Pro-Active Approach for Managing Pesticide-Caused Aquatic Life Toxicity

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- Current "Reactive" Approach for Regulating Aquatic Life Toxicity of Pesticides Not Protective of Environment
- Need "Pro-Active" Approach to Properly Screen Pesticides for Potential Water Quality / Ecological Impacts

Presented to Sacramento River Watershed Program Toxics Subcommittee, September 26, 2001

Current Passive, "Reactive" Approach Not Protective

- US EPA OPP & CA DPR Registration of Pesticides Significantly Deficient in Evaluating Potential for Registered Uses to Result in Aquatic Life Toxicity in Stormwater Runoff & Irrigation Water Releases
  - Does Not Require Fate/Transport Information or Aquatic Life Impact Information for Stormwater Runoff & Irrigation Water Releases
    - Information Essential for Evaluating Potential Impacts on Aquatic Life of All Pesticides That Could Be Mobilized by Rainfall Runoff, Fugitive Irrigation Water, & Irrigation Tailwater (Runoff/Release Waters)
- Current Reactive Approach Failed to Detect OP Pesticide Toxicity to Aquatic Life for Well-Over a Decade after "Damage" to Ecosystems Began to Occur

Need “Pro-Active” Approach

- Needed To Properly Screen Pesticides for Potential Water Quality / Ecological Impacts
  - Monitoring Stormwater Runoff & Irrigation Water Releases Should Be Required for Registration of All Pesticides Used in Manner That Presents Potential Threat to Water Quality
  - Monitor for:
    - Presence of the Pesticide in the Runoff/Release Waters
    - Persistence of the Pesticide in Aquatic Systems Receiving Runoff/Release Waters
    - Toxicity to Several Forms of Water-Column & Benthic Life in the Runoff/Release Waters

“Pro-Active” Approach (cont’d)

- If Toxicity Found or If Concentrations of Pesticide Potentially Toxic (i.e., above Worst-Case Water Quality Criteria) Require Comprehensive Field Studies to Evaluate Whether Measured or Potential Toxicity Adversely Impacts Numbers, Types, or Character of Aquatic Life in Receiving Water
  - If Potential Adverse Impacts Found on Organism Assemblages in Receiving Water, Determine Significance of Impacts to Water Quality – Beneficial Uses – of Waterbody
    - Err on Side of Protection of Water Quality – Beneficial Uses When Lack of Definitive Information
- Required Studies to Be Funded by Pesticide Manufacturers, Users, & Others Who Profit from Use of the Pesticide

“Pro-Active” Approach (cont’d)

- The Phase-Out/Down of OP Pesticides Diazinon & Chlorpyrifos in Urban Areas Will Result in Large-Scale Use of Other Pesticides
  - Should Focus Initial Development & Application of Pro-Active Approach in Urban Areas

For Currently Regulated Pesticides

- Determine What Pesticides Are Used in an Area; How, Where, When, and in What Amounts Applied
- Conduct Field Monitoring Program for Low-LC_{50} for Daphnia & Fathead Minnow Larvae That Could Be Present in Stormwater Runoff & Irrigation Water Releases Designed to Determine:
  - Concentrations of Each Pesticide in Runoff & Release Water
  - Fate & Persistence of the Pesticides in the Receiving Water
  - Aquatic Life Toxicity to Suite of Water-Column & Benthic Organisms

For Currently Regulated Pesticides

(cont'd)

- Field Monitoring Program Designed to Determine (cont'd):
  - Whether Organism Assemblages in Receiving Waters Are Appropriate for Habitat Characteristics
    - Examine Worst-Case Situations near Point of Use/Runoff
  - Follow Runoff/Discharge Plumes Using Toxicity & Pesticide Concentrations
    - Establish Toxicity—Duration of Exposure Relationship for Planktonic & Benthic Organisms
- These Types of Studies Need to Be Conducted for Several Years for a Given Pesticide Formulation & Application Method to Evaluate Climatic Effects
  - If Formulation or Application Changes, Repeat the Studies

Adequacy of Analytical Methods

- Sampling & Analytical Methods Must Be Evaluated to Ensure That Potential Toxicant Can Be Determined Reliably at Potentially Toxic Levels
- If Analytical Methods Not Available to Quantify Pesticide at 0.1 LC_{50}, for Most Sensitive Form of Aquatic Life, Require Manufacturer to Develop Reliable Analytical Method before Pesticide Registered
- If Analytical Method Inadequate, Contact US EPA Office of Water & Pesticide Programs, CA Dept. Pesticide Regulations, & State Water Resources Control Board to Request That Pesticide Manufacturer Be Required to Immediately Develop & Properly Evaluate Analytical Methods for the Pesticide

Addressing “Disagreements among Experts”

