Annual Research & Monitoring Update

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

Presentation Overview

- Pesticides of concern
- Analytical methods
- Bay Area water quality monitoring
- Pyrethroids
- Other findings
- Recommendations

Pesticides of Concern: Runoff

- Pyrethroids
  - High risk of urban creek sediments toxicity
- PHMB (swimming pool and spa biocide)
- Carbaryl & Malathion
- Copper (Algaecides, fungicides, wood preservatives)
- Fipronil??

Pesticides of Concern: POTWs

- Tributyltin (cooling water treatments and other biocides)
- NDMA in metam sodium root killers
- Pyrethroids (Buzz-Off clothing)
- PHMB (swimming pool and spa biocide)

Pesticides of Concern: Uses in Surface Waters

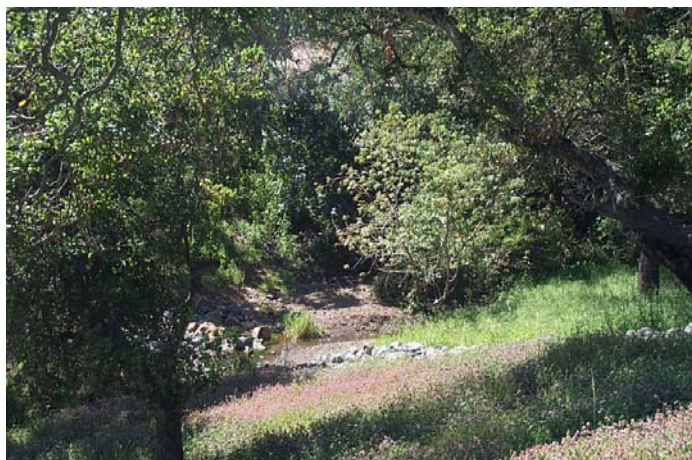
- Marine antifouling paints
  - Copper
  - Zinc pyrithione (zinc omadine)
  - Irgarol 1051
- Herbicides
  - Copper algaecides

Analytical Methods

- Pyrethroids—improving
  - 2 commercial labs offer low d.l.
  - Sampling methods need working out
  - TIE methods in development
- PHMB—??

Planned Monitoring – Bay Area

- Water column
  - Diazinon, other OP pesticides, Toxicity
  - Pyrethroids (limited), Carbaryl (very limited)
  - PHMB – None identified
- Sediments (limited)
  - Pyrethroids, Toxicity
- Mostly fresh water



Planned Monitoring – Bay Area

- POTW effluent
  - Compliance monitoring: tributyltin, NDMA, toxicity
  - Pyrethroids & PHMB – None identified (*any info*?)

Photo courtesy Calvin College

Pyrethroids Are Already Causing Toxicity

- Most incidents involve organisms living in sediments
- Toxicity found in California rivers and streams
  - No testing in salt water yet
- Future is a big concern
  - Is toxicity occurring in urban areas?
  - Can they build up in sediments?
  - Use has increased dramatically

Hyalella azteca (amphipod)

Pyrethroids Are the Most Common Urban Insecticides

- Diazinon & Dursban were the most common insecticides
- Pyrethroids have replaced them
  - Bifenthrin
  - Cyfluthrin and Beta-Cyfluthrin
  - Cypermethrin
  - Deltamethrin
  - Esfenvalerate
  - Lambda-Cyhalothrin
  - Permethrin

Pyrethroids Have Many Uses

- Keeping insects out of buildings
- Underground termites
- Lawn/garden insects
- Pet fleas





What's Next—Pyrethroids

- Urban creek sediment data
  - Expected this summer
- Sediment organism toxicity data
  - Hyallela azteca LC50s expected this spring
- Regulatory
  - U.S. EPA re-registration
  - 303(d) listings???

Other Findings

- Cumulative effects important
  - Pesticides and other stressors
  - Multiple pesticides
- Degradates need to be considered
- Urban different than Ag
  - Toxicity index – insecticide > herbicide
  - Slower decomposition
  - Higher runoff

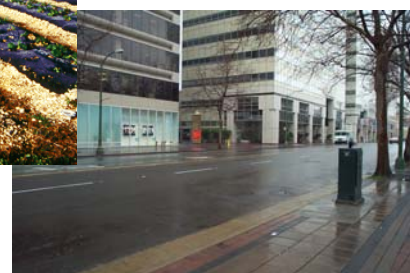


Photo courtesy USGS

Recommendations—Analytical Methods

- Try out pyrethroid methods in all media
- Develop standard procedures for pyrethroid sample handling
- Develop methods for other pesticides of concern

Photos courtesy USGS

Recommendations—Monitoring

- Surveillance monitoring needed
  - Priority: toxicity & pesticides of concern
  - Include sediments
  - Salt water, fresh water, POTW discharges
- Check for pesticides of concern when toxicity occurs
- Inform U.S. EPA and DPR of all incidents
- Publish results!

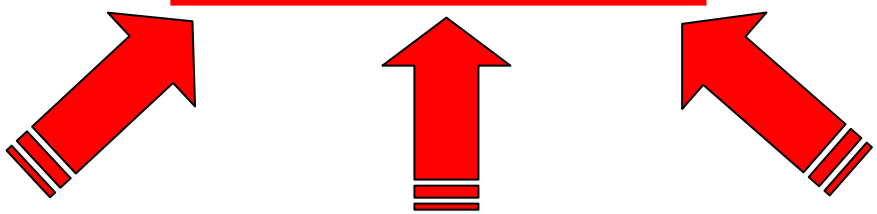


Photo courtesy NOAA

Recommendation

- Integrate research and monitoring information into your own planning
  - Manage current problems
  - Prevent future problems