristics

Pesticide Analytes of Interest

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
Phenoxy (PX)	4	Water
Triazines (TR)	12	Water
Pyrethroids (PY)	11	Sediment
Total	64	

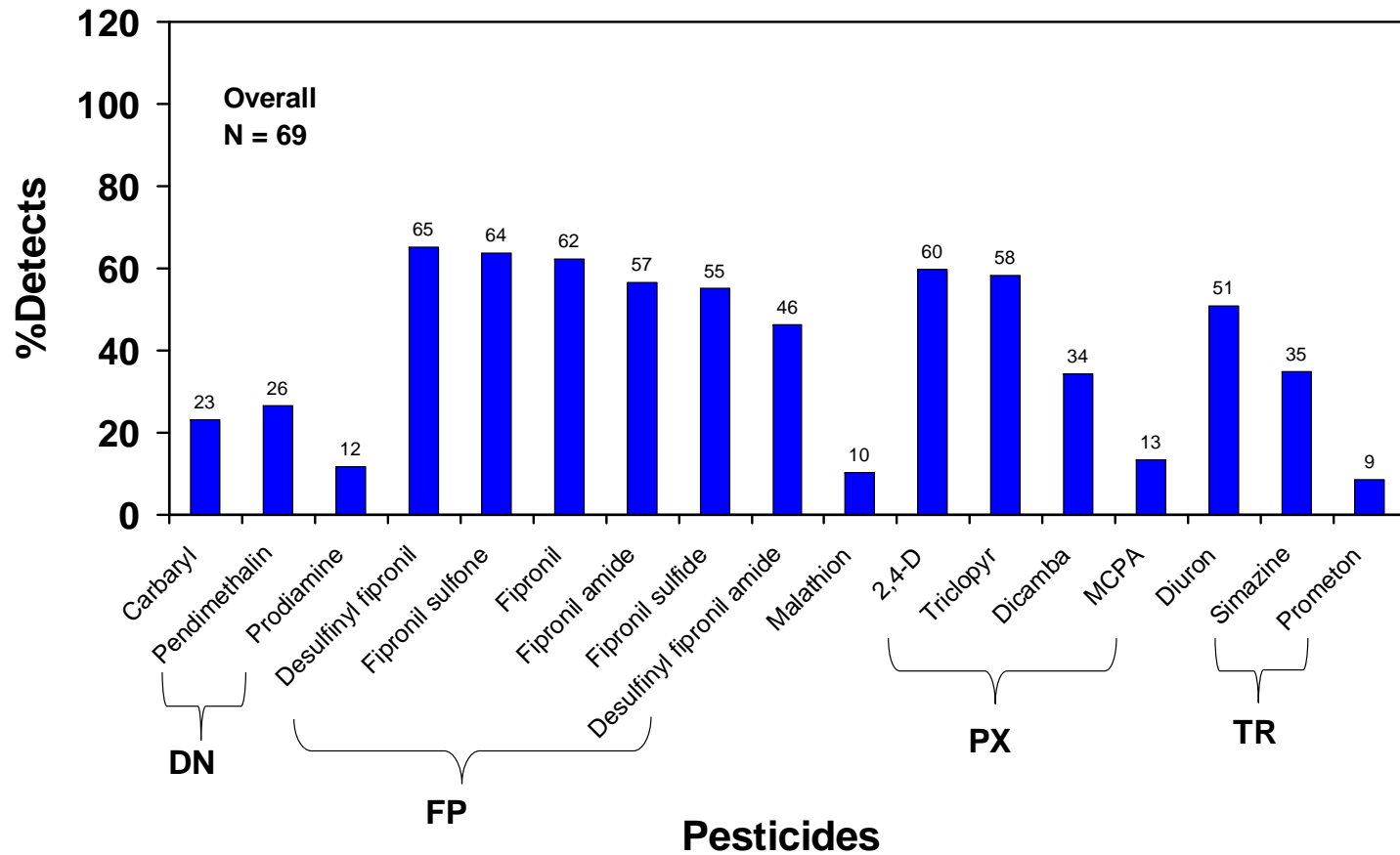
Credit: Li-Ming He, Environmental Monitoring Branch, DPR 2008



