National Park Service
U.S. Department of the Interior

# Along the Edge of the Earth

## A coastal inventory of Hawaii's national parks.

What do we do if the coastlines of Hawaii's national parks are exposed to an impact like an oil spill? What sort of information is needed to inform management actions? Staff at many national parks have been recently confronted with these types of questions. Often we have had little basic information about coastal resources other than the longstanding knowledge of Hawaiians as reflected in the many descriptive names for coastal areas. National parks in Hawaii have coasts with diverse natural and cultural resources, many of which occur on and around the intertidal zone. This zone is special because it is submerged twice daily by high tides, and alternately exposed to air during low tides.

## Why take an inventory?

Coasts contain or provide many resources including traditional food gathering, fish ponds, temples, and other cultural sites. The coasts are also home to numerous plants and animals, some native or endemic (occuring only within a given area). An inventory of the resources on the coasts provides a point of reference from which to assess future changes in resources.

Coasts face many natural and anthropogenic (human-caused) threats, some more dramatic than others. The Deepwater Horizon oil spill in the Gulf of Mexico impacted 550 miles of coast including many national park and USFWS refuge coasts http://www.fws.gov/home/dhoilspill/. More than 600 National Park Service employees from 120 parks and 15 offices worked on the Gulf spill between April 20-Oct. 20, 2010. Over 918 tons of oiled debris was removed from Gulf Islands National Seashore alone http://www.nps.gov/aboutus/oil-spill-response.htm.

Hawaii's national parks coasts are in many ways more vulnerable than parks elsewhere due to remoteness, rough sea conditions at certain times of year, high vessel traffic, and limited response capabilities.

Threats or impacts to coasts are often cumulative and interact to compound a serious problem especially in the context of global climate change. This is especially true as coasts undergo increasing sea levels, water temperatures, and acidity. Some coastal resources will be lost or submerged and the coastline will move further inland. Threats other than oil spills and climate change include: overfishing/resource extraction, vessel groundings, trampling/physical damage, pollution, soil runoff and sedimentation, and other land use effects.

## How do we prepare for coasts at risk?

A key element of effective response preparedness is science-based information on resource condition. A recent coastal inventory project provided a baseline of coastal resources in Hawaii national parks. Information on coastal geology, biology, human uses, and physical drivers (e.g., wind, waves, tides) was collected using basic 18th century methods; supplemented by modern technology, including digital cameras and GPS.

Scientists walked or flew (Hawai'i Volcanoes NP) over all park coasts. The coasts were divided into segments based on major geological and biological features like substrate type (bedrock, boulder, cobble, sand, etc.), mineralogy (e.g., volcanic basalt, carbonate, or limestone), slope, coast orientation, or areas covered by a predominant species.

Data collected from each park was entered into a GIS database which allows park managers and others to easily search through results of the inventory. For example, if you want to know how much sandy beach is in a particular park and where it occurs, or find out where certain coastal features or species occur, you can quickly locate this information in the database. Associated graphs, tables, photos, and maps will help you on your quest.

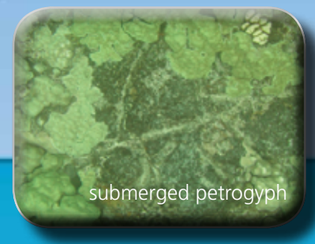
Now that we have hundreds of photographs, detailed maps, and resource data, we will always know what the 53 total miles of coastline in Hawaii's national parks were like at the time of the survey. In the event of a gradual change (e.g., climate change) or a castastophic disaster (e.g., oil spill) we will have baseline knowledge of our finite and precious coastal resources.

— L. Basch, NPS Marine Ecologist

— G. Kudray, NPS PACN Program Manager

Steep volcanic cliffs and headlands are the most common type of coast in Hawaii parks followed by: low-slope basalt intertidal benches with tide pools; boulder; cobble; pebble; carbonate white, mixed white and black sand, and volcanic black sand beaches.

Park coasts preserve unique cultural resources and landscapes such as prehistoric and historic house and burial sites, trails, tidepools, temples, petroglyphs, and fish ponds.



submerged petrogyph

Biodiversity, vertical distribution, and abundance of coastal organisms is generally higher on coasts exposed to strong wave action.

Fortunately, only a few invasive species were found on park coasts (two algae, a mangrove, and a barnacle). They currently pose a relatively low threat to park coastal habitats, but this may change quickly.

Some parks have considerable coastal species richness including: land plants, marine algae, marine invertebrates, marine fishes, birds, sea turtles, and marine mammals. Total coastal species seen in park: Hawai'i Volcanoes National Park (103), Kaloko-Honokōhau National Historical Park (109), Kalaupapa N.H.P. (116), and Pu'uhonua o Hōnaunau N.H.P. (96).

Park coasts provide critical habitat for two sea turtles (green and hawksbill), the endangered Hawaiian monk seal, birds, corals, sharks, and many other rare, threatened, or endangered plants and animals.

Park coasts preserve some of the finest tidepool habitats, species assemblages, and resources in the Hawaiian archipelago.