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 Sites
- Streams & rivers
- Rivers, effl., nearshore
- Mussels
- Sediment
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

- South Monterey Bay
- North Monterey Bay
- Mean SF Bay 7/03

Site

[Bar chart showing comparison of nearshore waters exceeding ocean plan for different sites.]
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