



# Resource Management News

## Summer 2014



Northwestern Lagoon in Kenai Fjords National Park. NPS photo.

Summer is the busy field season for resource management staff in Kenai Fjords National Park and the Southwest Alaska Inventory and Monitoring Network. This newsletter highlights our major summer projects. As you will see, we often partner with other federal agencies, non-profit organizations, and universities to best steward the park's resources.

This year commemorates a number of landmark events for Kenai Fjords and Seward, Alaska where the park headquarters is based. Fifty years ago on March 27, 1964, an earthquake with a magnitude of 9.2 centered in the Prince William Sound area catastrophically affected a large number of Alaskan communities including Seward, Anchorage, and Valdez. This earthquake was the most powerful earthquake in U.S. history and second largest earthquake ever recorded. The tsunami resulting from the earthquake devastated Seward's primary dock and railroad infrastructure as well as many other structures.

Another significant event occurred twenty-five years ago on March 24, 1989 when an oil tanker called the Exxon Valdez struck Bligh Reef in Prince William Sound. An estimated 11 million gallons of oil impacted 1300 miles of Alaskan shoreline, including Kenai Fjords. Dealing with the effects of the oil spill was a primary focus of park activities during summer 1989. Even today, oil can still be found on some park beaches. Current park projects tie back to the Exxon Valdez Oil Spill; National Park Service has been conducting near-shore monitoring in Kenai Fjords to provide baselines and range of normal variation for specific vital signs in case of future disasters.

On a more positive note, fifty years ago was also the signing of the Wilderness Act which provided protection for federal wilderness areas. Kenai Fjords National Park has eligible wilderness, and park management closely scrutinizes park activities in eligible wilderness areas to ensure protection of wilderness.

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# Cultural Resources

## Archeology



NPS archeologist, Becky Saleeby (retired), gathers information at an archeological site which will be used to evaluate the site's eligibility for the National Register. NPS photo.

### *National Register Eligibility*

The National Register of Historic Places is the official list of America's historic places worthy of preservation. Authorized by the National

Historic Preservation Act of 1966, the National Register is part of a national program to coordinate and support public and private efforts to identify, evaluate, and support the Na-

tion's historic and archeological resources. A number of sites in the vicinity of Kenai Fjords National Park are currently listed on the National Register. They include the Seward Depot, Hoben Park, Brown and Hawkins Store, the Van Gilder Hotel, the Jesse Lee Home, and St. Peter's Episcopal Church.

In 2014, Kenai Fjords National Park will begin a project to research, evaluate, and assess the National Register eligibility of archeological sites in the park. Initial research will be conducted using photographs, maps, archeological reports, and published materials. Site assessments and surveys may be performed as well in order to update permanent park records. This information will be used to write Determinations of Eligibility (DOEs) which, upon completion, will be sent to Alaska's State Historic Preservation Officer for a review. If you'd like to know more about the National Register program, visit <http://www.nps.gov/NR/>

## Exit Glacier Project Jukebox

Kenai Fjords National Park  
<http://jukebox.uaf.edu/exitglacier>

## Oral History

### *Exit Glacier Project Jukebox*

The Exit Glacier Project Jukebox is a component of a three year project to preserve Seward's history and explore the possible definitions of traditional activities in the Exit Glacier area. Long-term residents of Seward were interviewed and recorded about their experiences in and around Exit Glacier. In fall 2013, Doug Deur of Portland State University completed an analysis of the recorded life histories of the project participants and secondary data. His findings will provide interpretive insight into Seward's history and assist park staff with future planning.

You can now listen to interviews, browse through photographs, and explore interactive maps on Project Jukebox, a digital oral history program made available online through University of Alaska, Fairbanks. (See image on the left for website address.)

# Cultural Resources

## Archeology

### *Shea Lots Archeology Reveals Seward's Frontier Days, circa 1905-1920*

Founded in 1903 as the southern terminus for the Alaska Central Railway, Seward quickly transformed from a wilderness into a bustling Progressive Era town. Among its pioneers was Charles Fremont "Fats" Hewitt, the railroad's first conductor. A few years later, Jacob Graef, and Christopher Columbus Shea and his fam-

### *From the archives:*

Seward Gateway in 7-12-1923:

## HUGE ICE PACK NAMED AFTER CHIEF EXECUTIVE

Harding Glacier, a huge ice pack, ninety miles long and forty miles in width, extending from Seward to Seldovia, has been named the Harding Glacier, in honor of the visit of our nation's chief executive. In view of the visit of President Harding, Seward citizens have given his name to the huge ice pack, believed to be one of the largest in existence, and a remnant of the glacial period when the ice cap covered the northern part of the Western hemisphere.

