



Resource Management Highlights

2017 Projects

Here are some highlights for another busy field season for Resource Management staff at Kenai Fjords. We have four main division branches: invasive plants/visitor impacts, wildlife ecology, cultural resources, and physical sciences. We work closely with the National Park Service's Southwest Alaska Inventory and Monitoring Network (SWAN) for long-term monitoring of our park vital signs to help us understand the health of park ecosystems. For many of these projects, we work closely with other agencies and partners.

Invasive Plants/Visitor Impacts

Invasive Plants

Kenai Fjords National Park has been actively controlling weeds for over a decade. In 2016, the crew surveyed 23.65 acres and treated 2.27 acres either manually or with herbicide. Monitoring for the aquatic invasive plant *Elodea* started last year in one lake, as *Elodea* can completely take over lakes and has been spreading across Alaska. We plan to survey another lake this summer. To promote native plants, we will also organize the 12th annual community weed pull with the local Seward community and Chugach National Forest.

Hiker Encounter Surveys and Soundscapes

In fall 2017, we will start the process to update the Exit Glacier Area Management Plan. In preparation for the plan, Harding Icefield Trail visitor encounters will be documented this summer to better understand visitor experience for the popular trail. Sound monitoring equipment will also be placed in the Exit Glacier area. This summer's sound data will be compared to 2009 sound monitoring data to determine if any changes have occurred. We hope that information from these projects can help us better understand any changes for visitor experience over time and help inform the Exit Glacier Management Plan process starting this fall.



Winter surveys in Northwestern Fjord. NPS photo.

Wildlife

Interagency Mountain Goat Project

Comprehensive mountain goat surveys in Kenai Fjords have only been conducted twice since the park was established in 1980. Mountain goats inhabit the entire length of the Kenai Mountains, and may be particularly susceptible to environmental changes. An interagency project will occur this summer to better understand the potential impact of climate change on mountain goats by providing baseline data about goat abundance and distribution across the Kenai Peninsula. The park, Kenai National Wildlife Refuge, Chugach National Forest, and Alaska Department of Fish and Game will partner to compare different methodologies to estimate goat abundance across the Kenai Peninsula. This information will allow the agencies to better manage and conserve the mountain goat population on the Kenai Peninsula.



Mountain goats at Exit Glacier area. NPS photo.

Winter Marine Bird and Mammal Surveys

In March, a late winter marine bird and mammal survey was completed with SWAN and U.S. Geological Survey. Over-wintering sea ducks such as Barrow's goldeneye and harlequin duck were common observations. Initial unexpected off-transect observations included ancient murrelets, Kittlitz's murrelets, and great blue herons; fewer sea otter pups were seen than expected. In light of the 2015-16 large-scale seabird die-off, observers noted if any fresh seabird carcasses were seen on beaches, and none were seen. Hundreds of common murrelets were, however, observed in open water in fjords and bays; this unexpected murre distribution may be a residual effect of the warm water mass that likely redistributed their prey resources. June summer surveys may help to shed light on how these seabirds are responding to changing ocean conditions.

Cultural Resources

Archeology

We are currently evaluating the National Register eligibility of outer Kenai coast archeological sites for the park. Eligible sites will be nominated to the National Register of Historic Sites. The Smithsonian Arctic Studies Center will also be partnering with us for other archeological field work.

Cultural Conversations

In April 2017, the park met with our affiliated tribal groups to discuss partnership opportunities and working together. This was the second year that the park hosted this workshop to facilitate tribal relationships.

Seward History

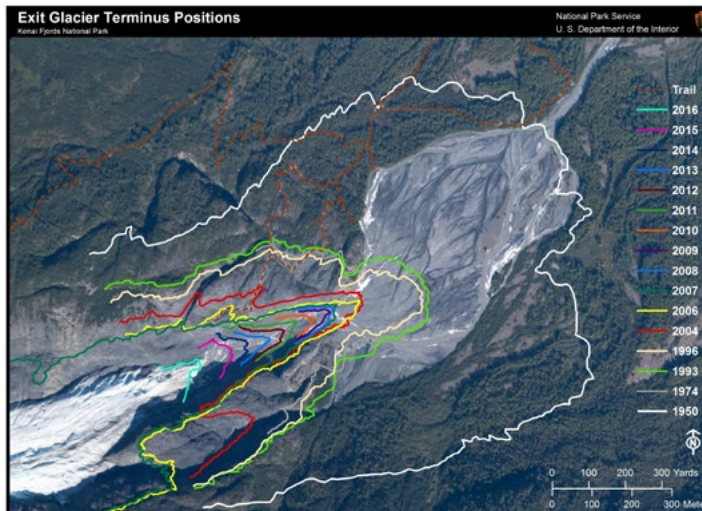
Two public books will soon be available related to Seward, Alaska history. The Historical Atlas of Seward, Alaska will focus on the development of Seward's downtown district through historical images and maps. With Resurrection Bay Historical Society, we are also producing a narrative companion book to the Atlas titled "Windows Through Time."