- Use Best Professional Judgment / Weight-of-Evidence Triad Approach for Assessing Potential Impacts
  - Aquatic Life Toxicity
  - Aquatic Organism Assemblage Information
  - Chemical Information on Fate, Persistence, Cause of Toxicity – TIE
- Peer Review Panel of Experts to Review Information
  - Conducted in Public, Interactive Process
  - Advocates of Particular Position Required to Present Their Evidence with Appropriate References
  - Opponents of Particular Position Present Their Evidence with Appropriate References
- Regulatory Boards Use This Exchange of Technical Information to Formulate Policy for Water Quality Protection
- Likely Need to Fund Participation of Public Groups & Some Other Stakeholders in Peer-Review Process

Suggested Approach

- Appoint & Fund Pro-Active Approach Advisory Committee Consisting of Representatives from:

  CVRWQCB, SWRCB, US EPA, OHHEWA, DPR, SRWP, Pesticide Manufacturers, County Ag Commissioners, Ag Interests, CALFED, Aquatic Toxicologist, Aquatic Chemist, Hydrologist, Invertebrate Biologist, Others?
- Geographical Scope to Include Sacramento & San Joaquin River Watersheds & Delta
- Develop Draft Guidance on Implementation of Pro-Active Approach
- Review Pesticide Use in Central Valley
- Select for Review Those Pesticides That Are
  - Used in Large Amounts,
  - Have Low LC50's for Daphnia & Fathead Minnow Larvae, and
  - Would Be Expected to Be Present in Stormwater Runoff and/or Irrigation Water Releases, and
  - For at Least Initial Review, Have Adequate Analytical Methods to Measure Pesticide Concentration at 0.1 LC_{50}

Suggested Approach (cont'd)

- Aquatic Chemistry/Toxicology/Fate Modeling
  - Determine Expected Transport Fate/Impact Model for Pesticide
    - Predict Areas of Receiving Water in Which Aquatic Life Toxicity Would Likely Occur from Stormwater Runoff Event or Irrigation Water Discharge
      - Initial Predictions Not Likely Highly Reliable
      - Reliability of Predictions Will Improve with Experience and Appropriate Monitoring
      - Eventually Will Be Able to Greatly Reduce Field Studies as Modeling Capability Improves
- Conduct Field Evaluations
  - Work with County Ag Commissioners to Determine Where & When to Set Up Pro-Active Field Monitoring Program

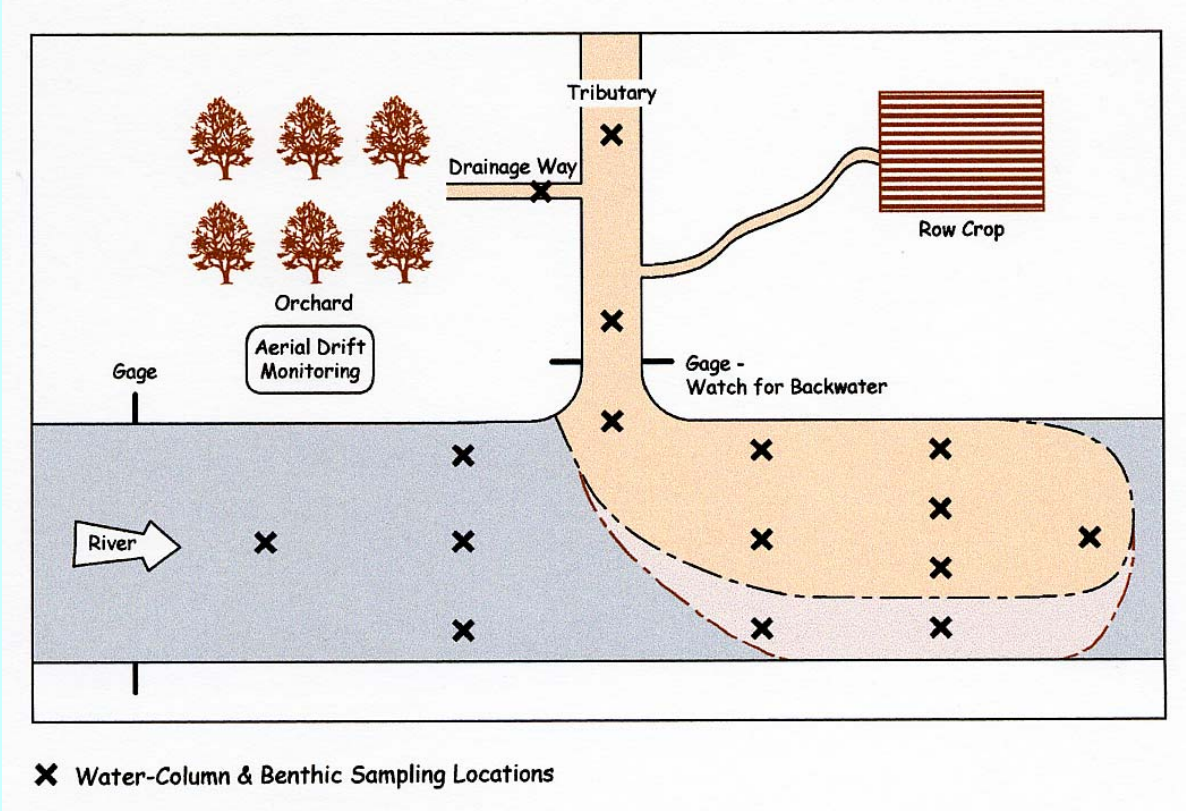
Aquatic Life Toxicity Studies on Stormwater Runoff