Innumerable large and small glaciers radiate from the main pack into the ocean. The pack extends west and southwest from Seward and can be reached by way of Lowell creek, by an auto road not exceeding four miles in length where machines could drive directly upon the ice field. A more feasible route at the present time is to go down the beach a half mile to Spruce creek, thence up the creek to Harding glacier, a mush for an Alaskan of about three hours. The trail is brushed out good and it is an easy climb.

It is the hope of the people of Seward that the President himself will at some future time step foot on the ice field which bears his name. At any rate for ages to come it will perpetuate the visit of our President.



Beverage bottles recovered from the Shea Lots privies. NPS photo.

ily arrived. Graef owned a hardware store on Fourth Avenue, while Shea served as a game warden for Seward and the surrounding area. All three men lived for several years on Block 10, on the east side of Third Avenue.

When the National Park Service purchased land in downtown Seward for future use as a parking lot, NPS archeologists surveyed and tested the property known as Shea Lots, looking for evidence of the town's early inhabitants. Archeologists found the remains of three outhouses, or privies, dating to Seward's early years. These privies are important to archeologists because during the early 20th century, privies were not only used as human waste receptacles, but also functioned as the primary trash dumps for the local residents.

Privies are particularly valuable because they contain everyday objects that say much about the daily lives of past people. Artifacts found in the privies on Block 10 date between 1905 and 1920. By combining data from the archeological artifacts with other information gained from old photographs, maps and census records; archeologists and historians were able to place "Fats" Hewitt, Jacob Graef, and Christopher Shea's family on Block 10 during the period that the privies were in use.

After locating the privies, NPS archeologists excavated them in order to preserve their

contents for research and exhibition. Each artifact was carefully recorded, sent to a lab for analysis and stored at the NPS Alaska Regional Curatorial Center.

The artifacts from the privies connect Seward with the broader world: wine and spirits from Europe, dinnerware from England, salad dressing and condiments from New York, patent medicines from the Midwest, and Clam Tea from Seattle. The United States was in the midst of the Industrial Revolution in the early 1900s and expanding its influence abroad. The people of Seward saw themselves as part of this process as they built a modern American town in a new frontier.

Products from this project include a booklet and brochure that will be available on the park's website: <http://www.nps.gov/kefj/historyculture/index.htm>.



Artifacts from the Shea Lots privies. NPS photo.

# Natural Resources

## Exotic Plant Management

In 2014, Kenai Fjords National Park begins the 11th year of the invasive plant management program using the Alaska Regional Exotic Plant Management Team (EPMT) protocol to survey, map and control invasive plants. Invasive plant species found in the park have been both eliminated or contained due to management activities over the years, but populations continue to be discovered in remote and undisturbed areas in the park. This confirms the importance of continuing to survey the park areas for invasive plants, prioritizing sites most heavily used by people, and continuing to monitor areas with less use that are still susceptible to infestation.



Searching for coastal invasive plants. NPS photo.

In 2014, park staff will continue to monitor and chemically control persistent populations of common dandelion located in remote areas of the park. These sites are located south of the outwash plain and north of the park



Herman Leirer Road Community Weed Pull in 2013. NPS photo.

road in the Exit Glacier area, and at two locations along the coast. The sites will continue to be monitored to determine how effectively these treatment strategies are meeting management goals.

Partnering with other agencies and organizations to control invasive plants continues to be a priority. The park is coordinating with the Kenai National Wildlife Refuge to survey three freshwater lakes within the park boundary for the invasive freshwater plant, *Elodea*. *Elodea* was discovered on three lakes on the Kenai Peninsula north of Nikiski in 2012 and 2013. *Elodea* is a freshwater invasive plant which reproduces vegetatively—it only needs a small fragment to break off a plant to spread. It can even survive frozen in ice and grows rapidly, eventually forming dense monocultures. *Elodea* is a threat in Alaska because it degrades fish habitat, compromises water

quality, makes boat and float plane travel difficult, displaces native plants and animals, and reduces dissolved oxygen. The lakes in the park selected for surveys are accessed by floatplanes coming from lakes that may be infested by *Elodea*. It only takes a small piece of a plant to be caught on a boat or floatplane to spread *Elodea* from one lake to the next. Thus, monitoring and prevention are key.

