National Park Service
U.S. Department of the Interior
Pacific Coast Science and Learning Center
Research Project Summary October 2006

Harbor Seals and Northern Elephant Seals: Indicators of Marine Ecosystem Condition

The Question: *How can the monitoring of harbor seals (*Phoca vitulina richardii*) and northern elephant seals (*Mirounga angustirostris*) give managers insight into the marine ecosystem condition at Point Reyes National Seashore?*

Reasearchers monitor seal populations at Point Reyes National Seashore to detect changes in population numbers and reproductive success and to identify factors that might affect population trends.

Park resource managers are identifying species that can provide insights into the condition of natural systems in the nation's parks through the Inventory and Monitoring Program. Changes in populations of top predators, for example, provide early warning of disruptions in natural ecosystems. Seals and sea lions, as the apex predators of the Pacific Ocean, were selected in 2003 by the National Park Service's San Francisco Bay Area Network as indicators for marine ecosystem conditions. Seals and sea lions, known as pinnipeds, are excellent indicators because they are major components of the marine food web and respond promptly to changes in the ecosystem. Pinnipeds are also important to monitor since they have special status under the Marine Mammal Protection Act due to unusual requirements for their protection and, in some cases, because of the precarious status of the species. Additionally, the protocols for monitoring these animals are well established and easily implemented. Other marine parks and agencies, including Channel Islands National Park and the NOAA Fisheries, monitor pinnipeds, providing important opportunities for regional collaboration on data collection and analysis.

Northern elephant seals are one of the apex predators of the Pacific Ocean marine ecosystem and can provide early warning of disruption in marine ecosystem function. Northern elephant seals spend 85-90% of their time in the ocean and the other time, hauled out on beaches to breed, birth, and molt.

The Project: *Monitor seal colonies throughout Point Reyes National Seashore and Golden Gate National Recreation Area with staff and volunteer assistance.*

Since the late 1970s, researchers and volunteers have monitored seal colonies at Point Reyes National Seashore to determine population status, detect changes in population numbers and reproductive success and to identify factors such as human disturbance that might affect population trends. During surveys, staff and trained volunteers collect demographic data, including the total number of animals by sex and age class, where possible, and number of pups. Information is also collected on environmental factors (e.g., weather, shoreline changes) and human disturbances (e.g., sources of disturbance impacts on seal behavior).

Monitoring at the parks primarily focuses on the two breeding species of pinnipeds, harbor seals (*Phoca vitulina richardii*) and northern elephant seals (*Mirounga angustirostris*). The topographic and hydrographic complexity of the coastal zone of the parks provide diverse habitats for seals and their prey. Harbor seals are the dominant and most widespread pinniped in the parks, hauling out throughout the year at numerous terrestrial sites. Point Reyes National Seashore is the northernmost breeding colony for northern elephant seals.

Harbor seal monitoring has been occuring through the significant assistance of volunteers throughout Point Reyes National Seashore since its inception.

Monitoring is also occurs with four other species of pinniped including California sea lions (*Zalophus californianus*), Steller sea lions (*Eumetopias jubatus*), Guadalupe fur seals (*Arctocephalus townsendi*), and Northern fur seals (*Callorhinus ursinus*). Steller and California sea lions have been censused weekly at the Point Reyes Headlands since 1995.

The Results: *Biologists have determined that some seal populations have increased significantly; however, recovery rates are influenced by human activities and environmental factors.*

Biologists have determined that populations of harbor and elephant seals have increased significantly within the seashore over the past 20- 25 years; however, individual colonies have experienced uneven recovery rates depending upon human activities. Steller sea lions, though, have declined precipitously over the same period and currently they no longer breed at Point Reyes or haul out at Sea Rocks at Golden Gate National Recreation Area. The parks have responded with various adaptive management strategies. At Drakes Estero, for example, park managers detected a decline in population numbers of harbor seals and determined that increased kayak use and oyster farming operations were disturbing the breeding and molting seals. In response, the park instituted a seasonal closure of the area to boating, and the recovery of the colony was documented in subsequent breeding seasons.

Monitoring several colonies has allowed biologists to distinguish broad-scale environmental effects, such as climate variability and El Nino events, from human-caused disturbances on individual colonies. Researchers may also detect regional or global trends by linking regional pinniped monitoring data with other monitoring indicators such as water quality, harmful algal blooms, weather, shoreline change and marine fish populations. The scientific information obtained through monitoring provides park managers a better understanding of how to restore and sustain species like the seals.

Additional Resources

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San Francisco Bay Area Network Inventory & Monitoring Program
www1.nature.nps.gov/im/units/sfan/index.cfm

Point Reyes National Seashore
www.nps.gov/pore

The Pacific Coast Science and Learning Center is one of 15 centers across the country working to increase the effectiveness and communication of research and science results in the national parks by facilitating the use of parks for scientific inquiry, supporting science-informed decision making, communicating relevance and providing access to research knowledge, and promoting resource stewardship through partnerships.