Katmai National Park and Preserve
Aniakchak National Monument and Preserve
Alagnak Wild River

National Park Service
U.S. Department of the Interior

Resource Management 2015

NPS/ R. Peterson

In September 2014, NPS staff and Student Conservation Association interns consolidated marine debris at Swikshak Bay, in preparation for the 2015 cleanup. Thanks in part to the Alaska SeaLife Center, Gulf of Alaska Keeper and Waste Management, this debris will be taken to Washington State for recycling and disposal this summer.

Marine debris is a common sight along coastlines around the world, even in places as remote as the Katmai Coast. In 2013, Katmai National Park partnered with the Alaska SeaLife Center's GYRE project to remove marine debris from Hallo Bay. Nearly 4,400 pounds of debris were removed. Fishing-related debris (buoys, floats, rope, line and netting) accounted for over 60% of the total debris weight. Beverage containers, foamed plastic, and other plastic material made up the majority of the remaining 1,400 pounds of debris. This summer, Katmai will conduct an intensive marine debris cleanup of five beaches (including Hallo Bay), as part of a multi-park project.

Katmai, along with Kenai Fjords National Park, Wrangell St. Elias National Park and Preserve, Cape Krusenstern National Monument and Bering Land Bridge National Preserve, will clean up NPS beaches and engage local schools and communities in the issues of marine debris. At Katmai, crews will be out at Sukoi Bay, Swikshak Bay, Kaguyak Bay, and north and south Hallo Bay during the second and third week of June to consolidate debris. The collected materials will then be removed by marine vessel and fed into a larger marine debris removal effort taking place throughout the Gulf of Alaska, Southeast Alaska and coastal British Columbia.

The NPS is partnering with the Alaska SeaLife Center, Gulf of Alaska Keeper, US Fish and Wildlife Service, Waste Management and local boroughs and school districts in this effort. Katmai's debris will be combined with collected materials gathered by the Gulf of Alaska Keeper and transported on a Waste Management barge. The barge will collect debris from other sites along the route until it reaches Seattle, Washington. Where possible, debris will be recycled.

Project activities and updates will be shared on the park website and facebook page. Keep a look out for more information and finding on this project throughout the summer at www.nps.gov/katm.

Forest Disturbance in Katmai and Lake Clark National Parks and Preserves

White spruce forests in Katmai National Park and Preserve and southern Lake Clark National Park and Preserve have been hard hit by the spruce beetle *(Dendroctonus rufipennis)* over the past several decades. In 2014, the Southwest Alaska Network (SWAN; part of the NPS Inventory and Monitoring Program) revisited many existing forest monitoring plots in forests heavily impacted by the beetle and established a number of new sites in undisturbed forest stands. The objective of the monitoring is to document changes in forest structure (the number and size of trees standing) and composition (the species present). These changes could include an increase in grass cover and downed wood on the forest floor in areas of beetle-kill, which would increase ground fuels over the long-term. A collaborative study between the SWAN and Humboldt State University, Nipissing University, and the University of Arizona is using tree-ring data to better understand the interaction between climate and beetle outbreaks. Results of this work suggest that warm temperatures in the spring can leave trees drought-stressed and susceptible to beetle attack, particularly in low snow years. Further north, in the black spruce ecosystem of Lake Clark NP&P, fire is another important disturbance. In June 2014, a team of fire ecologists from the regional office and SWAN biological technicians sampled a number of plots in the Currant Creek burn (2013) to assess fire severity. The resulting fire severity map may be used to examine the effects of the fire, and to predict where changes in vegetation and wildlife habitat could occur.

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Spruce beetle-related mortality in the Bay of Islands in Katmai National Park and Preserve.

Mercury Levels in Resident Lake Fish Tissue

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A NPS Technician uses hook and line to reel in a lake trout, later processed and analyzed for mercury concentration in its muscle tissue.

