



## Marine Ecology



**“Knowledge of the oceans is more than a matter of curiosity. Our very survival may hinge upon it.” — John F. Kennedy**

As part of the U.S. Geological Survey’s mission to study the natural resources of the United States and its global interests, USGS scientists have integrated the agency’s traditions in mapping and resource assessments with its modern capabilities in satellite technology, landscape analysis and ecological surveys, to not only chart our Nation’s vital terrestrial resources — but also that of its seas.

The **USGS Western Ecological Research Center** is an Ecosystems mission science center of the U.S. Geological Survey serving California, Nevada and the greater Pacific West. In service to state, federal and international institutions, WERC conducts a suite of marine and coastal ecology projects to provide critical data and scientific tools for ocean resource management and species conservation.

WERC marine ecology research spans the micro to macro scale: Developing RNA marker assays to assess marine mammal exposure to contaminants to stressors. Conducting seabird telemetry studies to track migration corridors and delineate ocean hotspots across the globe. Implementing comprehensive monitoring observatories to model and forecast coastal marsh resilience to climate change. Coordinating whole-system analysis of land-sea interactions that drive nearshore ecosystem health.

The diverse expertise of WERC scientists complements the multidisciplinary programs and missions of the **USGS Pacific Coastal and Marine Science Center**, **USGS Pacific Island Ecosystems Research Center**, and **USGS Alaska Science Center**, and at other **U.S. Department of Interior** bureaus and the **National Oceanic and Atmospheric Administration**.

### RESEARCH CONTACTS

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Coastal Food Webs and Conservation

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**Main Research Page**

<http://www.werc.usgs.gov/marine>

# WERC Marine and Coastal Ecology Studies



## COASTAL FOOD WEBS AND CONSERVATION

Based at UC Santa Barbara, WERC marine ecologist **Kevin Lafferty** specializes in coastal food webs and conservation science. Lafferty's team is building food webs, from protozoa to birds, for 14 estuaries along the U.S. Pacific Coast. With UCSB researchers, he is characterizing California kelp forest ecosystems, findings which can inform BOEM coastal resource planning. Lafferty's conservation research includes **marine reserve design and selection**, as well as protected species research on tidewater goby, abalone disease, and western snowy plover behavior. <http://www.werc.usgs.gov/lafferty>



## ESTUARIES AND SEA LEVEL RISE

At 14 estuary sites spanning San Diego to Puget Sound, WERC ecologists **Karen Thorne** and **John Takekawa** are establishing comprehensive wetland observatories to monitor and forecast the fate of salt marshes under sea level rise. Teams are conducting high-res RTK GPS surveys of marsh vegetation and elevation, and partnering with local institutions to record storm surge events, sediment transport and bathymetry, sediment core paleo data, waterbird ecology, benthic food webs, and long-term trends in marsh resilience.

<http://www.werc.usgs.gov/sfbayslr>



## SEABIRDS AND OCEAN HOTSPOTS

WERC seabird ecologist **Josh Adams** conducts habitat assessments and nesting studies, and helped pioneer satellite telemetry studies on auks, petrels, albatross, and shearwaters. For BOEM, Adams leads the **PacSEA marine transect surveys** studying seabird and marine mammal hotspots of the northern California Current Large Marine Ecosystem; a new, collaborative telemetry project assessing seabird distribution and movements to assess their vulnerability to wind energy sitings in Hawaii; and efforts to compile **spatial databases** for seabird and marine mammal ecology in southern California waters. <http://www.werc.usgs.gov/adams>



## ISLAND RESTORATION SCIENCE

WERC scientists **Robert Fisher** and **Kevin Lafferty** are part of the Palmyra Atoll Research Consortium, which provides restoration science for the **Palmyra Atoll National Wildlife Refuge**. Fisher's team surveys terrestrial wildlife and invasive species impact, while Lafferty is assessing reef food webs, using parasite diversity to measure reef ecosystem health. Elsewhere in the Pacific, WERC researchers also advise on biosecurity, endangered species surveys, and sea level rise risks for U.S. interests and foreign partners.

<http://www.werc.usgs.gov/palmyra>



## SEA OTTER RECOVERY

WERC ecologist **Tim Tinker** conducts **annual population surveys of California sea otters** for the USFWS, as well as a suite of comparative studies revealing natural and human factors limiting sea otter recovery in California. Tinker also studies the cascading influence of sea otters on local food webs, and collaborates on sea otter research in Alaska and Russia. He co-leads the **Pacific Nearshore Project**, a multiagency effort studying sea otters as an indicator of nearshore ecosystem health in California, Washington, British Columbia and Alaska waters.

<http://www.werc.usgs.gov/seaottercount>

## ADDITIONAL RESEARCH

Sea duck ecology and migrations • Oil spill seabird impact assessment • Seabird vulnerability to ocean energy projects • Boat traffic impacts on seabird behavior • Seabird breeding habitat restoration • RNA analysis for marine contaminants exposure • Salt marsh restoration science and management • Channel Islands fog ecology • BOEM fisheries GIS database

WERC partners in marine ecology research include: Bureau of Ocean Energy Management • U.S. Fish and Wildlife Service • National Park Service • NOAA • U.S. Department of State • U.S. Navy • Fisheries and Oceans Canada • California Department of Fish and Wildlife • California State Coastal Conservancy • University of California • Moss Landing Marine Laboratory • Monterey Bay Aquarium • Seattle Aquarium • The Marine Mammal Center • Santa Barbara Museum of Natural History • Oikonos • Santa Barbara Zoo • The Nature Conservancy

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