



IMPORTANCE

The North Coast and Cascade Network (NCCN) of parks provide refuge for a vast reservoir of marine resources in the intertidal zone, an area inundated and exposed twice daily by the tide. The hallmark of NCCN intertidal areas is diversity. These parks contain a range of intertidal habitats, including rocky shorelines, cobble and fine sandy beaches, and mud flats. These habitats in turn support the highest diversity of intertidal invertebrates and seaweeds found along the entire west coast of North America.

The intertidal zone represents a transition zone between terrestrial and marine environments. Intertidal and nearshore marine ecosystems are tightly linked via nutrient cycling, dispersal of organisms between zones, and the opportunistic use of intertidal areas by nearshore organisms when it is flooded. The nearshore waters of the Pacific Northwest are extremely productive. Oceanographic processes, such as upwelling of deep nutrient-rich water on the open coast and complex tidal currents in Puget Sound profoundly influence the productivity and diversity of the intertidal zone. Most intertidal invertebrates and seaweeds have life-stages that live and disperse through the nearshore coastal ocean and contribute to its high productivity.

Intertidal organisms have evolved myriad adaptations to life in a harsh wave-swept environment, yet these organisms are vulnerable to a wide range of anthropogenic stressors, including oil spills, invasive species, and global climate change. Climate change can affect intertidal organisms in a variety of ways, including exposure to increased water and air temperature, changes in sea level, increases in the frequency and magnitude of storm events, and increased acidity of the ocean caused by elevated CO₂ levels.

CONTACT: Steven_Fradkin@nps.gov

Monitored at:

Lewis and Clark National Historical Park

Olympic National Park

San Juan Island National Historical Park



A NCCN marine scientist assessing a monitoring site at Sokol Point in Olympic National Park.

STATUS and TRENDS

The intertidal habitats of the NCCN parks are dominated by rocky platforms and sand beaches. Over 350 invertebrate and seaweed species have been documented from these areas. Intertidal fish inventories have documented over 70 species from NCCN parks. The NCCN Intertidal Monitoring program focuses on detecting long-term trends in the community structure of rocky intertidal and sand beach communities. Intertidal monitoring documents the abundance and number of each species present in plots. The monitoring also includes an array of temperature data loggers deployed along the shore. Water temperature is a key determinant of intertidal community structure.

As of the summer of 2008, 11 rocky intertidal sites have been established in the NCCN parks, along with 8 sandy beach sites and 13 temperature monitoring sites.

DISCUSSION

Intertidal monitoring in the NCCN complements other intertidal monitoring programs, including other NPS networks on the west coast. The core rocky intertidal monitoring follows the MARINe (Mutli-Agency Rocky Intertidal Network) protocol currently being implemented at Cabrillo National Monument, Channel Islands National Park, Redwoods National and State Parks, and a variety of other non-NPS sites along the west coast. Inclusion of this methodology in the NCCN parks allows for comparison of coastwide trends in the abundance of rocky intertidal organisms.

Intertidal monitoring in the NCCN will allow park managers to better understand the impacts of global climate change, and will provide parks with crucial baseline data needed for the assessment of impacts and recovery from catastrophic oil spills. All of the NCCN parks are situated along major travel routes for commercial shipping traffic, including oil tankers, bound for the ports of Vancouver (Canada), Seattle, and Portland. The Olympic coast has already experienced two major oil spills prior to the establishment of intertidal monitoring in 1988 (Nestucca) and 1991 (Tenyo Maru).