DPR Urban Pesticide Monitoring Project – Water Results

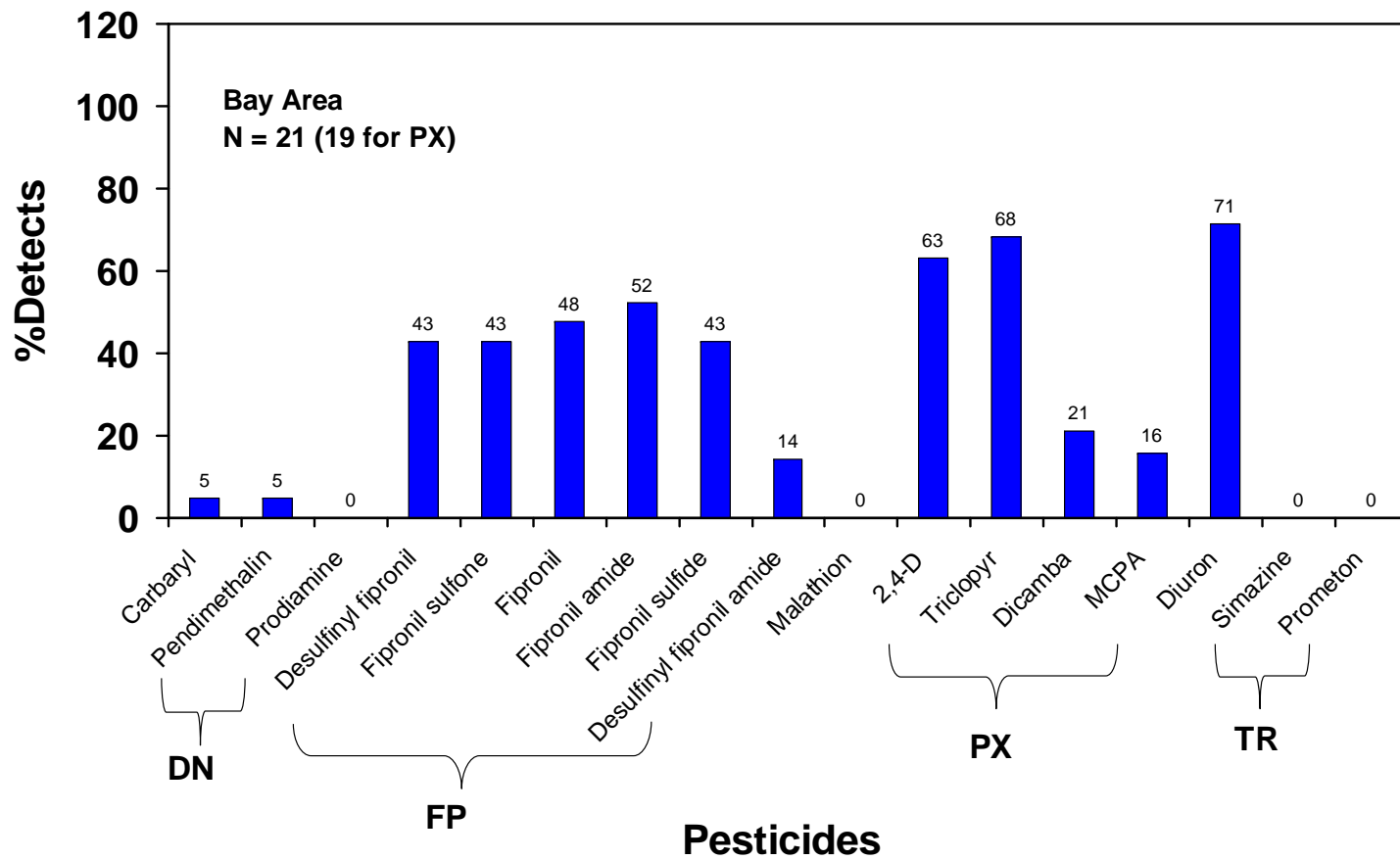
- Preliminary data
- “Frequency” only
- Dry-weather: **Fipronil & degradates > 2,4-D = triclopyr > diuron > simazine = dicamba > pendimethalin = carbaryl**
- Storm drain sites tend to exhibit higher concentrations than receiving water sites
- Pesticides more frequently detected in Orange Co. & Sacramento areas than S.F. Bay & S.D. areas

