

# *Cordell Bank National Marine Sanctuary*

## **Contaminants**

### **Management Issue**

There is the potential for high contaminant levels in Cordell Bank National Marine Sanctuary (CBNMS or Sanctuary) due to its proximity to a large metropolitan area as well as extensive agricultural lands and historic mining operations; however, there is little information on transport pathways and contaminant concentrations in benthic habitats.

### **Description**

Contaminants can have ecological and human health consequences, through the degradation of habitat, bioaccumulation of toxins in top predators, loss of species and communities, and human consumption of contaminated organisms. Contaminant concentrations and distribution in benthic habitats of the Sanctuary are poorly understood; there have been very few sediment contaminant samples collected on the shelf and slope within the sanctuary. Preliminary analysis of several samples collected within the sanctuary indicates low levels of Dichloro-Diphenyl-Trichloroethane (DDT), polychlorinated biphenyls (PCB), and polycyclic aromatic hydrocarbons (PAH). Nevertheless, data suggest that accumulation of DDT, PAHs, and PCBs may be occurring in the depths of Bodega Canyon (a feature just north of the Sanctuary), a pattern that holds true for other canyons in central California. Further work is needed to understand contaminant concentrations, transport pathways, changes in contaminant concentrations over time, and potential biological impacts.



*Van Veen grab samples can be used to test levels of contaminants in seafloor habitats. Photo credit: Dann Blackwood.*

### **Questions and Information Needs**

- 1) What are the concentrations of various contaminants within benthic habitats?
- 2) What regions and seafloor features within the Sanctuary have the highest concentrations of contaminants?
- 3) What are the potential sources and pathways transporting contaminants to the sanctuary?
- 4) How do patterns of contaminant transport and accumulation vary seasonally and inter-annually as a function of oceanographic conditions?
- 5) What are the rates of re-suspension of contaminants in different habitats/regions of the sanctuary and how do these vary seasonally and inter-annually as a function of oceanographic conditions?
- 6) Based on contaminant distribution patterns and life history strategies, are there particular species assemblages that have a higher probability to be negatively impacted by contaminants through direct contact, ingestion, or bioaccumulation?
- 7) Are there certain species within the offshore environment that can be used as biological indicators to measure changes in contaminants through time?

*Updated: 5/1/2010*

*For More Information -- <http://www.sanctuaries.noaa.gov/science/assessment>*

## Scientific Approach and Actions

- Develop a contaminant accumulation model based on existing oceanographic and geologic data and known sources of contaminants to predict patterns of contaminant distribution within the Sanctuary
- Utilize contaminant accumulation model results to design an adaptive sampling program to characterize the distribution and concentration of contaminants
- Sample sediments and tissues from infaunal organisms and analyze for chemical contaminants, including organic compounds (e.g., DDT, PAH, PCB), pharmaceuticals, and heavy metal
- Integrate benthic contaminant data with models of ocean currents to determine transport pathways and accumulation under various oceanographic conditions
- Integrate benthic contaminant data with models of seafloor sediment mobility to understand re-suspension of contaminants under various oceanographic conditions
- Integrate benthic contaminant data with infaunal data to assess levels of risk to various species assemblages
- Determine the feasibility of using specific offshore species as biological indicators of contaminant levels and develop protocols for monitoring contaminants

## Potential Key Partners and Information Sources

NOAA National Center for Coastal Ocean Science, University of California – Bodega Marine Laboratory, United States Geological Survey, Moss Landing Marine Laboratories, Southern California Coastal Water Research Project, U. S. Environmental Protection Agency.

## Management Support Products

- Maps of contaminant concentrations to illustrate spatial distribution within the Sanctuary and to determine overall concentrations within the Sanctuary compared to surrounding nearshore and offshore regions
- Models of transport pathways and re-suspension patterns to understand major sources of contaminants
- Assessment of species assemblages most sensitive to contaminants
- Assessment of how contaminant concentrations can change with varying oceanographic conditions, including predictions of contaminant patterns resulting from global climate change
- Characterization of benthic infauna within continental shelf, slope, and canyon habitats
- Development of monitoring protocol to assess changes in contaminant levels through time

## Planned Use of Products and Actions

- Use information on likely sources of contaminants to develop strategies for reducing the levels of contaminants reaching the coastal environment
- Work with NOAA partners to understand the impacts of contaminants to various fisheries and human health
- Understand the potential for changing contaminant levels due to changes in oceanographic conditions with climate change
- Use benthic community information to develop a species list for the sanctuary and potentially detect non-native species
- Interpret research results in support of outreach and education projects that inspire resource protection and stewardship

## Program References

### CBNMS Management Plan

- Conservation Science Action Plan, strategy CS-4, CS-5

### CBNMS Condition Report

- Contaminant concentrations in sanctuary habitats (question 7)

### ONMS Performance Measures

- By 2015, 100% of the sanctuary system is adequately characterized.
- Number of sites in which habitat quality, based on long-term monitoring data, is being maintained or improved.

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