Stormwater Runoff Toxicity in Orange County, CA
A Demonstration of Evaluation Monitoring

G. Fred Lee, PhD, PE, DEE
G. Fred Lee & Associates

Scott Taylor, PE
Robert Bein, William Frost & Assoc

Evaluation Monitoring Demonstration Project

Alternative to Conventional Stormwater Runoff Monitoring for BMP Development

1996 - Field Studies of Toxicity of San Diego Creek as It Enters Upper Newport Bay

Overall Implication of Urban Stormwater Runoff Toxicity on Water Quality/ Use-Impairment

---

Presented at State of CA Stormwater Quality Task Force Meeting, Ontario, CA, Nov 14, 1997

Inadequacy of Conventional Stormwater Runoff "Water Quality" Monitoring

Conventional Stormwater Runoff Monitoring

Measure Total/Dissolved Concentrations for Suite of Chemical Parameters for Several Storms per Year

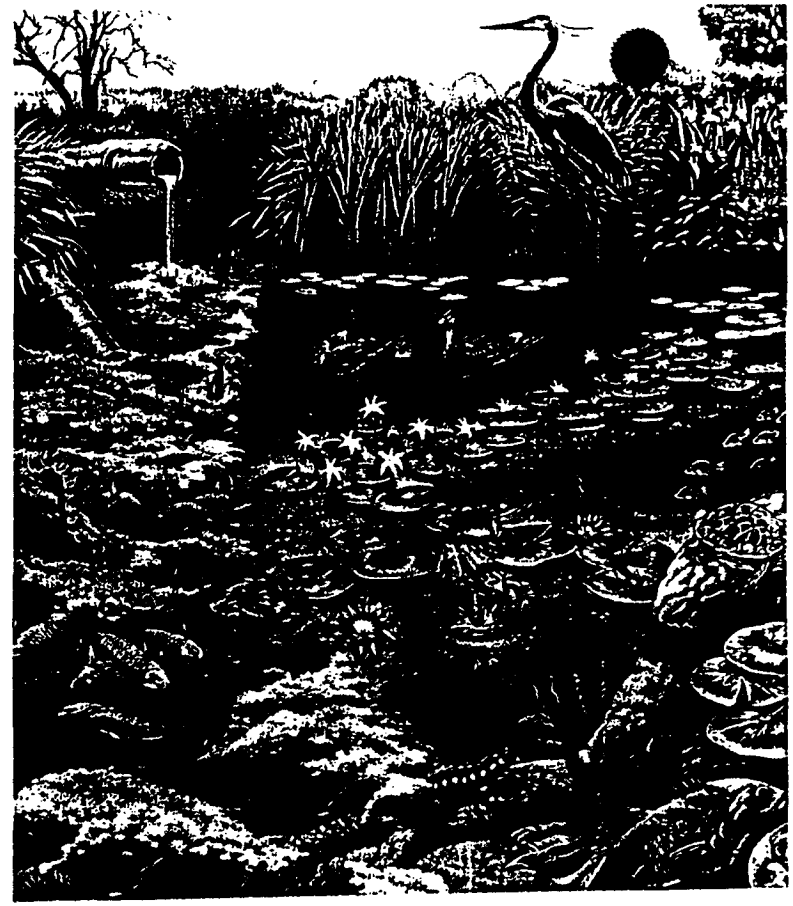
Provide No Reliable Information on Impacts of Stormwater Runoff-Associated Constituents on Receiving Water Water Quality

US EPA Stormwater Runoff Water Quality Management Regulations

Require Control of **Pollution** to Maximum Extent Practicable Using Best Management Practices

CWA-Defined **Pollution**: Use-Impairment of Water Receiving the Runoff

Conventional End-of-Pipe Edge-of-Pavement "Water Quality" Monitoring Cannot Define **Pollution** of Receiving Waters



Upper Newport Bay Designated Beneficial Uses

- Water Contact Recreation
- Non-Contact Recreation
- Commercial and Sport Fishing
- Wildlife Habitat
- Rare, Threatened, and Endangered Species
- Fish Spawning, Reproduction, and Development
- Marine Habitat
- Shellfish Harvesting
- Biological Habitats of Special Significance
- Estuarine Habitat

What Impairment Exists to Each of These Uses?

