

Denali National Park and Preserve Wildlife Updates August 2020

Bear Monitoring - No field work, data analysis continues, no update

The objective of this study is to document the ecology of grizzly bears and their movements on the northeast portion of the park, especially outside the north park boundary where they may be subject to legal harvest and possible future intensive management efforts by the State of Alaska.

Radio telemetry efforts so far in this area have shown that grizzly bears initially encountered within the park spend some portion of their lives outside the park boundary. These data were acquired from GPS radio collars that were deployed on bears in 2013 and released in 2015. Every year since then a small number of new collars have been deployed each May on new bears or previously collared bears, to replace aging equipment. 2019 was the last year of funding for this study, no more new collars will be deployed. Data will continue to be gathered from the remaining collars until the last ones release in September 2022. Preliminary analysis of location data collected so far showed that of the 42 bears for which there are data, 23 (54%) went outside the park at least once during monitoring. Of those, 8 had minimal locations outside the park, while 15 made more extensive forays. Thus 36% of bears spent considerable time outside the park. Location data will continue to be mapped as data are collected. Full analysis of the data will be completed after September 2022 when the last of the collars are programmed to release.

Bear DNA Citizen Science Study – No field work due to Covid-19, field worked planned to pick up again in 2021, no update

Denali National Park and Preserve (Denali) currently receives over 600,000 person days of visitor use per year in an area with grizzly bear (*Ursus arctos*) densities as high as 32 bears/1000km². The population of grizzly bears in the park appears to be stable. As visitation to Denali continues to increase, human/bear conflict will likely follow suit. In Denali, many people have the opportunity to observe grizzly bears in their natural environment. The park provides an invaluable opportunity for the public and fosters an appreciation and understanding of bears.

The current bear density estimate originates from a predator/prey study conducted during the early 1990's. For many reasons (paucity and senescence of data, methods for density estimation, and study area) the current bear density estimate is somewhat irrelevant to bear management as it pertains to human/bear conflict. Bear density estimates are notoriously difficult and expensive to conduct for a number of reasons. The Bear DNA Study aims to develop an accurate, robust and spatially explicit capture recapture bear density estimate, while at the same time engaging our visiting public.

During the summer season of 2018, scat samples were collected for approximately eight weeks. During that time, 105 collection kits were distributed to 138 participants. Although the study was open for anyone to participate, sampling by employees accounted for less than 1% of participants; 99% were park visitors. Citizen scientists collected 165 samples, with collection rates varying from zero to five samples collected per kit. Citizen scientists spent nearly 9,000 hours afield collecting samples, covering over 670 miles. Of the samples collected in 2018, 106 samples were submitted for genetic analysis. Samples were hierarchically tested for species, sex, and individual identification. Eighty-two samples were identified as brown bear, two as black bear, two as not bear, and 20 could not be identified to species. Twenty-five samples were identified as female brown bear, 13 as male brown bear, and two as male black bear. In total 32 individual bears were identified.

During the summer season of 2019, samples were collected for approximately eight weeks. Anecdotally, DNA is more easily extracted from brown bear scat samples when the bears are feeding on berries, for that reason the sampling period was selected to coincide with the berry season. During that time 161

collection kits were distributed to 214 participants. The number of participants increased by 55% in 2019. Although the study was open for anyone to participate, similar to the previous season participation by employees accounted for just over 1%; 99% of participants were park visitors. Citizen scientists collected 272 samples a 65% increase from the previous season, with collection rates varying from zero to five samples collected per kit. Of the 272 samples collected 235 were determined “good for analysis”, meaning that the samples appear to be good, and had accompanying accurate spatial data. A selection of samples from the 2019 field season were sent for DNA analysis in the spring of 2020, results are pending. Field work planned to pick up again in 2021.

The Denali Bear DNA study has undoubtedly helped foster a relationship between Denali National Park and Preserve and the visiting public. It gives the visiting public a way to participate in the stewardship of their national park, and an opportunity to connect to the place in a way that furthers the mission of National Park Service. The Bear DNA study is continuing through the Summer 2020 season with ongoing sample collection and laboratory analysis.

Bear Management

Denali’s Wildlife Management program strives to educate visitors about how to recreate in areas where bears are present. Tracking interactions between bears and people is organized in the Bear Human Incident Management System (BHIMS). This system provides a way for people to report their interactions with bears and for wildlife staff to rate the severity of those interactions and track patterns. Interactions are divided into back- and front-country locations and fall into three basic categories: observation (seeing a bear), encounter (close proximity, bear aware of people), and incident (bear charge, physical contact with person or property, bear getting human food).

2020 started off with detection of major break ins by a bear in the Kantishna and Wonder lake areas in May. The bear had broken into lodges and NPS cabins and trailer full of dog and human food. Efforts to catch the bear at that time were unsuccessful and by mid June the bear was no longer detected in the area. In early September the bear returned and broke into at least 2 properties. Due to the extent of damage done and the amount of food acquired by the bear, the decision was made to remove the bear if it were captured. In late September the bear was captured in a culvert trap after it broke into two lodges and was euthanized. Efforts have been made to educate users of the area to improve security of properties to make them more bear resistant and prevent any similar situations in the future.