On June 27, 2014, the park will sponsor the 11th annual Herman Leirer Road Community Weed Pull. This community event is a partnership project with volunteers, local agencies, and non-profit organizations to control invasive plants on the road corridor which provides a vector for invasive plant species to spread from the Seward area to the Chugach National Forest and the Exit Glacier area of the park.

### BLOG ON...

Want to learn more about research being conducted in the park? Are you curious about what it's like to do fieldwork in Kenai Fjords? Check out the Resource Management blog titled "Kenai Fjords in the Field" to gain a first-hand perspective from the field. Rather than a data summary or a trip report, these posts provide an experiential sense of what it's like to conduct fieldwork in the park.

Feel free to peruse past posts from 2012 and 2013 and join us again this season as we share our field experiences on the park website. Check us out at: <http://www.nps.gov/kefj/blogs/Kenai-Fjords-in-the-Field.htm>.

# Natural Resources

## Bear Management



Black bear in alpine meadows in Exit Glacier area. NPS photo.

### *Bear Management*

Bears occur throughout Kenai Fjords National Park and are focal attractions for visitors. Seeing a bear in its natural habitat often contributes significantly to visitor experience. This interaction, however, can increase the potential for conflict between humans and bears and alter normal bear behavior. These factors present a management challenge when striving to preserve bears as an integral component of the ecosystem while providing for public safety.

Over the last two years, we have observed an increase in the number of incidents of bears obtaining human food and garbage by damaging property. In 2013, we recorded five related incidents in which a bear obtained food from

garbage cans in the Exit Glacier developed area. The perpetrator gained entry into the trash cans using three different methods: 1) knocking over the can and causing the back door to pop open, 2) sticking a paw into an open access point (i.e. the recycling hole), and 3) taking advantage of a poorly secured latch. During four of these incidents, a bear also investigated vehicles in the campground parking lot leaving behind paw prints and scratch marks and in one case, breaking into a locked topper on a pickup truck. In response, the bear response team with help from maintenance staff and park management better secured existing garbage cans and replaced older models with new bear resistant cans, installed a trail camera to help identify problem bears, installed additional signage at the campground, and temporarily closed the campground.



Bear damage to bear resistant trashcans at the Nature Center in summer 2013. NPS photo.

### **BE BEAR AWARE!**

Minimize negative bear-human interactions:

- Store all food in bear resistant food containers.
- Make noise while hiking to avoid surprise encounters.
- Do not approach bears.
- Avoid camping in high bear use areas.
- Defend your food and gear from a curious bear.

### **HELP THE PARK**

Visitors and staff involved in a bear-human interaction should fill out a BHIMS (Bear-Human Interaction Management System) form when:

- 1) A bear exhibits **unusual behavior** (e.g. stalking, charging, threat displays, or physical contact),
- 2) Extreme evasive action is taken in response to a bear (**use of bear pepper spray or fire arm**),
- 3) **Garbage or food** is involved, or
- 4) **Property** is damaged or lost.

Thank you for your prompt reporting!

In 2014, the primary goal of our bear management program is the same as in past years: to provide for visitor and staff safety by minimizing bear-human conflicts. To do this, everyone in the park including visitors need to work together to prevent bears from obtaining human food and garbage. Please report to park staff any garbage cans that are overflowing, damaged, or have faulty latches as soon as possible to avoid bears obtaining a trash reward. Please also report bears investigating trash cans or vehicles immediately. It is highly recommended that visitors don't leave food inside their vehicles overnight, especially in the park's campground area.

### **SWAN Inventory and Monitoring**

The Southwest Alaska Network (SWAN) is one of 32 Inventory and Monitoring programs within the National Park Service. SWAN consists of five Alaskan park units: Kenai Fjords National Park, Katmai National Park and Preserve, Aniakchak National Monument and Preserve, Alagnak Wild River, and Lake Clark National Park and Preserve. These parks were grouped together into a single network because they shared characteristics such as marine coastal habitats and glaciers. By grouping five park units together into a single network for inventory and monitoring, project funding and management have been streamlined.