Monitoring since 2005 has built a solid baseline of tissue samples from more than 300 fish, representing nine species from 13 lakes in Katmai and Lake Clark National Parks and Preserves. These samples indicate that some resident fish species in southwest Alaska lakes have acquired elevated concentrations of mercury (Hg), the majority of which is methylmercury (MeHg), a toxic and readily biomagnified form. Why do fish from Katmai and Lake Clark, which inhabit some of the most pristine and remote waters in North America, have such elevated Hg concentrations? The Southwest Alaska Network (SWAN; part of the NPS Inventory and Monitoring Program) will be partnering with toxicologists at the US Geological Survey's Mercury Research Laboratory to answer this question through additional chemical and statistical analyses of lake trout *(Salvelinus namaycush)*. Given the importance of resident lake fish, both as long-lived predators and as food sources for humans, understanding their contaminant levels is crucial.

Changing Tides: Intertidal Invertebrates, Bears and People

This spring, the National Park Service will embark on a new study to investigate the unique link between the terrestrial and nearshore environments, specifically coastal brown bears and intertidal invertebrates. At Katmai, three unique field research activities will take place throughout the summer to help us better understand this link: marine intertidal surveys, bear movement study using GPS collars, and field observations of foraging brown bears.

The marine intertidal
Clams and other intertidal invertebrates are known to be important early season forage for coastal brown bears along the Alaska Peninsula, and are key components of the nearshore food web. They provide food for a multitude of animals including sea stars, sea ducks, shorebirds, sea otters, wolves and bears.

This summer, researchers from the NPS and USGS will map the extent of clam and mussel beds and measure species diversity, composition, and density along the Katmai Coast. Laboratory work at the Alaska SeaLife Center will measure the effects of anticipated changes in ocean conditions and potential disturbances to these invertebrates. Natural and human-related pressures can impact the health of these nearshore invertebrate communities, which in turn can affect those species that rely on them. Although remote, the Katmai Coast is still vulnerable to a multitude of changing conditions and disturbances, such as ocean acidification, sea level changes, and oil spills.


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A USGS technician excavates clams within a plot on the Katmai Coast. Clams will be collected, identified to species and measured.

Brown bear movement within Katmai's coastal habitats
Coastal brown bears on the Alaska Peninsula are some of the largest in the world, thanks in part to abundant seasonal food resources. Access to and abundance of food can vary throughout the season. Spring forage, including clams, mussels and sedges, is important after a winter of denning. During the summer and fall, packing on weight for the winter ahead can mean all the difference in survival.

To better understand bear use and movement within coastal habitats and to measure the relative importance of seasonal forage on long-term health and survival, 12 female bears will be fitted with GPS collars in May. NPS, USGS and Washington State University researchers will evaluate body condition of the collared animals in the spring, summer, and fall to compare overall health throughout the season. Blood and hair samples will be collected to measure the relative amounts of marine-derived proteins within the bears' diets over the entire season. Collaring and recapture of bears for habitat use and health assessments will provide new information on coastal brown bear ecology.


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Clam beds provide important early season food for bears on the Alaska Peninsula Coast.

Brown bear foraging throughout the season
From June to September, a graduate student from Washington State University will spend two weeks a month observing foraging bears at Hallo Bay. She will be recording foraging effort and overall return. Feeding observations of bears clamming in the intertidal, fishing in streams and grazing in sedge meadows will be conducted and relative caloric value determined for these efforts. The extent to which bears rely on marine-influenced food resources will provide unique insight into the link between the marine and terrestrial ecosystems.

Katmai will be actively communicating the activities and findings of these studies throughout the three-year life of this project. Look for updates on the park website (www.nps.gov/katm) and facebook page. We look forward to connecting with you as this unique story unfolds. Through this project, we will gain valuable insight for long-term preservation of this dynamic nearshore connection and the species that rely on it.

Sea Star Wasting Disease

Sea stars play a vital role in shaping the marine communities in which they live. Many sea stars are considered top level predators, and have earned the title of being a keystone species. Keystone species are species that have a dramatic impact on community diversity.

Since 2013, sea stars in the Pacific Ocean have been dying in large numbers because of a mysterious sea star wasting disease. This disease first causes lesions to appear on sea star bodies, and within days the sea stars begin to die and decompose. Sea star wasting disease can move through sea star populations like a wildfire moves through a forest, and can kill many different species of sea stars at the same time. This disease has been observed as far south as Baja, Mexico and as far north as Sitka, Alaska. Scientists have recently identified the cause of this widespread disease to be a virus, named sea star associated densovirus (SSaDV). Though the culprit of this disease has been identified, scientists do not know what is causing this disease to spread so rapidly.

