



# Resource Management 2018



Wolves on the Valley of Ten Thousand Smokes Road in Katmai National Park. Photo credit: A. Ramos

Each summer, National Park staff working in Katmai National Park and Preserve, Aniakchak National Monument and Preserve, and the Alagnak Wild River, spend time in the field to study, inventory, and monitor cultural and natural resources. Summer is the time to do it: rivers are flowing, wildlife is active and study sites are accessible. With more than 4.73 million acres between the three park units, this is a busy time of year.

Resource Management falls under three main groups: cultural resources, natural resources, and inventory & monitoring. The cultural resource program involves archeology and anthropology and focuses on the history of human occupation in the region. The natural resource program studies biological and physical resources, such as wildlife, fish, plants, wilderness, and backcountry resources. The third group, inventory and monitoring, is part of a National Park Service effort to understand the status of the park's natural resources. The Southwest Alaska Network (SWAN) Inventory and Monitoring Program cooperates with the park to conduct various surveys to understand how park resources may change over time.

Throughout this field season, look for project and research updates on our website ([www.nps.gov/katm](http://www.nps.gov/katm)), Facebook page, and through the explore.org Katmai bear cams. We hope that you enjoy reading about the many projects occurring in these remarkable parklands. See you in the field!

## Research Permits

In addition to work conducted by NPS staff, external researchers come to the parklands to conduct a wide array of studies. Projects include investigations of the ongoing volcanism in the area, climate, wildlife ecology, and contaminant accumulation. The diversity of work helps to answer local management questions as well as those of greater interest to science. The parks are a vibrant, living laboratory.



This year marks the 100th anniversary of Katmai National Park!  
To find out more about centennial events please visit  
<https://www.nps.gov/katm/planyourvisit/2018-centennial.htm>

## Savonoski Ethnographic and Archeological Survey

2017 saw the first year of fieldwork on the Savonoski Archeological and Ethnographic Survey, a collaborative project between UAF-Museum of the North and Katmai National Park. The mission included reconnaissance of high probability landforms that led to the discovery of three new sites dating to the pre-contact and historic periods, as well as updated mapping of new features at previously known sites along the Grosvenor River and confluence area. The 2018 season will include survey of Ninagiak drainage and Hallo Bay as well as the lower Savonoski and Uyak confluence areas. For more information, contact Linda Chisholm (907-246-2154 or linda\_chisholm@nps.gov)

**Photo: The Savonoski River in Katmai National Park and archeological items.**



## Following in the Footsteps of the National Geographic Society's Original Katmai Expeditions



**The Valley of Ten Thousand Smokes, Katmai National Park.**

Approximately one century ago (1915-1919), the National Geographic Society sponsored four expeditions to the Alaska Peninsula to study the environmental impacts of the 1912 Novarupta volcanic event, the largest of its kind to occur during the 20th century, and the second largest to occur within recorded human history. The expeditions, led by Ohio State University botanist Prof. Robert F. Griggs, would ultimately lead President Woodrow Wilson to declare Katmai a National Monument in September of 1918. This summer, an interdisciplinary team co-sponsored by the National Geographic Explorers Grant, Penn State doctoral candidate Laura Stelson, and the park—including archeologists, natural resource specialists, interpretative volunteers, and a photojournalist—will traverse the historic NGS expedition route to evaluate Griggs' campsites to the National Register of Historic Places; record botanical succession data; and assess potential threats or impacts to future site preservation and interpretation.

The photojournalist will focus on the collection of photos and video footage that draw parallels to the work and experiences of the explorers of the historic expedition and convey the impacts of a century of change on the landscape itself. These 2 Resource Management Newsmaterials would serve in the creation of a short film, a virtual story map of sights and locations significant to the original expedition, as well as new interpretative materials for park visitors, general audiences, and educational applications. For more information, contact Linda Chisholm (907-246-2154 or linda\_chisholm@nps.gov).

### South Naknek <NN> Cannery History Project

The park and Alaska Region Cultural Resource programs will continue staff support of this ground-breaking collaboration between the Alaska Association for Historic Preservation, Tundra Vision: Public History Consultants, and Trident Seafoods. The industrial landscape of the 128-year old <NN> Cannery is a physical reminder of the deep economic and social ties between the South Naknek-Naknek-King Salmon villages and the bountiful salmon resources borne from Katmai's natal streams and watersheds. For more information, please visit <https://nncanneryproject.com>.

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## Nutritional and Landscape Ecology of Brown Bears on the Katmai Coast

The Changing Tides project is in the process of summarizing the findings from habitat, diet, and behavioral data collected over the last three summers. Though they're still waiting on some laboratory results before the data can be properly summarized, some trends are emerging.