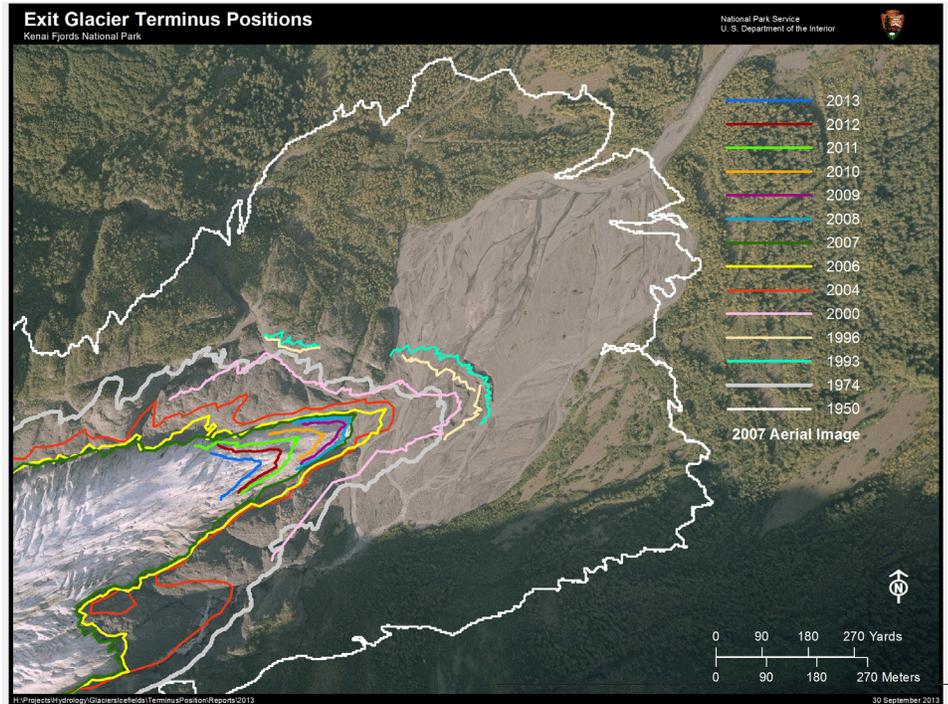
The network and park staff have chosen specific vital signs to monitor, representing key indicators of the condition of park ecosystems, information critical for the National Park Service to protect and manage parks. SWAN and Kenai Fjords staff work closely together to successfully implement these vital signs monitoring projects.

# Natural Resources

## Exit Glacier

### Terminus Position Mapping

Kenai Fjords continued monitoring Exit Glacier's terminus position in 2013 by using GPS to map the lowest portion of this out-flowing glacier's terminus. Results from the annual measurement indicate that Exit Glacier retreated 130.5 ft (39.8 m) in 2013 (from October 1, 2012- September 30, 2013). This number is simply the difference between the fall 2012 and 2013 terminus positions measured in GIS. It does not take into account any advance-retreat cycles that may have occurred during the 2012-2013 winter season. Despite having record warm temperatures in summer 2013 and a record cold July in 2012, the annual rate of retreat was very similar in 2011, 2012, and 2013. This highlights the lag time between changes in climate and a glacier's mass balance and the responding change in a glacier's terminus position.



Exit Glacier annual terminus mapping. Earliest years were digitized from historic aerial photos.

## Glacier Mass Balance

Annually mapping the location of a glacier's terminus position is only one of the ways that we monitor change in the glaciers at Kenai Fjords. Since the terminus position is easily discerned by the eye, this number helps to quantify the most obvious changes to park staff and visitors at Exit Glacier, but it only provides a small amount of data regarding the glacier's state. Changes in glacier thickness and volume are also necessary to determine if a glacier is growing or shrinking. To determine this state, seasonal measurements are taken of accumulation (winter's snow/precipitation) and ablation (loss of ice through melting, sublimation, and calving) and this data is used to calculate the glacier's mass balance.

Glacier mass balance measurements are completed during two site visits each water year, which begins/ends approximately at the end of September on the Harding Icefield. The first measurements of the water year are recorded in the spring at the end of winter (the accumulation period); this indicates how much snow was deposited on the ice field. The second measurements are conducted in

