

# CCLEAN

Central Coast Long-term Environmental Assessment Network

*www.cclean.org*

City of Santa Cruz

City of Watsonville (Lead Agency)

Duke Energy

Monterey Regional Water Pollution Control Agency

Carmel Area Wastewater District

Central Coast Regional Water Quality Control Board

# CCLEAN Objectives

- Obtain high-quality data for status and trends in nearshore waters, sediments, and associated beneficial uses
- Determine whether nearshore waters and sediments are in compliance with the Ocean Plan
- Determine sources and amounts of contaminants discharged to nearshore waters
- Ensure understandable and relevant data presentation

# Program History

- Extensive stakeholder input for design
- Monitoring began in 2001
- Currently funded through June 2006

# CCLEAN Design Process

1. Establish List of Stakeholders
2. Prioritize Beneficial Uses
3. Determine Indicators of Impairment
4. Evaluate Possible Water-Quality Stressors
5. Design Monitoring Program

# Priority Beneficial Uses

- Marine Habitat
- Rare, Threatened, or Endangered Species
- Water Contact Recreation
- Wildlife Habitat

# CCLEAN Measurements

POPs in Water and  
Sediment

Nutrients

Pathogens

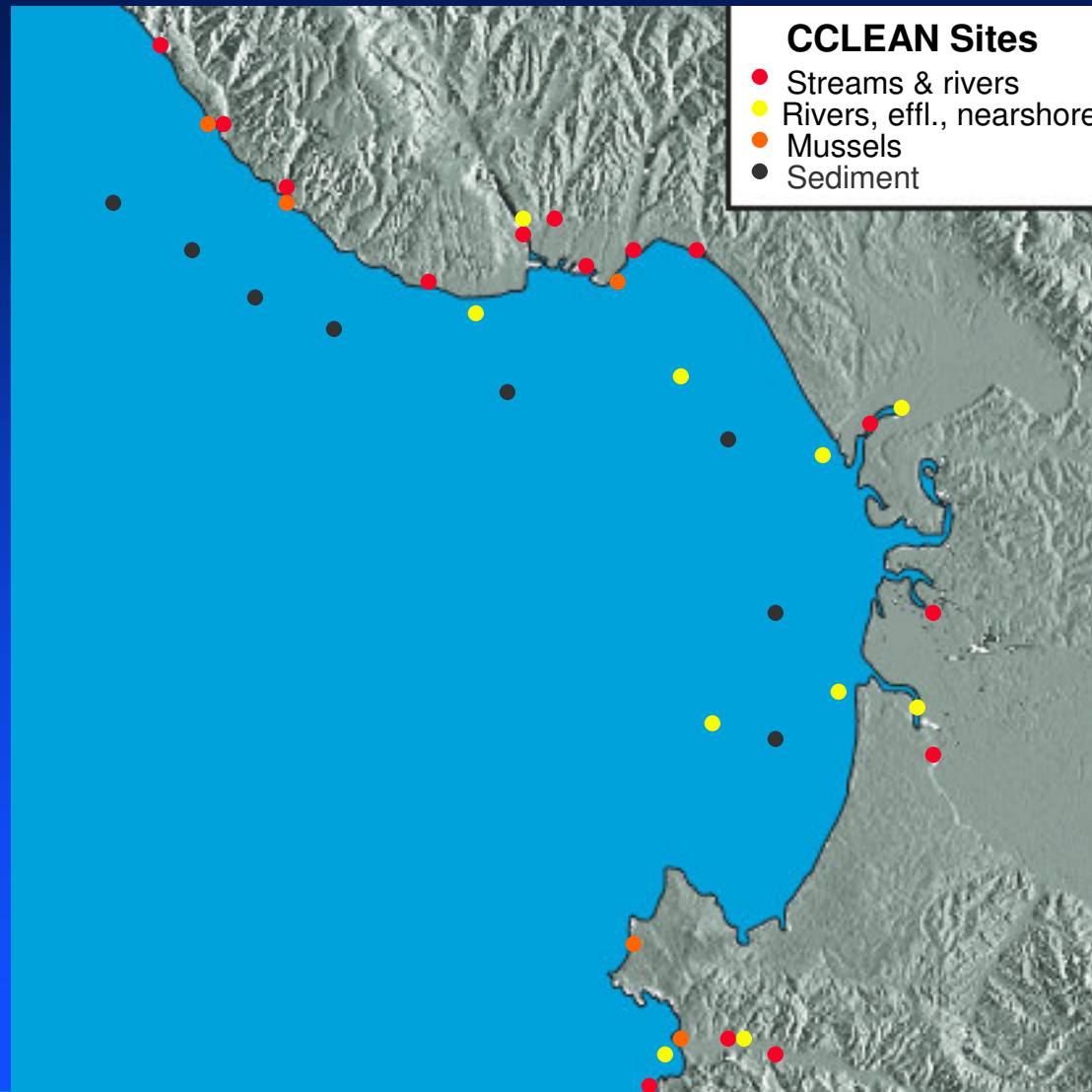
River Suspended  
Sediments

Trends,  
Sources and  
Effects

# Program Elements

- Rivers, effluent, nearshore water
- Streams
- Mussels
- Sediment
- Sea Otters

# CCLEAN Sites





# CCLEAN Monitoring Team

- Kinnetic Laboratories, Inc.
  - River, Effluent, Nearshore Water Sampling
  - Mussel Sampling
- MEC with ABA Consultants
  - Sediment Sampling
- Wastewater Plant Personnel
  - Effluent Sampling
- Counties of Santa Cruz and Monterey
  - Stream Sampling
- Axys Analytical
  - POP Analyses
- Biovir
  - Bivalve Bacteria

# Rivers and Effluent

- Four rivers, four wastewater discharges
- Wet-season and dry-season sampling
- 30-day flow-proportioned sampling using SPE (XAD-2 resin) methods
  - PAHs, PCBs, chlorinated pesticides
- TSS, silicate, nitrate, ammonia, urea, orthophosphate

*Estimate annual loads*

# Mussels

- Five locations
- Wet-season and dry-season sampling
  - PAHs, PCBs, chlorinated pesticides
  - Total coliform, fecal coliform, enterococcus

