



# Sea Otter Ecology and Population Trends



Monterey Bay Aquarium

## Adored by many — yet despised by others — there is no doubt that sea otters captivate the public.

But sea otters can serve as **indicators** of the health of our nearshore waters and coastal resources. Sea otters live their entire lives within nearshore waters, dependent on its kelp forests and other habitats for food and shelter and rarely straying into the open sea. This dependence also means that a sea otter is constantly exposed to whatever contamination or stressors are in its local environment — pollutants flushed downstream from inland waters, or a food web disrupted by altered oceanic trends.

Moreover, sea otters are a **keystone species** for the nearshore Pacific Coast. Absence of sea otters can lead to major changes in the local ecosystem — a rippling influence on many levels of the food web, from kelp forests to commercial fisheries.

Sea otters have been protected from hunting since the fur trade bans a century ago. While some populations are now abundant and stable, others are either declining or struggling to reach healthy numbers. Can these differences be explained by oceanic influences, or by human impacts to adjacent landscapes? What do these trends say about the quality of the sea otters' marine habitat — the same habitat which supports our fisheries and our recreational waters?

The need to understand sea otter ecology continues. Scientists at the **USGS Western Ecological Research Center (WERC)** are helping to lead the research, with studies spanning Alaska to California on both the **southern sea otter** (*Enhydra lutris nereis*) and **northern sea otter** (*Enhydra lutris kenyoni*) subspecies.

WERC scientists are harnessing collaborative partnerships within USGS and with local, state, federal and international partners, along with cutting-edge laboratory analyses and detailed, long-term field observations — all towards providing science on this important marine species.

## RESEARCH CONTACTS

**M. Tim Tinker**  
Principal Investigator  
<http://www.werc.usgs.gov/tinker>  
[ttinker@usgs.gov](mailto:ttinker@usgs.gov)

**Brian Hatfield**  
Spring Population Survey and  
Stranding Network Coordinator  
[brian\\_hatfield@usgs.gov](mailto:brian_hatfield@usgs.gov)

**Nicole LaRoche**  
Southern Range Coordinator  
[nlaroche@usgs.gov](mailto:nlaroche@usgs.gov)

**Joe Tomoleoni**  
Field Biologist  
[jtomoleoni@usgs.gov](mailto:jtomoleoni@usgs.gov)

**Ben Weitzman**  
Field Biologist  
[bweitzman@usgs.gov](mailto:bweitzman@usgs.gov)

**Lizabeth Bowen**  
Molecular Ecologist  
[lbowen@usgs.gov](mailto:lbowen@usgs.gov)

**Main Research Page**  
<http://www.werc.usgs.gov/seaottercount>

# WERC Sea Otter Research Projects



## CALIFORNIA SEA OTTER ANNUAL POPULATION SURVEY

Since 1982, WERC has led annual population surveys of the southern sea otter in partnership with the **California Department of Fish and Wildlife (CDFW)**, **Monterey Bay Aquarium**, **UC Santa Cruz** and other institutions. Researchers and volunteers survey the California coast from Half Moon Bay to Santa Barbara each year to take the pulse of adult and pup numbers. The population estimates are provided to the **U.S. Fish and Wildlife Service (USFWS)**, which manages this federally listed threatened species. <http://www.werc.usgs.gov/seaottercount>



## CALIFORNIA SEA OTTER STRANDING NETWORK

CDFW and WERC have counted the number of dead, sick or injured sea otters recovered along California each year since 1968. Each reported sea otter carcass is examined if possible, and a subset of fresh carcasses are sent to the **CDFW Marine Wildlife Veterinary Care and Research Center** for necropsies to determine cause of death and physical condition. This multiagency collaboration has led to discoveries such as liver failure in sea otters, linked to blooms of the toxic *Microcystis* cyanobacteria in inland waters. <http://www.werc.usgs.gov/seaotterstranding>



## COMPARATIVE STUDIES IN CALIF.

With the **Monterey Bay Aquarium**, **CDFW** and other partners, WERC compares southern sea otter health, survival, behavior and ecosystem parameters at sites throughout central California, including Monterey Bay and Big Sur. Health exams and tagging studies help WERC scientists learn how natural factors and man-made stressors influence sea otters among different areas. Geospatial data are collected on habitat use and movements, diet and diving behavior, disease and contaminant exposure, reproduction and survival.



## SAN LUIS OBISPO REGION STUDY

Southern sea otters are experiencing unusual rates of mortality from sharks along this part of the California coast. WERC researchers and partners have expanded tagging and observation surveys to this region, which may have important differences with ecosystems elsewhere in the sea otter's range.

## SOUTHERN RANGE MONITORING

Sea otters are returning to southern California waters. With the **Santa Barbara Zoo** and other partners, WERC is studying the ecology of this natural range expansion, which will aid USFWS and Bureau of Ocean Energy Management (BOEM) assess management implications and policies.



## PACIFIC NEARSHORE PROJECT

Along with the **USGS Alaska Science Center** and other institutions, WERC is leading the **Pacific Nearshore Project**, a multi-year effort uniting U.S. and Canadian institutions in a comparative study of southern and northern sea otter populations, to assess nearshore ecosystem health along California, Washington, British Columbia and Alaska coasts. <http://www.werc.usgs.gov/nearshoreproject>

## GENE TRANSCRIPTION ANALYSIS

WERC researchers can now analyze sea otter blood samples to assess an individual animal's exposure to disease, contaminants or other stressors without invasive exams and biopsies. The analysis has potential applications for assessing animal conditions after ecological disturbances.

## ADDITIONAL ACTIVITIES

AK population/ecosystem studies • food web modeling • infectious disease studies • tag technology development • sea otter social behavior studies • public outreach

WERC partners in sea otter ecology research include: USGS Alaska Science Center • USGS Western Fisheries Research Center • California Department of Fish and Wildlife Office of Spill Prevention and Response • Monterey Bay Aquarium Sea Otter Research and Conservation Program • U.S. Fish and Wildlife Service • National Park Service • Bureau of Ocean Energy Management • Canadian Ministry of Agriculture and Food • Fisheries and Oceans Canada • Seattle Aquarium • California Academy of Sciences • The Marine Mammal Center • Santa Barbara Museum of Natural History • Santa Barbara Zoo • UC Davis Oiled Wildlife Care Network • UC Santa Cruz • University of Wyoming • University of Idaho

The USGS Western Ecological Research Center (WERC) is an Ecosystems mission science center of the U.S. Geological Survey serving California, Nevada and the greater Pacific West. Online at [www.werc.usgs.gov](http://www.werc.usgs.gov)