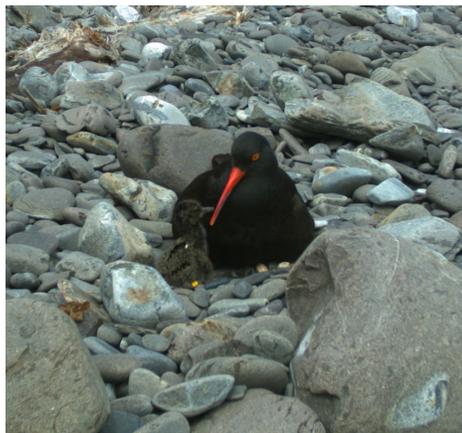
the fall, when the previous winter's snow and ice have stopped melting but before any new snow has accumulated; this indicates how much of last winter's accumulation persisted through the summer. Due to uncontrollable circumstances, park staff were late in visiting the sites in fall 2013 and, consequently, had to remove up to 8 ft (2.5 m) of snow that had accumulated in September and October. After shoveling snow to the side, park staff were able to view the end-of-summer 2013 surface and take measurements. Based on preliminary results, the record warm temperatures of summer 2013 resulted in a big year of surface melt on Exit Glacier. At the lowest site, located near Marmot Meadows at an elevation of 1,745 ft (532 m), park staff measured a loss of 22 ft (6.65 m) of surface ice (of which 1.6 ft (.5 m) melted in September alone). Further up the glacier at elevation 3,645 ft (1,111 m) park staff measured a loss of 4.5 ft (1.36 m) of surface ice. Perhaps the most notable observation at this particular site was that, in addition to the melting of all of the 2012-2013 accumulation, all of the firn (the old, compressed snow) that had accumulated since the project started in Fall 2009 had also melted during the summer!



Mass balance site. NPS photo.

# Natural Resources

## Black Oystercatchers



Adult black oystercatcher with chick. NPS/University of Alaska Fairbanks remote camera photo.

### Black Oystercatcher Studies

The black oystercatcher (*Haematopus bachmani*) is a common and conspicuous member of the rocky and gravel intertidal marine communities of eastern Pacific shorelines and is completely dependent on nearshore marine habitats for all critical life history components including foraging, breeding, chick-rearing, and resting. The bird is highly susceptible to human disturbance and serves as a “keystone” species, as the bird is important in structuring nearshore systems. Oystercatchers can eat large numbers of herbivorous invertebrates, resulting in trophic cascades that include shifts in invertebrate species composition and size distribution which can then lead to diminished grazing intensity on algae and increased algal populations. Oystercatchers bring limpets, mussels, and other prey back to their nests to provision chicks and researchers will collect shell remains at nests to examine oystercatcher diets. The collection of black oystercatcher prey data offers a unique perspective into processes that structure nearshore communities, including the potential consequences of anticipated increases in human disturbance.

Kenai Fjords and Southwest Alaska Inventory and Monitoring Network (SWAN) staff conduct annual monitoring of black oystercatcher population density, nest density and

productivity, and chick provisioning as part of the Nearshore Monitoring Program. However, each of these metrics is estimated from a single visit to oystercatcher nests annually and data resulting from a single observation are recognized as potentially influenced by events that occur both prior to and following the visit, including breeding failure, and egg and chick mortality.

Research by two graduate students in Kenai Fjords National Park is supplementing annual black oystercatcher monitoring efforts. In cooperation with the University of Alaska Anchorage, stable isotope analysis was completed on field-collected and archived black oystercatcher blood and feathers as well as known prey species in 2012 and 2013 to assess adult diet throughout the duration of the breeding season. Results show diet consistently includes primarily mussels and limpets over the entire breeding season (Mar to Aug), which closely matches previous results from observation-based studies. Additionally, stable isotope analysis indicates black oystercatcher diet has changed little in the northern Gulf of Alaska over the last 100+ years, further strengthening the justification of black oystercatchers as an indicator of intertidal ecosystem health. In another study in cooperation with the University of Alaska Fairbanks, active nests are being intensively monitored during the 2013 and 2014 breeding seasons to examine the role of intertidal invertebrates in the diet of black oystercatcher chicks and assess the influence of these prey items on their body condition and survival. Remote cameras and direct observation are being used to monitor nests and record provisioning behaviors and repeat captures to track chick growth patterns.

This summer, park staff and the UAF graduate student will conduct the second and final year of field research on black oystercatcher nests in Aialik Bay. Results of this study will inform and improve long term monitoring programs and management of black oystercatchers at Kenai Fjords National Park, Katmai National Park and Preserve, and Prince William Sound.

### MARINE DEBRIS

Marine debris includes any non-natural solid material that comes onshore both intentionally and unintentionally. Fishing gear, plastics, styrofoam, and jettisoned boat cargo are examples of marine debris. Debris can affect marine mammals directly through entanglement, strangulation, and digestive blockage. Ingested plastics can also cause effects across the food web. Occasionally, hazardous materials can come ashore which require special handling and removal processes. In March 2011, a magnitude 9.0 earthquake struck the Japanese coast generating a devastating tsunami that killed over 15,000 people and created 5 million tons of marine debris. Approximately 1.5 million tons of this debris is in the process of arriving on the west coast of the contiguous United States and Alaska. The 2011 Japanese tsunami marine debris has heightened public awareness on the Pacific and Alaska coasts about the issue of marine debris.