Pesticides & Degradates in Urban Dry-Weather Flow (Drool)

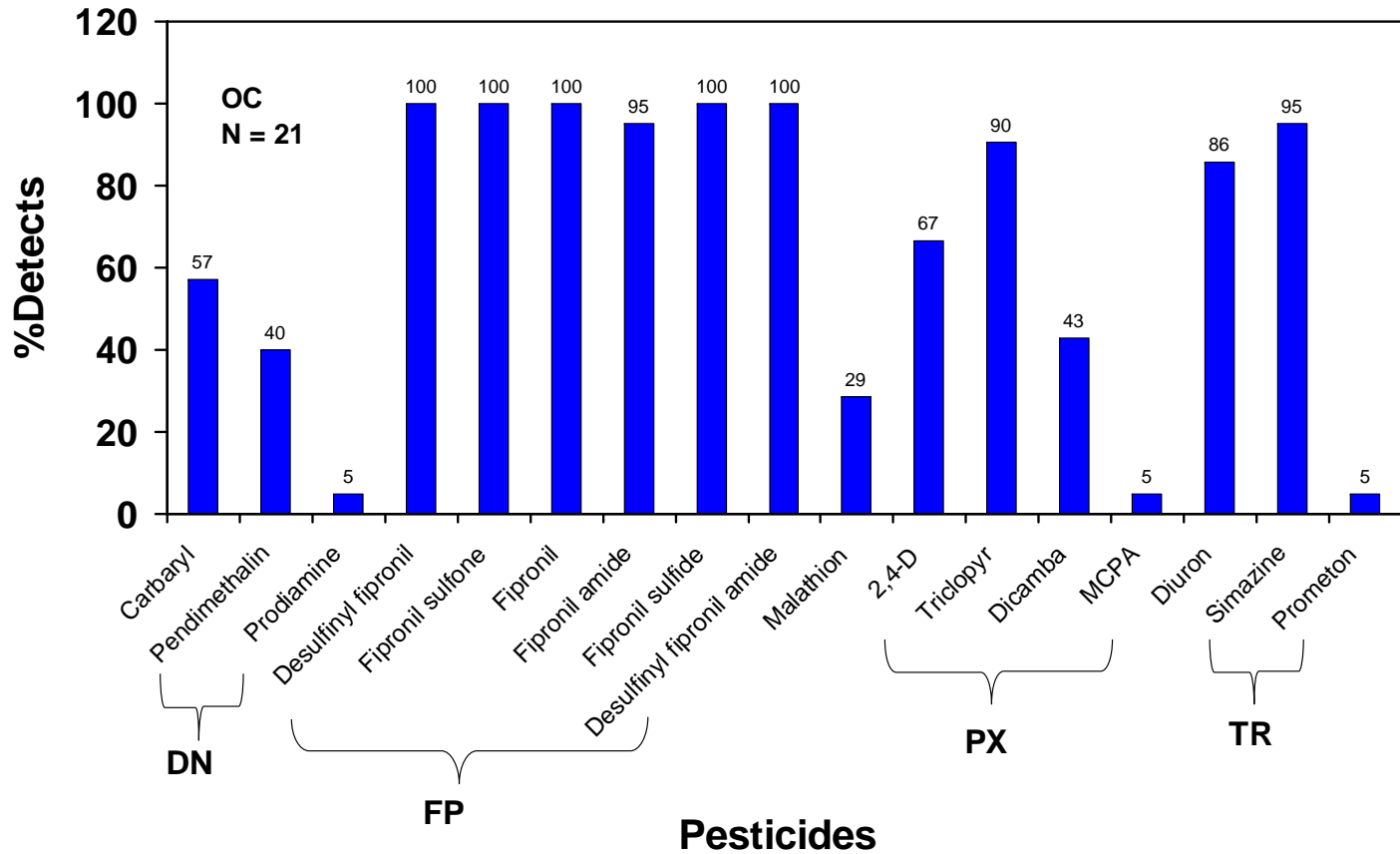


Credit: Li-Ming He, Environmental Monitoring Branch, DPR 2008

Bay Area Prelim. Results (Drool)



Orange Co. Prelim. Results (Drool)