For example, researchers have been able to plot the stable isotope values, which serve as identifying markers, of collared bears along with potential food items and use statistical models to determine the proportion of food items the bears might have eaten. Preliminary results suggest coastal Katmai bears in early summer (June) are consuming approximately 98% vegetation, 1% clams, and 1% flounder during that time. However, when researchers plot the later season diet after salmon have arrived, the proportion of foods in bears' diet differs markedly. In the later season (September), values reflect a stronger reliance on salmon resources, but also show that all bears are not consuming salmon equally. The statistical model shows that, on average, the bear population is consuming approximately 47% vegetation and 53% salmon, but that the degree of salmon consumption by individual bears ranges from 19-93%.

The use of intertidal food resources (clams, flounder) by coastal bears was a main interest to researchers in this study, but interestingly, the stable isotope results and statistical model output do not show significant use of intertidal food resources (clams, flounder) by bears in either season. Researchers will continue to summarize the remainder of their findings and look forward to sharing them as soon as they are available.



Preliminary results suggest coastal Katmai brown bear diet consists of approximately 98% vegetation in early summer (June).



Preliminary results suggest coastal Katmai brown bear diet consists on average of approximately 53% salmon, with salmon consumption by individual bears ranging from 19-93%.

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## A Genomic Perspective on Katmai's Brown Bears



NPS Ranger and researcher Michael Saxton works to set hair snares to collect brown bear hair samples.

Katmai is home to one of the densest and most well-known populations of brown bears on the planet, but our understanding of the population connectivity is limited. The Aleutian mountain range bisects the park and reduced food resources in the mountains may limit bear movement and restrict gene flow. In 2016, park biologists began a study that uses genetics to shed light on gene flow throughout the Park and Preserve. This information will help to illuminate movement patterns of bears and help us understand how bears are connected across the park. By collecting samples from along the coast and at various locations in the interior of the park, biologists will be able to analyze gene flow and determine if bears are consistently crossing the mountain range between the coast and interior regions. In 2017 sampling continued and expanded to new locations, and researchers began extracting DNA from samples. Logistical challenges prevented biologists from reaching some locations in 2017, so they will continue collecting samples this year, focusing on samples from the southern coast and Brooks Camp. The use of biopsy darts at Brooks Camp allows researchers to visually identify bears as they are sampled. With this information, they will be able to construct a pedigree of the local population and evaluate the level of genetic diversity in the Brooks bears. The information gained from this study will provide valuable insight into the health of the population and help inform management decisions that impact these amazing animals.

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## Invasive Plant Management

Invasive and exotic plants are considered the second greatest threat to biodiversity after habitat loss. They display rapid growth, spread with little or no human assistance, and are expensive to remove and difficult to control once established. In Katmai, we are working to prevent the establishment and expansion of exotic and invasive plants.

In 2017, the field work for the Exotic Plant Management Team (EPMT) was carried out from June through September. In August, a six person Student Conservation Association crew assisted with manual control at Brooks Camp. Fieldwork involved invasive plant surveys and control work in areas of high visitor use. Priority locations for control work included Lake Camp, Brooks Camp, Valley of Ten Thousand Smokes Road, Fure's Cabin, Nonvianuk Ranger Cabin and boat landing, the Battle River Wilderness Retreat inholding, and the NPS administered property in King Salmon. Surveys were conducted at several locations including the Kulik Lodge and airstrip, Royal Wolf Lodge, the east end of Kulik Lake, Kamishak River, and Contact Creek airstrip.

Chemical treatment was carried out at Lake Camp, Brooks Camp, Fure's Cabin, Nonvianuk Ranger Cabin, Battle River Wilderness Retreat, and NPS administered property in King Salmon targeting common dandelions and sheep sorrel (Lake Camp only). Manual control methods were used on all other invasive plants found.

In August the EPMT assisted with surveys for the aquatic invasive Elodea at popular float plane destinations within the park. Pike Lake and Crosswinds Lake as well as high traffic areas along Naknek River, Naknek Lake, Brooks Lake, Lake



An SCA intern performs exotic plant management field work in Katmai.

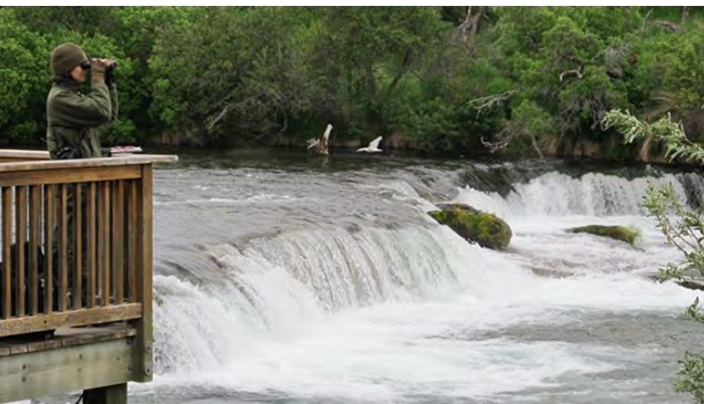
Grosvenor, Lake Coville, American Creek, Nonvianuk Lake, Mirror Lake, and the float plane drop off for Funnel Creek were sampled for Elodea. Elodea was not found in the park.