Since 2009, Kenai Fjords National Park has annually partnered with a local non-profit organization, Resurrection Bay Conservation Alliance (RBCA), to document and remove marine debris on park and local beaches in Resurrection Bay and on beaches on the park's outer coast. In 2013, the park also initiated NOAA marine debris shoreline surveys, which will contribute information to a national database tracking national accumulation rates. Anticipated marine debris activities in Kenai Fjords for 2014 include NOAA marine debris shoreline surveys, annual RBCA marine debris removals, and marine invasive monitoring. Monitoring for marine invasive species that can be transported on marine debris will continue in Aialik Bay.



NPS photo.

# Natural Resources

## Sea Otters

### *Foraging Ecology of Sea Otters*

Observations of sea otter foraging behavior within Kenai Fjords National Park have been accomplished annually in June since 2007, as part of the ongoing Southwest Alaska Network (SWAN) Vital Signs monitoring program. Results to date indicate sea otters in Kenai Fjords consume a high proportion of mussels relative to otters in other areas of Alaska. In Prince William Sound, Katmai National Park, and Glacier Bay National Park, clams are the major component of the diet, comprising 55-70% of the prey items



Sea otter mom and pup hauled out on a rock. View through a spotting scope. Photo by U.S. Geological Survey, B. Weitzman.

identified by observers. In contrast, in Kenai Fjords, mussels (*Mytilus trossulus*) have dominated sea otter diets during June across all years of SWAN monitoring data collection (2007-2011), comprising about 61% of the diet, with clams the second most prominent prey item at about 25% of the diet. Otherwise, chitons, crabs, octopus, snails, sea stars, sea urchins, and other prey each comprised less than 10% of the of prey recovered.

If sea otters in Kenai Fjords are dependent on mussels as a major component of their diet, they may be at risk of food limitation as a result of fluctuations in prey availability, as related SWAN studies show that mussel abundance and sizes across the Gulf of Alaska



Several sea otters hauled out on a rock. Photo by U.S. Geological Survey, B. Weitzman.

vary considerably from year to year. Further, during most seasons, mussels have low energy content, when compared to other prey items. Consequently, the apparent high degree of sea otter consumption of mussels has raised questions about potential food constraints on the otter population in Kenai Fjords. Also, if Kenai Fjords sea otters are at the lower range of energy recovery, there are concerns that the population may be more susceptible to disease, severe weather events, climate change, vessel traffic, and other disturbances. In Kenai Fjords, sea otters are a keystone predator in the nearshore ecosystem, a vital sign for long-term monitoring, and a priority species for conservation based on park enabling legislation.

To examine this further, NPS and U.S. Geological Survey have partnered on a project focusing on sea otter foraging habits, prey availability, and prey quality (calorie content) in Kenai Fjords starting in 2014. Teams of observers will start fieldwork in April and plan to collect foraging data monthly through September. Prey item samples will also be collected for caloric analysis.

### **Protecting Wild Coho Salmon in the Resurrection River Watershed**

Coho (silver), pink, chum, sockeye and Chinook salmon have all been documented within the Resurrection River watershed. In addition to wild salmon stocks, several areas in the lower Resurrection River watershed have been stocked with hatchery-reared coho salmon smolts since 1964, and today the hatchery releases support one of Alaska's largest sport fisheries for coho salmon. Sport fishing for salmon within the Resurrection River has been closed since 1960, although the area downstream of the Seward Highway Bridge was opened to salmon fishing in 2005. The sport fishery for coho salmon in Resurrection Bay has also increased dramatically in recent years. Estimated harvest of coho was almost 136,000 salmon in 2005, 38% of which were estimated to be from wild stocks. Despite this relatively large contribution of wild stocks to the sport fishery, there is currently very little information available about wild coho salmon ecology or abundance within the Resurrection River, and there is no information on how increasing sport harvest may affect the natural and healthy population of coho salmon within Kenai Fjords National Park.

This summer, with help from Lake Clark National Park fisheries biologists, Kenai Fjords National Park will conduct a pilot study to collect the necessary information to design and implement an effective monitoring program for coho salmon in the Resurrection River watershed. One of the first steps in this process is to gather information on the spatial and temporal distribution of coho salmon as they move through the watershed.

Specifically, this project will identify the migration routes, run timing, spawning distribution, and spawn timing of Resurrection River coho salmon. Understanding migration patterns and spawning activity by coho salmon in the Resurrection River will provide the park with the foundation for future work on population abundance and address a data gap in our current knowledge of this important stock.