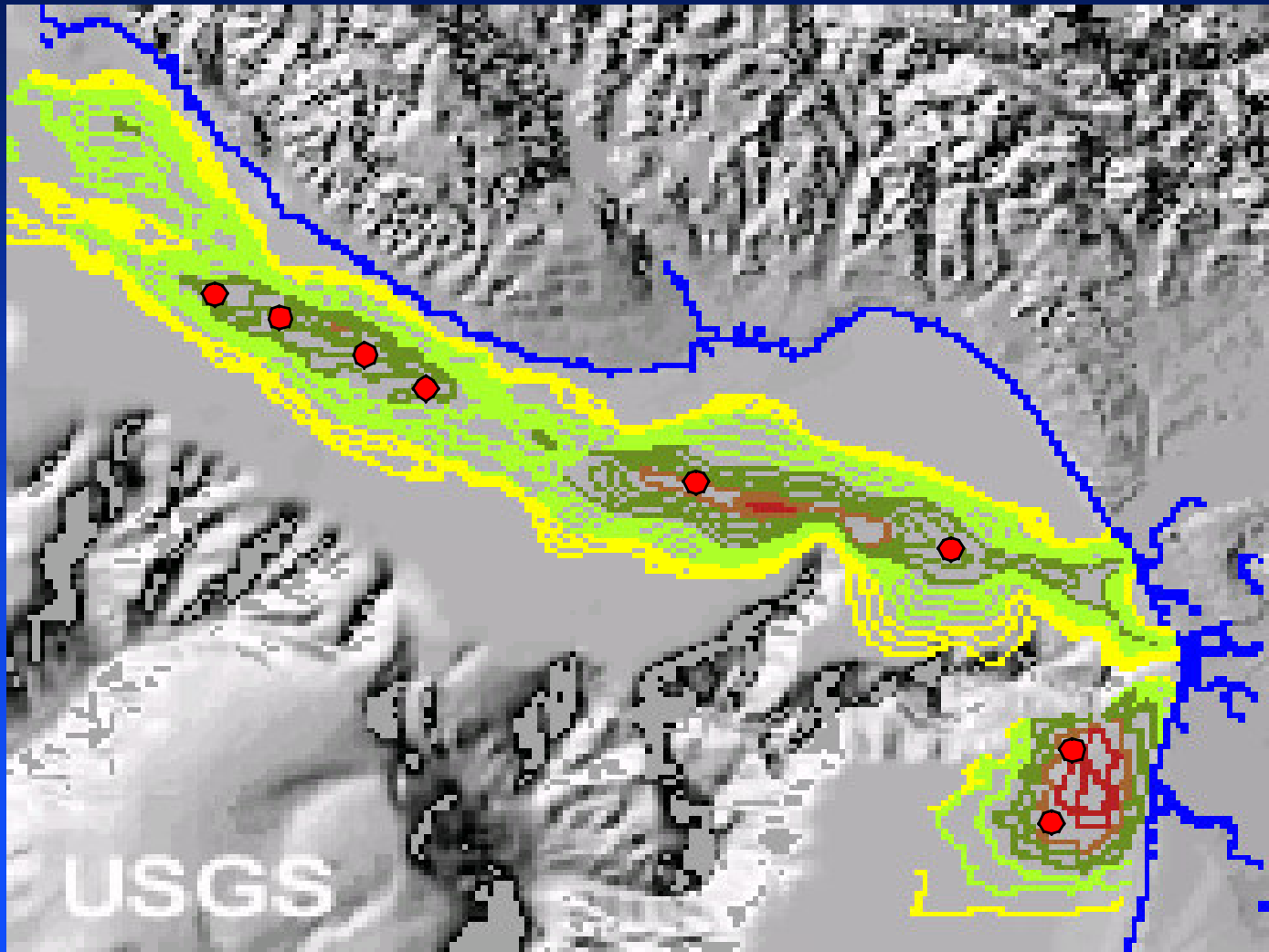
*Determine sources and contamination of sea otter prey*

# Sediment

- Eight locations
- Annual (late summer-fall) sampling
  - PAHs, PCBs, chlorinated pesticides
  - Grain size, TOC
  - Infaunal abundance

*Determine benthic trends and effects  
of POPs*

# Sediment Sites



# Streams

- 15 streams, rivers and coastal locations
- Monthly sampling
- Counties of Santa Cruz and Monterey
  - TSS, silicate, nitrate, ammonia, urea, orthophosphate
  - Total coliform, fecal coliform, enterococcus

*Estimate annual loads*

# Nearshore Sampling

- Two locations
- Wet-season and dry-season sampling
- 30-day flow-proportioned sampling using SPE (XAD-2 resin) methods
  - PAHs, PCBs, chlorinated pesticides
- TSS, silicate, nitrate, ammonia, urea, orthophosphate
- Total coliform, fecal coliform, enterococcus