In 2018, the EPMT will plan to visit many of the same sites as in 2017 and continue chemical and manual treatment for invasive plant species. The EPMT plans to survey and map new backcountry areas as well as assist the USFWS with control work on lands adjacent to the park.

For further information on invasive plants in Katmai National Park and Preserve, or to report a suspicious terrestrial or aquatic species, please contact the Exotic Plant Management Team at **907-246-2156**. Identification materials for both native and non-native species are available upon request to help visitors identify species in the field.

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## Monitoring Bears along Brooks River



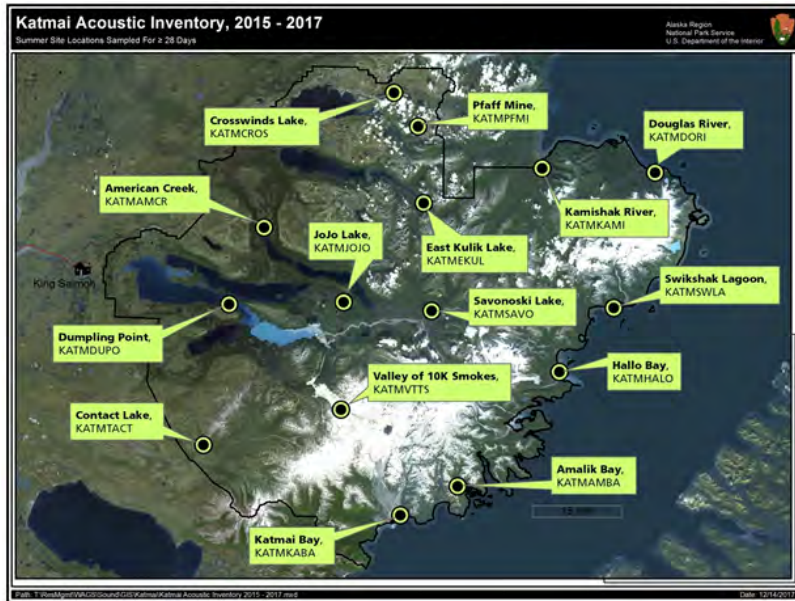
NPS Ranger and researcher Leslie Skora observes bears along the Brooks River.

Is the bear population at Brooks River in Katmai National Park in Alaska changing? Due to the high concentration of bears observable at Brooks River, this location offers a unique and effective opportunity to view and count bears without using invasive and costly techniques such as collaring.

For over 20 years, park biologists have monitored the number of bears feeding at Brooks River during the salmon run. Individual bears can be recognized using physical and behavioral characteristics. Individually identifiable bears are assigned three-digit identification numbers in an effort to track the number of individuals using the river from season to season and year to year. New or unidentifiable bears are assigned new numbers each year.

With this information, the park can monitor the number of bears using the river each season and how that number has changed through time. Research has begun to model how these counts of individual bears reflect the actual bear population within the area, as well as to calculate survival rates and factors that might affect the number of bears returning each year. A better understanding of how the bear population fluctuates can provide insight into the overall health of the surrounding ecosystem and provide information on how bear populations regulate themselves and how they may be affected by environmental changes.

## Katmai Acoustic Inventory Completed in 2017



Katmai Acoustic Inventory, 2015 – 2017. One-month measurements were made at each location shown on the map. Sites sampled in 2017 were Amalik Bay, Contact Lake, Crosswinds Lake, East Kulik Lake, Kamishak River, and Savonoski Lake.

As the fifth largest area of designated Wilderness in the nation, Katmai must preserve wilderness character for the public at a vast scale. Two qualities of wilderness character – naturalness and solitude – are experienced directly through an animal’s sense of hearing.

The acoustic environment, then, is a valuable resource to Katmai.

It preserves the natural ability of animals to communicate and to utilize their preferred habitat without stress. Impacts to acoustic environments affect the balance of predator-prey relationships as well as community-level biodiversity. For years Alaska’s rich heritage of natural quietude has allowed visitors and locals alike to appreciate and connect with the grand, remote, rugged Katmai landscape and the organisms that call it home.

Katmai’s acoustic inventory aims to preserve that experience. From 2015 – 2017 the park collected measurements and audio recordings of its acoustic environment. These baseline documents provide an objective basis from which to measure changes to the resource. Data were collected at fifteen site locations spread across the park, and will be used to inform Katmai’s Wilderness Stewardship and Backcountry Management planning process.