In the summer of 2014, the Gulf Watch Alaska (GWA) team searched for sea star wasting disease in the northern Gulf of Alaska. GWA surveyed almost 2,000 sea stars at 24 different sites and found no diseased sea stars. Survey sites were located in Prince William Sound, Kenai Fjords National Park, Kachemak Bay, and Katmai National Park and Preserve. Additionally, a GWA team member conducted research dives at multiple sites in the central and western Aleutian Islands, and found no signs of wasting disease.

There have been anecdotal reports of diseased sea stars in Prince William Sound and Kachemak Bay, though these reports have not yet been confirmed to be wasting disease. Future GWA summer surveys are planned for the northern Gulf of Alaska. The GWA program is monitoring for the disease across a large geographic area and will be able to detect large-scale outbreaks if the disease spreads to this region.

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Sea star wasting disease has become an issue along the Pacific Coast of North America. This disease has not yet been observed in the northern Gulf of Alaska, which includes the Katmai Coast.

Archeological Survey and Evaluation of Amalik Bay National Historic Landmark

UAMN

Archeological investigation of eroding coastal settlement. A cultural deposit capped by 1912 Katmai Tephra is exposed in the wall of the excavation.

This year archeologists from the University of Alaska Museum of the North (UAMN) will continue artifact and sample analysis, and writing while planning to conduct the final field season of archeological research at early Ocean Bay sites at the Amalik Bay National Historic Landmark. In 2014, work at three eroding coastal sites provided rich assemblages of artifacts and faunal remains that provide information concerning seasonality and subsistence practices about Ocean Bay Culture, the most ancient archeological sites on Kodiak Island and the Katmai Coast. Archeological deposits at a site in inner Amalik Bay investigated in 2014 were unusually deep and contained multiple ocher-covered surfaces with hearths and charcoal deposits that may indicate multiple house floors. In 2016, UAMN archeologists will complete investigation of this site and determine the age of the earliest occupations there.

Brooks Camp Ground Penetrating Radar Survey

Brooks Camp occupies a terrace north of the mouth of Brooks River that overlooks lower Brooks River and the adjacent shore of Naknek Lake. In the past, major Alaska Native settlements occupied this prime location. When Brooks Lodge began in 1950 the area was deserted and the outlines of ancient houses obscured by a thick layer of tephra (volcanic ash) deposited by the 1912 Novarupta Eruption. As the lodge grew, the landscape was leveled to accommodate lodge facilities further reducing the visibility of and accessibility to the archeological remains.

In order to evaluate and protect this earlier settlement, Katmai archeologists will direct a geophysical survey including a ground penetrating radar (GPR) investigation of Brooks Camp. GPR will locate house floors, occupation surfaces, graves and other feature with precise depths. This information will allow archeologists to investigate archeological features without requiring the excavation of large areas. With knowledge of the location of significant resources, archeologists can help the park plan projects that avoid harming archeological sites and conduct archeological research at minimum cost and ground disturbance.

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Brooks Lodge and office are built atop the ruins of past Alaska Native settlement.

River and Sedge Meadow Surveys of Brown Bears

The longest record of bear activity at Katmai is from surveys flown along salmon spawning streams. These surveys take advantage of the natural ecosystem dynamics, concentrating bear activity in areas where food is available. Stream survey records go back to 1976, and the park continues to fly them annually so long as weather allows.

These stream surveys are limited in utility due to the inability to estimate the proportion of overall bears that are seen during a survey. Nevertheless, they provide a snapshot of bear activity levels, and the observed patterns also appear to mirror the experience of people in the region, suggesting more bear activity during times when more bears are also reported around villages and more bears are documented at locations with detailed records such as Brooks Camp.

In addition to general indications of bear activity levels, the surveys provide an opportunity to document demographics of the bears that are seen. Bear population demography can be an important consideration in harvest management, but also provide insight into natural populations processes. These surveys, due to the long time period, are our best way to evaluate demographic changes such as the proportion of family groups.

On the Katmai Coast, a similar opportunity to use natural ecosystem dynamics to facilitate some basic, repeated documentation of bear activity levels has recently been started by the park. Bears congregate in coastal meadows to feed on sedges in the early summer, and are highly visible from the air. Due to the locations of the major salmon spawning streams, the stream surveys document bear activity levels only for the Bristol Bay side of the park. While the streams on the Pacific Coast also support salmon, the nature of the landscape is less accomodating for stream surveys, and the meadow survey procedure was determined to be safer and more effective in facilitating many observations with fewer flights.