Credit: Li-Ming He, Environmental Monitoring Branch, DPR 2008

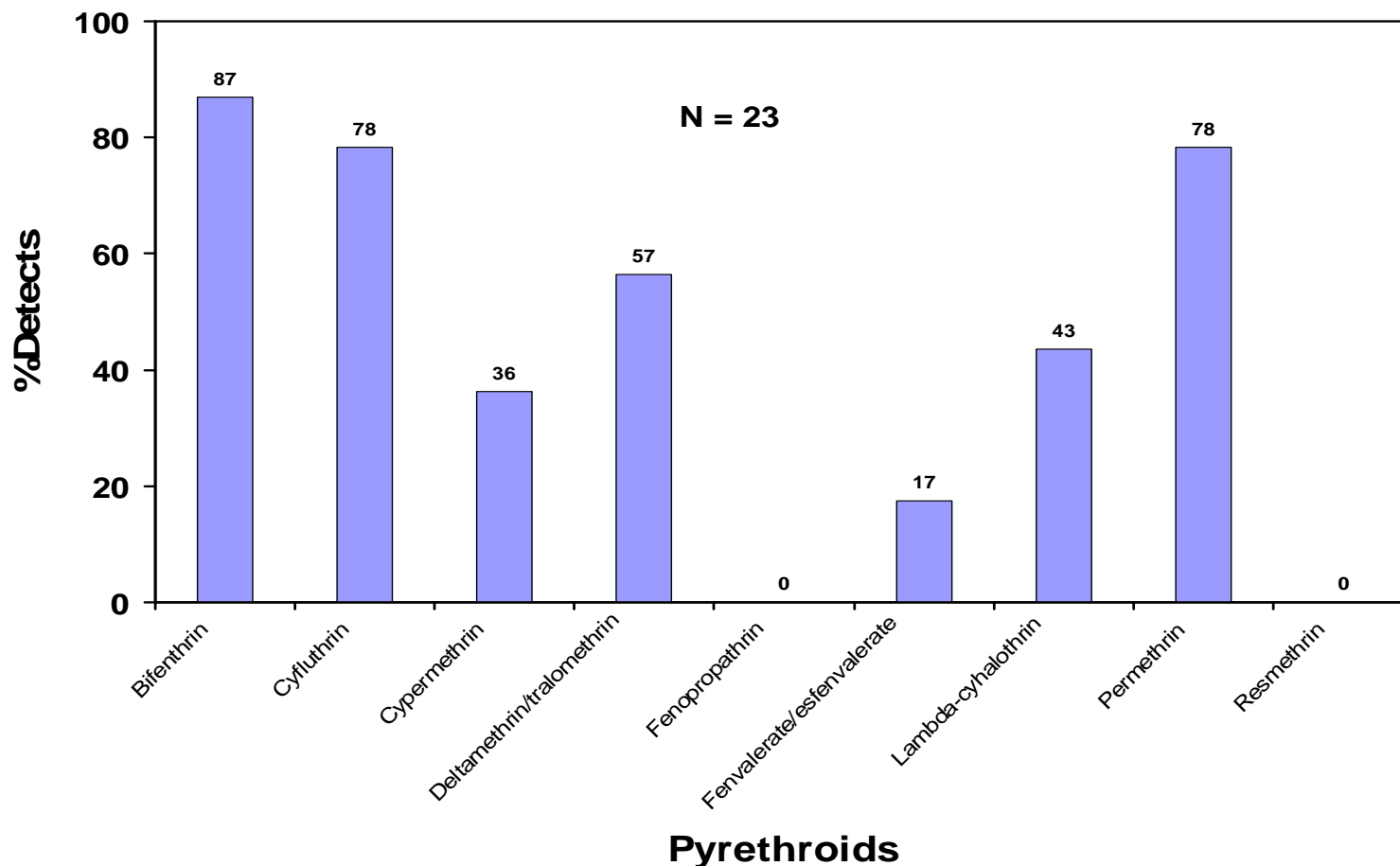


Wet Weather Prelim. Results

- Similar results to dry weather
- Higher detection frequencies for rain runoff
- Storm drains higher frequencies vs. receiving water
- Pyrethroid insecticides frequently detected in rain runoff
- Rain runoff sampling continues (weather permitting!)

Pyrethroids in Urban Sediment:

Bifenthrin > cyfluthrin = permethrin >
deltamethrin/tralomethrin > λ -cyhalothrin > cypermethrin





Findings from Other Urban Studies...

- Runoff from many CA urban areas showed frequent detections & high concentrations of:
 - Pyrethroids
 - Fipronil & degradates
- Toxicity in urban creek sediment growingly linked to pyrethroids
- Impervious surfaces help lead to greater off-site movement of pesticides
- Ants! Ants! Ants!



Life After OPs

- Problems w/ OP replacements
- Trading water column toxicity for sediment toxicity
 - Pyrethroids stick to organic matter in soil/sediment
 - More available to sediment-dwelling inverts.
- Bifenthrin appears to be most problematic
- Other concerns: fipronil & degradates, herbicides in water?
 - W.Q. impacts not clear yet...



Urban Users/Sources

- Many user groups – generally divided into:
 - ➔ Licensed users
 - ◆ Pest control operators & other users that hold a QAL or QAC
 - ➔ Non-licensed users
 - ◆ Residential users (i.e., homeowners, tenants)
 - ◆ Industrial & institutional users
 - ◆ Others



Residential Areas

- Most investigated
- Source investigations point to:
 - Outdoor uses by both licensed & non-licensed applicators
 - For insecticides, structural & landscape applications are likely to be important contributors
 - Some pyrethroids found are those used almost exclusively by PCOs



