

Long-term Monitoring of the Marine Nearshore in the Southwest Alaska Network

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Approximately 1,200 miles (1,930 km) of marine coastline, one-fourth of the marine coastline of the entire national park system, lies within the Southwest Network. The marine nearshore component of this coastline, which is bounded by the 65-130 feet (20-40 m) depth contour offshore (light penetration limit) and the high tide line inshore, is an important link between the terrestrial and oceanic ecosystems. The marine nearshore provides critical habitat for a variety of species including invertebrates, fishes and several marine mammal and bird species that define a unique marine food web where kelps provide much of the primary production. The nearshore also supports important human activities such as commercial fishing, subsistence and recreation.

Several resources that are of conservation concern to the NPS reside in or utilize the marine nearshore. Six of these resources have been identified by the SWAN I&M program as vital signs for monitoring the overall status of the marine nearshore environment. These include: kelp and seagrass, marine intertidal invertebrates, marine birds, black oystercatcher (*Haematopus bachmani*), sea otter (*Enhydra lutris*), and marine water chemistry. For each biological vital sign, metrics that encompass measurements of abundance, distribution, density, size, productivity or diet are collected. The marine water chemistry vital sign monitors salinity, temperature and levels of various contaminants in the marine nearshore system.

The nearshore monitoring program is designed to provide information regarding levels of natural variation in the system, detect changes and track trends at a variety of temporal (hourly to multi-annual) and spatial (2.7 ft²/0.25 m² quadrat to network-wide) scales. Simultaneously, the design incorporates well known ecological processes and trophic interactions at spatially balanced, randomly selected sites in the nearshore, from primary production to primary consumers to apex predators. The physical measurements may help inform causes of change that occur in the nearshore food web.

For example, we may detect a decreasing trend in the size distribution and density of intertidal invertebrates at some spatial scale in the network. Hypotheses regarding the causes of the decline would be formulated based on available data currently being collected through the SWAN nearshore monitoring program. Examples of alternative hypotheses include: 1) increasing contaminant levels on a local or region-wide scale, 2) changing predator density and distribution on a local or regional scale, and 3) changing marine water temperature or salinity. The variety of temporal and spatial scales as well as the processes and species interactions inherent in the nearshore monitoring design will help to evaluate causes of change that are detected. This information will aid resource managers in the determination of appropriate actions, if possible, and to alleviate human effects on the resource of concern.

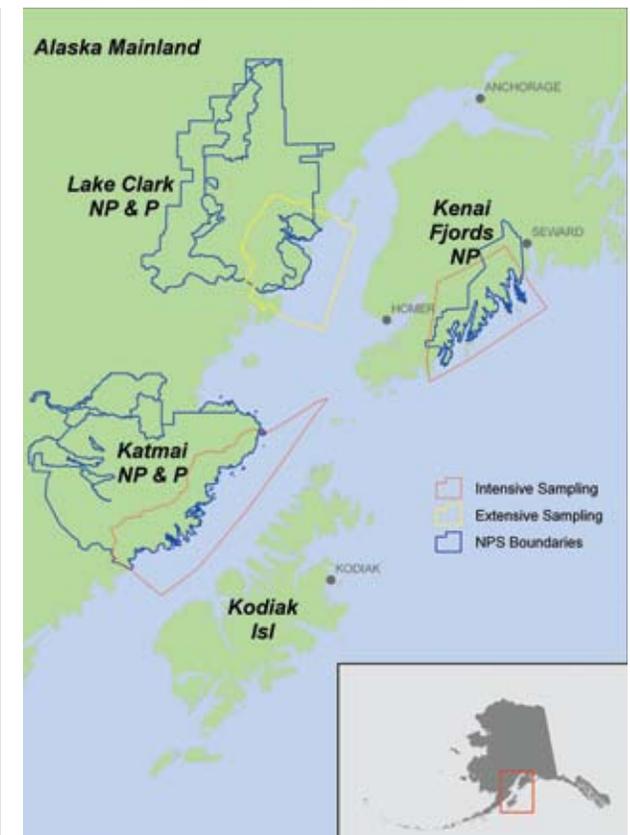


Figure 1. Sampling locations for the SWAN nearshore vital signs monitoring program. Intensive sampling blocks (indicated in red) are locations for monitoring all vital signs. Less frequent monitoring of a limited number of vital signs is to be conducted in the extensive block at Lake Clark National Park and Preserve (indicated in yellow). Park boundaries are indicated in blue.



Figure 2. Dr. Allan Fukuyama and Heather Coletti sample the rocky intertidal.



Figure 3. Two adult black oystercatchers with two chicks in Katmai National Park and Preserve.



Figure 4. Limpets grazing on intertidal algae in Lake Clark National Park and Preserve.



Figure 5. Kimberly Kloecker sampling a mussel bed in Kenai Fjords National Park.



Figure 6. NPS biologists sampling the soft sediment intertidal for bivalves in Lake Clark National Park and Preserve.



Figure 7. NPS and USGS biologists conducting marine birds surveys in March 2008 along the Kenai Fjords National Park coast.