For more information on natural sounds research in the National Park Service go to:

<http://www.nature.nps.gov/sound/index.cfm>  
or Davyd Betchkal at Davyd\_Betchkal@nps.gov

## The Dinosaurs of Aniakchak National Monument



Dr. Yoshitsugu Kobayashi and Tomonori Tanaka, both of Hokkaido University, measuring duck-billed dinosaur footprints on a bedding plane.

In 2001 the discovery of the first dinosaur footprint occurred in Aniakchak National Monument, which was also the first record of a dinosaur in any NPS unit in Alaska. In 2002 there was the discovery of an additional two more dinosaur footprints. All three of these tracks could be attributed to duck-billed dinosaurs.

In 2016, 31 tracks were found in the park and in 2017, an additional 35 tracks were discovered. Most of the combined record of tracks now found in Aniakchak can be attributed to plant-eating duck-billed dinosaurs. The tracks range in size from those made by likely full-grown adults to juveniles. Rare tracks attributable to armored dinosaurs are also known from the new localities. In addition to the previous documented occurrences of these two dinosaurs, as well as a fish-fin swimming trace made when the fish was skirting the river bottom, in 2017 the paleontology team also found tracks attributable to a crane-sized bird and a medium-sized meat-eating dinosaur. The large bird tracks are like the tracks previous described from Denali National Park, *Magnavipes denaliensis*. The meat-eating dinosaur track was made by a predatory dinosaur approximately 6-7 m long, about the size of *Nanuqsaurus*, the tyrannosaurid known from bones from the North Slope.

The rocks containing the dinosaur footprints found in Aniakchak largely represent rivers and floodplains. Multiple fossil forest horizons have also been found and the presence of leaves of cf. *Metasequoia* (Dawn Redwood) suggest that this tree was an important canopy species.

This summer’s activities will continue the study of the dinosaurs of Aniakchak by additional reconnaissance of rock exposures, as well as using a drone to capture images of these exposures at larger scales.

## Wilderness Visitor Use Study

This summer data collection begins for a multi-year project designed to assist in the development of a wilderness backcountry management plan for Katmai National Park and Preserve and future planning efforts at Lake Clark National Park and Preserve. The work is being led by Drs. Jeffrey Skibins and Ryan Sharp at Kansas State University, Dr. Matt Brownlee at Clemson University, and Dr. Charles Robbins at Washington State University. Our multi-disciplinary team will be studying the visitor experience, social and natural impacts, and bear ecology. By collecting social and ecological data, our goal is to better understand how visitor interests align with bears' needs.

Our study will collect data from interviews, surveys, and GPS sources, and remote cameras to create a more holistic understanding of how visitors experience the park, which activities they participated in, and what type of bear viewing experience they may have had. This is referred to as a mixed-methods study. Mixed-methods studies enhance the strength, reliability, and validity of findings because they facilitate the inclusion and presentation of a greater diversity of viewpoints and data sets. A visitor study conducted in 2014 identified some key trends in visitation, but greater clarity is required, especially as it pertains to bear viewing outside of the Brooks Camp region. Our goal is to provide data that will contribute to the ongoing provision of high quality visitor experiences and long-term brown bear conservation efforts at Katmai and Lake Clark.



Remote cameras like the one pictured will be set up in coastal locations this summer to document bear activity patterns.

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## Other Natural Resources Programs for 2018

### • National Oceanic and Atmospheric Administration (NOAA) standing stock survey

We will continue long-term marine debris monitoring to document type and density of debris wash-up. Coastal sites include Swikshak Bay, Hallo Bay, Dakavak Bay and Aniakchak National Monument.

### • Coastal Observation and Seabird Survey Team (COASST) surveys

In a partnership with the University of Washington we will continue to monitor Swikshak and Hallo Bays to document seabird mortality (count and identify beached birds). This will provide us with baseline data so that we may better understand the effects of environmental stressors such as changing climate, severe winters, and oil spills on seabird species.

### • Seabird Colony and Marine Mammal Haul-out Mapping

We will continue a seabird colony and marine mammal haul-out inventory on the northern Katmai Coast. Updated information on colony and haul-out locations will help us to better understand population sizes and species use along coast.

### • Stream and Meadow Surveys

Aerial bear surveys are flown over coastal meadows (June) and select salmon streams (July and August) at regular intervals to document bear use at these important seasonal foraging areas.

### • Backcountry Impacts Monitoring

Rangers will continue to collect field data including photos and GPS locations to document human impacts (evidence of camping, etc.) in the backcountry.

### • Spatial Data Collection

Park GIS specialists will opportunistically collect GPS locations to geo-reference aerial photos and to update the Alaska Region database of buildings and installations.

### • Statewide Digital Mapping Initiative

A contractor for the State of Alaska will collect coordinates from a few locations in Katmai as a control for digital maps produced from aerial photography.



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