Meadow surveys were conducted in 2013 and 2014 for Swikshak, Katmai Bay, and Hallo Bay sedge meadows. In order to learn how to make sure these surveys are most effective, the NPS will be conducting the surveys at different times of day and multiple points during the summer to identify patterns of bear activity that allow the surveys to be conducted in a manner that generates the most consistent data possible.

An initial summary of stream survey data over the past forty years indicates a 20 year cycle of bear activity, with current activity levels along the counted streams near a low point of the cycle.

NPS

Sedges are high in protein and provide important early season food for coastal brown bears. Katmai's coastal sedge meadows provide opportunities for visitors to view bears, such as these two cubs.

American Dipper Survey in the Katmai Preserve

NPS/ S.Anderson

Biological Science Technicians inflate rafts on Kukaklek Lake in preparation for Nanuktuk Creek surveys. One American Dipper was recorded on the creek during the June 6, 2014 survey.

The American Dipper *(Cinclus mexicanus)* is one of a few avian species that is a year-round resident of southwest Alaska. Dippers use clear, fast moving streams and rivers during their breeding season and migrate to open water areas in the streams during the winter. Very little time is spent away from the water and this species does not make long distance flights over land. The American dipper's diet consists of a wide variety of aquatic invertebrates and fish. Salmon presence in streams benefits dippers in two ways. First, dippers are known to feed directly on salmon and their eggs. Secondly, salmon carcasses have been shown to increase the number of macro invertebrates, important food for dippers.

Dipper dependence on aquatic food sources and the fact that they do not migrate makes them excellent indicators of stream habitat condition. Dippers are also vulnerable to land management practices such as pollution, road building, deforestation and mining. Factors that compromise the health of a stream have been shown to destroy dipper habitat, decrease dipper population, and can directly kill the birds.

The Bristol Bay watershed supports the largest sockeye salmon fishery in the world. Six major river basins flow into Bristol Bay. Mining development has been proposed in some of these watersheds.

This study provided vital baseline data on the American Dipper in Katmai Preserve. If mining operations begin, this study will provide a baseline to document any effects with subsequent surveys in the future. Seven rivers and streams were surveyed and locations of dippers were recorded and mapped. A total of 27 dippers were recorded on five of the seven rivers. If mining operations begin, similar surveys will be performed on the same seven rivers to record any changes to the dipper populations. With dippers being an indicator species of stream habitat, this survey will help future resource managers determine effects on the environment from mining operations.

FWS

American Dippers feed primarily on aquatic invertebrates in fast-moving rivers and streams, and therefore are good indicators of stream health.

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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.

Katmai National Park & Preserve, Aniakchak National Monument & Preserve, and Alagnak Wild River

Katmai National Park was originally established as a monument in 1918 to preserve the Valley of Ten Thousand Smokes, created by the 1912 eruption of Novarupta. Since its creation, Katmai has undergone many expansions to preserve and protect the resources within this region. In 1931, the monument was expanded to protect brown bear, moose and other wildlife. In 1942, islands within five miles of the shoreline in the Shelikof Strait were added to protect marine mammals resting on the islands. The boundary was expanded in 1969 to include all of Naknek Lake. Another 1.4 million acres were added in 1978 to protect brown bear habitat and watersheds vital to red salmon spawning. In 1980, the Alaska National Interest Lands Conservation Act (ANILCA) redesignated 3.7 million acres as Katmai National Park and an additional 308, 000 acres as Katmai National Preserve.

Aniakchak National Monument was established in 1978 to preserve the Aniakchak caldera and its associated landscape, including the Aniakchak River and other lakes and streams, in their natural state. It was also created to assure continuation of the natural process of biological succession; and to protect brown bears, moose, caribou, sea lions, seals, and other marine mammals, geese, swans, and other waterfowl. It was redesignated as a Monument and Preserve in 1980 under ANILCA. The area is one of the least visited areas in the National Park System because of poor weather conditions typically hindering access.

Alagnak Wild River was established in 1980 through ANILCA to preserve the free–flowing condition of the river.