D-043044

D—043044

Evaluation Monitoring Approach for Water Quality Management

Focus Monitoring Resources on:

- Evaluation of Real Water Quality Use-Impairments in Receiving Water for Stormwater Runoff
- Determine the Specific Cause(s) of Use-Impairment
- Determine Source(s) of Constituents Responsible for Those Use-Impairments
- If Urban & Highway Stormwater Runoff Is Significant Source of Specific Constituent(s) Responsible for the Use-Impairment, Control **Pollutants** at the Source

  If Not Possible, Develop Site-Specific BMP's to Control Pollution to Maximum Extent Possible

  Will Result In Significantly Different Type of BMPs Than Typically Used Such as Detention Basins & Filtration

  Detention Basins & Filtration Useful Only Where Excessive Erosion Causes Water Quality/Use-Impairment Due to Siltation and/or Turbidity

Basic Engineering Approach:

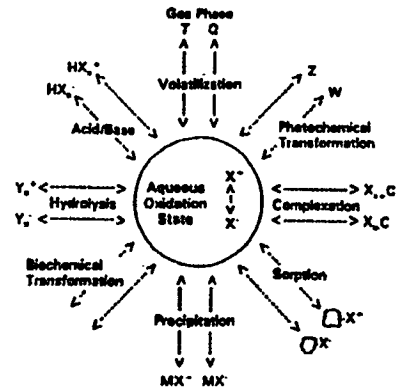
Find the Problem & Solve It in a Technically Valid, Cost-Effective Manner

Focus Stormwater Water Quality Management on *Impacts* of Chemicals - Not on Chemicals That May Be Adverse to Water Quality at Some Location for Some Sources

Evaluation Monitoring Is Conducted in a Watershed-Based, Technical Stake-Holder-Driven Program

Evaluation Monitoring Focuses on Using Aquatic Chemistry, Aquatic Toxicology, and Water Quality Information to Define & Manage Impacts of Urban & Highway Stormwater Runoff

Aquatic Chemistry of Chemical Contaminants

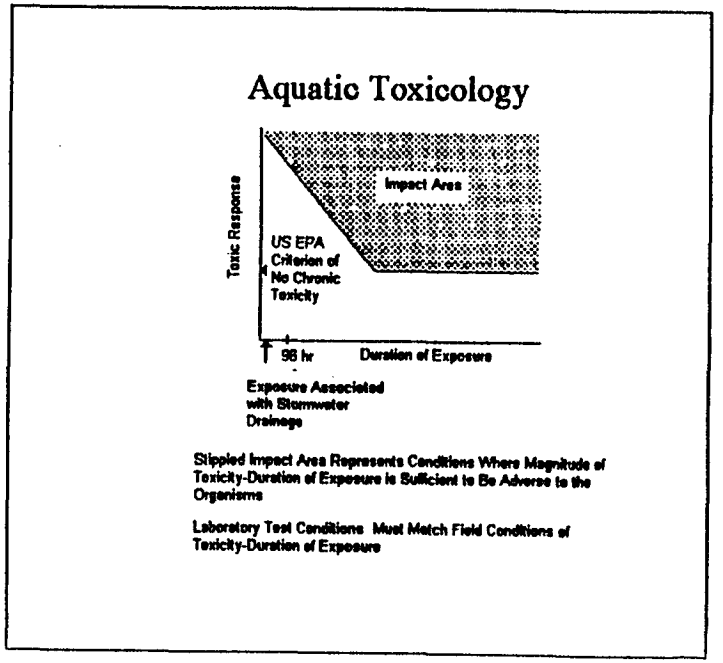


Distribution Depends on Kinetics & Thermodynamics of Reactions in a Particular Aquatic System

Each Chemical Species Has Its Own Toxicity Characteristics

Many Forms Are Non-Toxic

Toxicity - Duration of Exposure Relationship



D-043045

D-043045