*Compare to Ocean Plan*

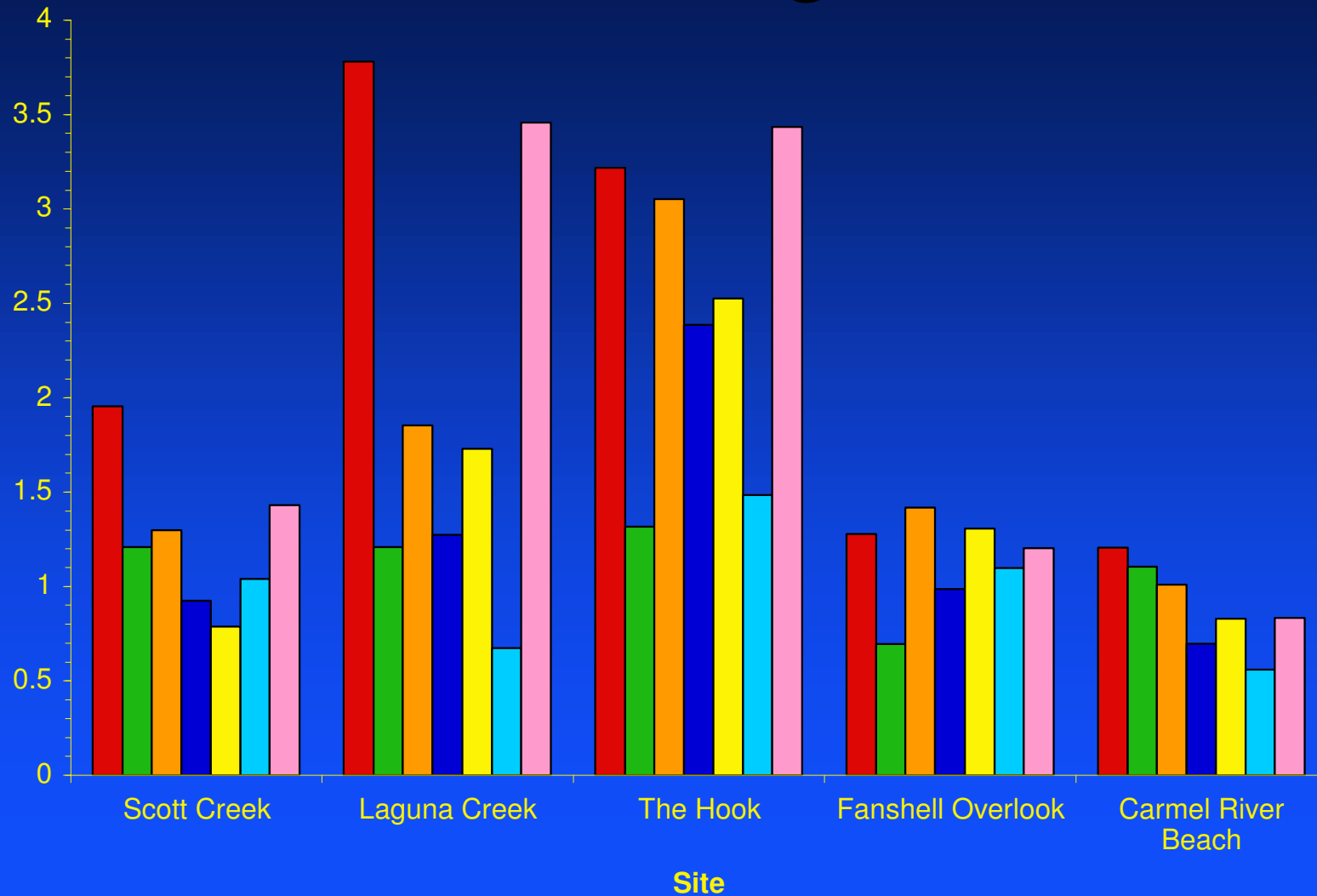
# Sea Otters

- Proposition 13 funding
- Collaboration with CDF&G
- Measure POPs in sea otter tissues
- Compare POPs with cause of death and indicators of health