Why is Mitigation Such a Challenge?

- Traditional W.Q. mitigation tools for Ag. not suited for urban setting
- Impractical? Impossible? How do you effectively control or enforce homeowner use?
- Many PCOs
- Still does not take much to be problematic – parts per billion – parts per trillion
- Should we “fix” a.i. or address use pattern?



Why is this Important?

- State & Regional Boards have legal mandate to protect W.Q.
- Could initiate regulations & discharge permitting process based on toxicity linked to pesticides
- Municipal stormwater programs are responsible dischargers
 - Problem – they cannot control “use”
 - Fines & vulnerable to litigation (i.e., law\$suit\$)
- DPR also has legal mandate to prevent significant adverse effects to the environment



Mitigation

- DPR's “Pyrethroid Reevaluation”
 - Work w/ registrants
 - Better define problem & identify potential mitigation
- Management practices are being studied & evaluated
 - e.g., treatment types, surface material wash off, lawn irrigation management
- Urban user outreach projects by DPR & others
- U.S. EPA label changes (e.g., pre-construction termiticide treatments)
- Regional Boards likely to pursue discharge regs. & enforce permit requirements



Mitigation

- DPR to unveil new S.W. regulations this year to address both Ag. & urban W.Q. issues
 - Basic requirements to begin addressing urban sources (will likely deal w/ structural & landscape uses)
 - State & Regional Boards currently reviewing draft regs.
 - CACs next
 - Then public review
- Adopted regs. 2010?
- Compliance & enforcement of these regs. could prove vital in the improvement of urban W.Q.

Thank You...



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