Physical Sciences

Exit Glacier

Terminus Position

In 2016, Exit Glacier retreated 78 m (252 ft), the largest annual retreat recorded for the glacier. For comparison, the average rate of retreat over the past five years (2011 to 2015) was 44.4 m/yr (162 ft/yr). Park researchers will continue to map seasonal changes to the position of Exit Glacier's terminus to track the rate of retreat.



Exit Glacier annual terminus mapping.

Glacier Mass Balance

Fall 2016 ended the seventh year of glacier mass balance monitoring on the northern Harding Icefield. Mass balance monitoring results have shown the year-to-year variability of weather in this maritime climate, with consistent ice loss in the outflowing portion of Exit Glacier. Preliminary results of Spring 2017 mass balance data show shallow snowpack measured at the six sites on the northern Harding, with the lowest snow depth measurements recorded at the four highest sites and the second lowest snow depth at the two lowest sites in the seven years of the mass balance study. A six-year mass balance summary report is pending this summer.

Fjord Oceanography

This summer, National Park Service staff will initiate oceanographic sampling and measurements in Aialik Bay to gather baseline data on ocean acidification, to map ocean currents, and to map the bathymetry in Aialik Bay to better understand the influence of glaciers on ocean acidification. From June to September, data will be acquired through continuous sampling at two locations on either side of the Aialik Glacier moraine in addition to monthly point samples along a fjord-long transect.

Bear Glacier's Ice-Dammed Lake Dynamics

A high elevation ice-dammed lake on Bear Glacier's northern tributary has been the source of numerous floods in Bear Glacier's proglacial lake (commonly referred to as "Bear Glacier Lagoon"), a popular destination for kayakers and stand-up paddleboard recreationists. The Bear Glacier area is managed by both National Park Service and the State of Alaska, and both agencies are concerned about visitor safety regarding flooding resulting from the release of water from the upper elevation ice-dammed lake. In an effort to better understand the timing, frequency, and volume of discharge from the source lake, the park and State of Alaska Geohazards Office will be working together to install telemetered timelapse camera equipment and a level logger at the ice-dammed lake. The park will also maintain a timelapse camera and level datalogger in the lower elevation proglacial lake to document and assess flooding and volume changes related to the drainage of the source lake on a daily basis.



Monitoring Program

SWAN Inventory and Monitoring

The Southwest Alaska Network (SWAN) is one of 32 Inventory and Monitoring programs within the National Park Service. Specific vital signs that represent key indicators for the health of park ecosystems are monitored at five Alaskan park units: Kenai Fjords, Katmai, Aniakchak, Lake Clark, and Alagnak Wild River.

Vital signs monitoring for Kenai Fjords focus on **marine nearshore, weather, bald eagles, glacier extent, nunatak vegetation, spruce-hemlock forests, and freshwater lakes**. The marine nearshore includes **black oystercatchers, kelp, intertidal invertebrates, eel grass, marine birds, sea otters, and marine water chemistry**. (Vital signs in **bold** are monitored annually.)

Other Park Monitoring Projects

Additional annual monitoring programs are **marine invasives (green crabs and tunicates), seabird mortality, bear-human interactions, and gypsy moths**. Weather at Exit Glacier is monitored by a **SNO-TEL station** and a **CO-OP weather station**.

Nunatak Monitoring

Last summer, nunatak vegetation communities near Skilak, Bear, Petrof, and Wosnesenki glaciers were resurveyed after 11 years. Nunatak lichen and moss were also surveyed for the first time. Nunataks are of interest due to their geographic isolation and may have supported rare populations that survived the Last Glacial Maximum, approximately 20,000 years bp. Monitoring objectives for the nunatak vegetation communities are to estimate long-term changes in species richness, cover, and diversity. Preliminary results suggest vascular plant communities have remained relatively stable across all sites over the past decade, with some evidence of herbivory disturbance and composition shifts. Vascular plant species richness varied from less than 15 species to greater than 30 species per site.

Surveying nunatak plant species. NPS Photo.

Paleontology

Last summer, the first known fossils within the boundaries of Kenai Fjords National Park were discovered! The fossils were located in the Permian (250-300 million years ago) limestone of the McHugh Complex mélangé, in the southern end of the park. These fossils are of Tethyan affinity, which means they originated in the lower latitudes of present day Asia and traveled thousands of miles across the proto-Pacific Ocean to dock against North America. This part of the Kenai Peninsula is the only place they have been found in the western hemisphere.