# Natural Resources

## Vegetation Change

### *Historic photos showing rapid shrub establishment after glacial retreat*

Over the last 50 years, as glaciers have receded in Kenai Fjords, many of the upper fjords have converted from ice to shrubs. Lowland forest have converted to brackish meadow in the wake of the 1964 earthquake, and river channels have changed course, leaving behind new islands of alder and willow in alluvial outwash.

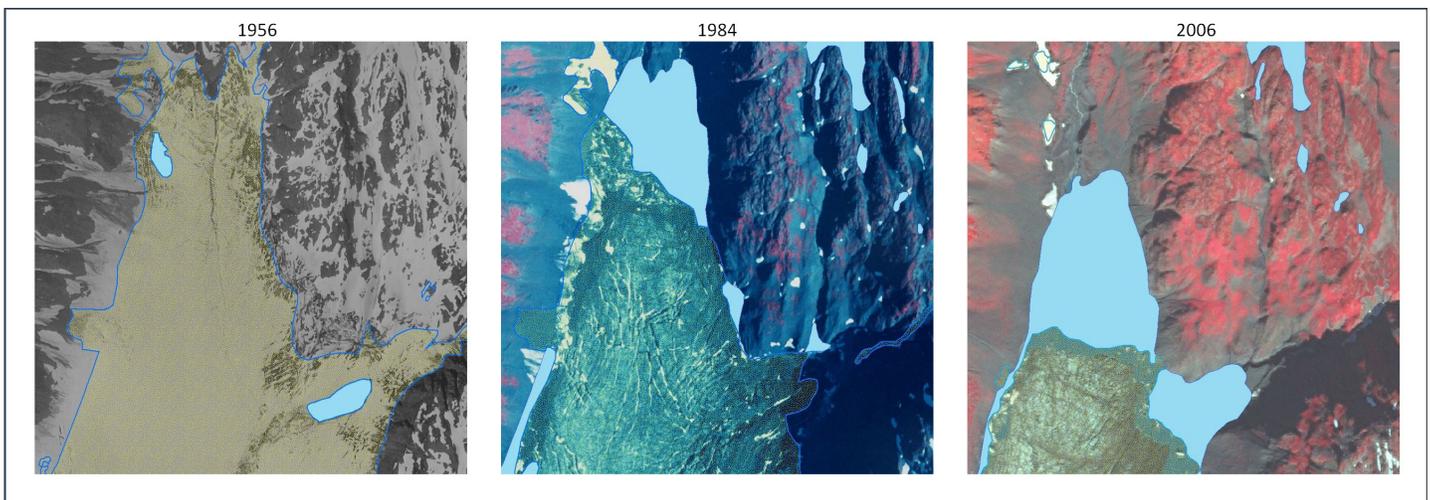
In 2012, the Southwest Alaska Inventory and Monitoring Network (SWAN) partnered

with Saint Mary's University of Minnesota to develop methods for mapping landscape changes. Historic black and white (1950s-era; 1:40,000) and color infrared (1980s-era; 1:63,000) aerial photos have been mosaicked by Saint Mary's University, and are now being interpreted against IKONOS base imagery acquired in 2005.