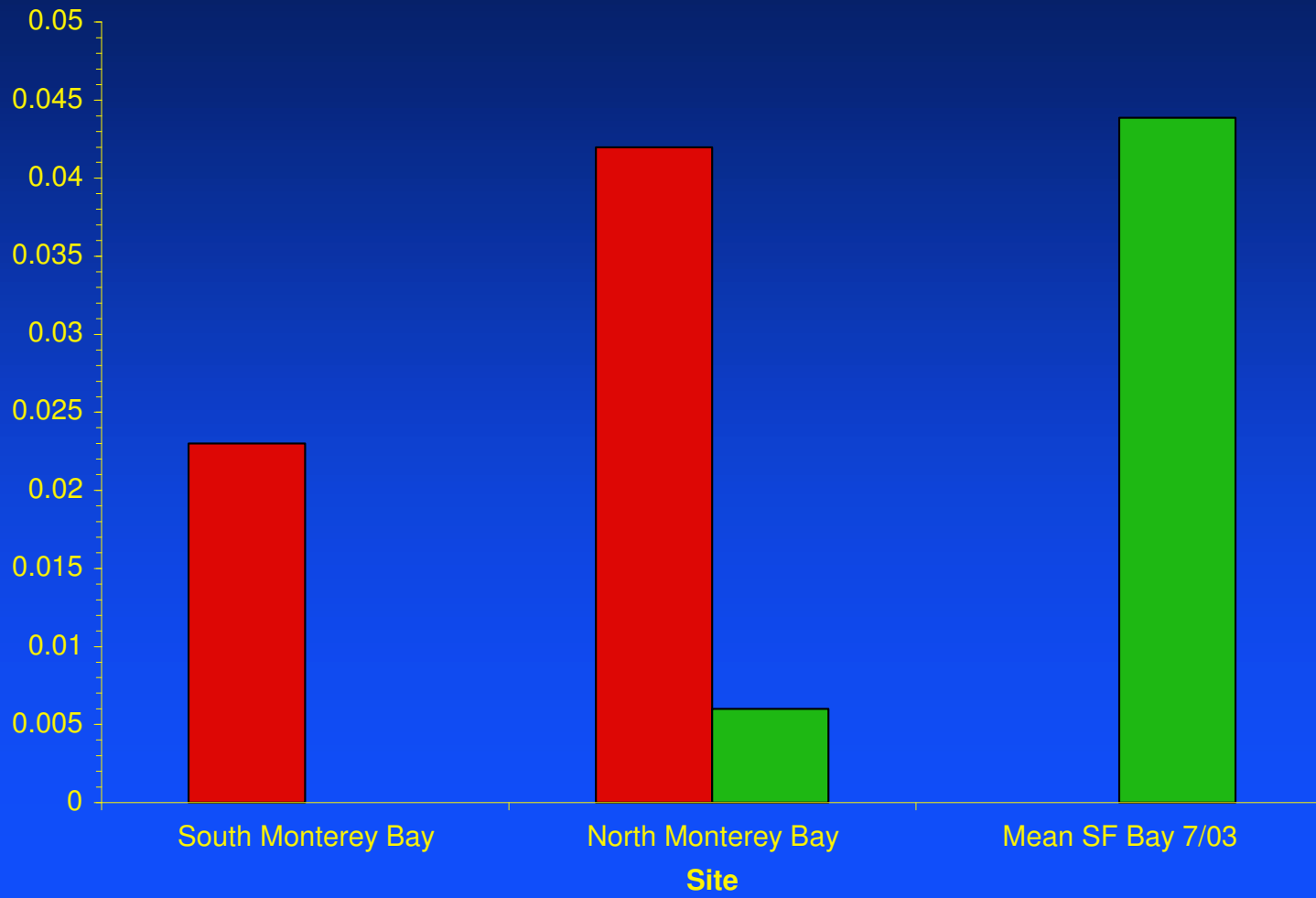
*Determine effects of POPs on otter health and mortality*



# Mussel POPs are High & Seasonal



# Nearshore Waters Exceed Ocean Plan



# Other Findings

- Pajaro and Salinas rivers contribute highest loads of pesticides and most nutrients, but there are other unknown sources
- Sediment DDTs exceed the average for San Francisco Bay and are not declining

# What is Working Well

- Multidisciplinary approach
- Flow-proportioned solid-phase extraction of POPs
- Cooperation and collaboration among multiple agencies

# Challenges

- Designing cohesive multidisciplinary program with limited funding
- Coordination among multiple agencies
- Methods development
- Estimating flow from ungauged streams