? Issues That Need to Be Considered ?

- Could There Be Toxicity in Stormwater Runoff?
- Is There Toxicity in the Stream during Water Runoff Event?
- Is There Toxicity in the Stream between Runoff Events?
- What Is the Concentration/Duration of Exposure Profile of Pesticide/Chemical Being Evaluated during the Runoff Event?
- If Pesticide/Chemical Toxic or Potentially Toxic, Evaluate Period of Time during Which Planktonic & Benthic Organisms Could Be Exposed to Toxic Conditions within the Urban Stream & Receiving Water
- What Is the Fate of the Toxic Urban Stream Water in the Receiving Water?
  - What Is Rate of Dilution/Dissipation of Toxicity in the Receiving Waters for the Urban Stream?
  - Is There Toxicity in Receiving Water Upstream of Entrance of Urban Stream during Stormwater Runoff

Aquatic Life Toxicity Studies on Stormwater Runoff
? Issues That Need to Be Considered ?
(cont'd)

- If It Appears That Desirable Forms of Aquatic Life Could Receive Toxic Exposure That Could Be Adverse to Beneficial Uses of Urban Stream or Receiving Waters, Conduct Special-Purpose Study of Planktonic and/or Benthic Organism Assemblages
  - Does the Toxicity Significantly Cause Significant Alteration of Numbers and Types of Desirable Aquatic Life?
  - Use Best Professional Judgment, Weight-of-Evidence, Triad Approach, in an Interactive, Peer-Review Process to Determine if Adverse Impacts to Beneficial Uses of the Urban Stream Are Potentially Significant



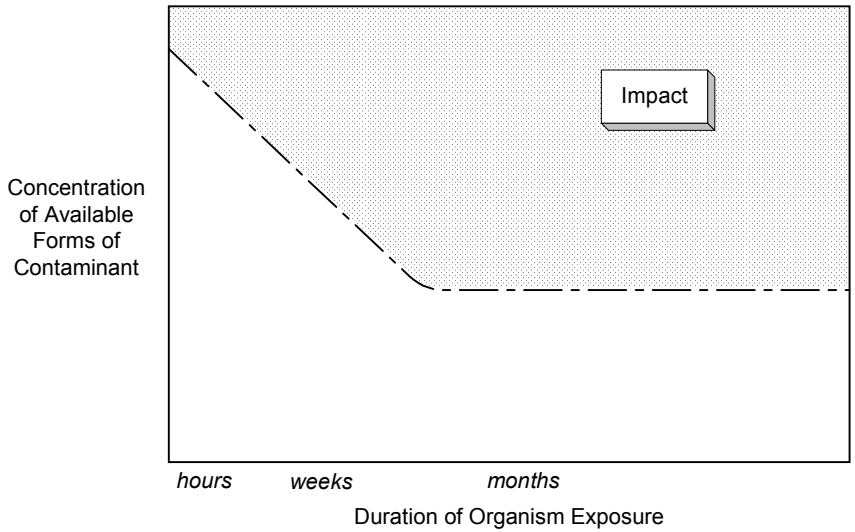
Use Caged Organisms at Selected Locations

Sample Water Column during Runoff Event
Measure Toxicity & Pesticide Concentrations

Near-Field vs. Far-Field

Define Chemical & Toxicity Plumes
Use Specific Conductance & Temperature to Define Tributary Plume
Use Oranges to Define Velocity

Determine Duration of Exposure for Toxic Conditions for Planktonic & Benthic Organisms



ISSUES:

- What Is Impact of Toxicant on Numbers, Types & Characteristics of Desirable Aquatic Life?
  - Direct & Higher-Trophic-Level Impacts
  - Impacts on Zooplankton That Are Essential, Non-Replaceable Food for Larval Fish
  - Consider both Acute & Chronic Impacts
- Does This Impact Represent a Significant, Adverse Impact on Beneficial Uses of Waterbody Fisheries & Other Aquatic & Terrestrial Life of Importance to the Public?