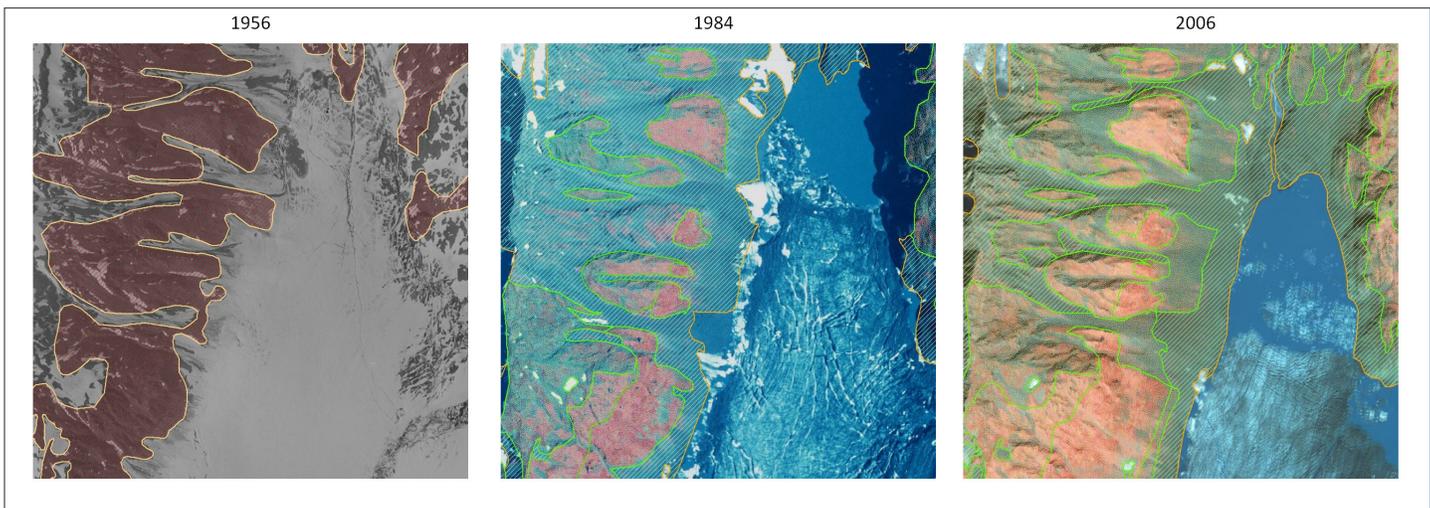
Areas of interest for the project are Bear Glacier, which receded nearly 3 km between 1950 and 2005, and Northeastern Glacier. A separate analysis, based on an interpretation of 3400 random points assigned across

the lower elevations in Kenai Fjords National Park, showed that approximately 7% of the land area had lost ice, and 10% of the area had shown an increase in shrub cover.

The delineations developed by Saint Mary's University will provide a spatially-explicit estimate of where change has occurred, how extensive the change is, and how rapidly the change happened. In some areas, the transition from ice to alder has taken less than 30 years. A geographic information system (GIS) data set and final report are expected by the end of the year.



A side (feeder) glacier on the larger Bear Glacier complex, Kenai Fjords NP. The outline of the glacier is shown in the 1956 photo, with the glacier shaded in pale yellow. Between 1956 and 1984, the side glacier receded 530 m, and between 1984 and 2006, it receded another 680 m, as shown by the areas in blue fill. A small lake that now sits at the terminus of the side glacier periodically drains, causing an outburst flood at the mouth of Bear Glacier.



Vegetation establishment, primarily alder, on the side slopes near Bear Glacier, 1956-2006. Side slopes were either bare rock or covered in snow and ice in the 1956 photo, but by 2006 over 600 acres of vegetation had established in this area. Vegetated areas appear as shades of red in the 2006 infrared IKONOS image. Areas shown by the yellow hatched lines in 2006 have remained unvegetated.



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## EXPERIENCE YOUR AMERICA



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This is the seventh annual issue of Resource Management Newsletter produced by the Resource Management Division at Kenai Fjords National Park.

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The National Park Service cares for the special places saved by the American people so that all may experience our heritage.

## Kenai Fjords National Park

Kenai Fjords National Park was established on December 2, 1980 by the Alaska National Interest Lands Conservation Act (ANILCA). The park comprises approximately 670,000 acres within its legislative boundary. National Park Service manages approximately 607,000 acres, with the remaining acreage owned and managed by the State of Alaska, Port Graham Corporation, and private inholders.

The park is located on the east coast of Alaska's Kenai Peninsula and extends into the Gulf of Alaska. Over half of the park's acreage is covered by the Harding Icefield, and the icefield stretches from tidewater glaciers at sea level to broad expanses of ice and snow, interrupted only by the nunataks of the Kenai Mountains. Outflowing glaciers from the icefield and steep, scenic fjords create a rugged coastline. A narrow fringe of temperate rain forest growing between the icefield and the sea hosts a rich diversity of terrestrial and

marine life. This area was traditionally used by the Alutiiq people, and the Native villages of Port Graham and Nanwalek continue to be affiliated with the park. The park borders Kenai National Wildlife Refuge, Alaska Maritime Wildlife Refuge, Chugach National Forest, and Alaska state lands.

The park's enabling legislation identifies the following purposes: "to maintain unimpaired the scenic and environmental integrity of the Harding Icefield, its outflowing glaciers, and coastal fjords and islands in their natural state; and to protect seals, sea lions, other marine mammals, and marine and other birds and to maintain their hauling and breeding areas in their natural state, free of human activity which is disruptive to their natural processes" (ANILCA sec.201(5)). Unlike most park units added to or created in 1980, ANILCA did not allow for sport hunting or federal subsistence in Kenai Fjords National Park.