A bear frequenting the Savage river area most of the summer was reported showing aggression to visitors in this heavily used area. In early August, the bear was captured and radio collared. A technique called “hard release on site” was used to deter the bear from continuing to frequent the area. The bear moved out of the area after release and has been mostly staying away since that time. Satellite telemetry deployed on this bear provides location information when the bear is in areas where it cannot be visually detected or radio tracked from the ground.

Private vehicle weekends on the Park road and Road Lottery provided much opportunity for bear viewing along the Park road. Managing people at bear jams pushed staff to the limit of their capacity and fortunately no serious incidents occurred.

Moose Monitoring (no change from Oct 2019 update). Moose monitoring surveys are on hold for 2020.

Denali receives funding for moose monitoring every third year from the Central Alaska Monitoring

Network. These funds are then matched with park funds to conduct a moose survey on the north side of the park. Denali conducted this north side survey in fall 2017. The survey area covers all areas within the park on the north side of the Alaska Range Mountains.

Occasionally in years in between Denali receives funding from the NPS Subsistence Advisory Committee for surveys in areas of particular interest to subsistence users. In fall 2018, funding was provided to survey a study area near Cantwell. This area was last surveyed in 2013. The area is small enough that all units can be counted thus resulting in a reliable census of moose in the area.

Sufficient snow and reasonable weather conditions allowed us to conduct the survey between December 4 and 14. Results are as follows:

- Total units sampled = 66
- Total area sampled = 395 mi²
- Total moose counted = 509 (49 calves, 139 bulls, 321 cows)
- Density = 1.3 moose/mi²
- Calf:Bull:Cow ratio = 15:43:100

The total number of moose and density are up from the 2013 survey (total count = 360, .91 moose /mi²) while the calf:bull:cow ratio is similar to 2013 (15:53:100).

Denali is scheduled to receive funding for a full north side moose survey again in fall 2020. Given adequate conditions the survey will be conducted in November/early December.

Caribou Monitoring - Caribou monitoring field work was conducted in 2020. Annual reports of caribou monitoring are completed in March of each year for the previous year.

This report summarizes research and monitoring of the Denali Caribou Herd conducted during October 2018-September 2019. During this period, the specific objectives included:

1. Estimate the population size and composition in late September each year;
2. Determine productivity, survival patterns and age structure of adult females;
3. Assess calf production and recruitment;
5. Relate caribou population status, trends, and vital rates to climatic variables and predator population characteristics.

Herd size estimate of 3,050 caribou for September 2019. This number is a modest decline in the herd estimate from the previous year, resulting largely from a lower bull:cow ratio and thus fewer bulls estimated in the herd. The decline noted is also consistent with reduced adult female survival and calf recruitment noted during the year.

The adult sex ratio is 37 bulls: 100 cows. Adult sex ratios declined from an average of 56:100 during 1984-1989 to a low of 29:100 during 1997-1998 as a result of increased mortality of males during severe winters in the late 1980s and early 1990s, along with very low recruitment of calves. Bull:cow ratios increased slowly from 1998 to 2010, and have averaged 42:100 since then.

During the mid-June 2019 post calving surveys, we noted 24 calves:100 cows; by 1 October, that ratio had declined to 15:100, lower than the average during 2004–2017 (22:100). Based on these measures of calf production and survival, and accounting for adult female survival between mid-May and late September, survival to fall was estimated at 19% for 2019 calves. Fall calf survival averaged 28% during 2004–2017, compared to 42% and 15% during 1987–1990 and 1991–2003, respectively. Calf recruitment

during the last 2 years (19%) may indicate a notable reduction in recruitment.

During October 2018–September 2019, the estimated annual mortality rate was 9% for adult females, comparable to the long-term study average of 11% (range of annual values = 2–23%), and higher than rates for the last 5 years (mean = 5%; range 4–8%). Females \geq 13 years old made up 6% of the population in May 2019, declining from a peak of 22% in 2008. It is expected that the proportion consisting of these older females should stabilize at about current levels barring some major change in herd demography.

Based on data collected from radiocollared females during October 1986–September 2013, age-specific survival rates of females tend to be generally high for 2- to 7-year-olds, averaging 0.94, then decline slowly during 8–13 years of age prior to declining markedly as individuals become senescent. The 2 oldest caribou females we have monitored died in May as they turned an estimated 20 years old.

Sheep Surveys

Ground-based Dall's sheep surveys have been conducted annually along the Denali National Park Road corridor from 2008 to 2019. Areas surveyed vary slightly from year to year depending on weather conditions and information gathered from aerial overflights. The number of sheep observed and classified has ranged from 41 to 242 sheep each year.

Estimates of sheep productivity ranged from 3.1 (2013) to 50.0 (2016) lambs per 100 ewe-like sheep (including yearlings). Ground surveys in 2020 were suspended due to Covid-19.

In 2020, an aerial survey was conducted using distance sampling methods. The survey was conducted throughout sheep habitat north of the Alaska Range. This survey is conducted along transect lines, as opposed to a minimum count method. The survey was conducted over three days and 86 transects were completed. A total of 154 sheep were counted on transect with 331 sheep in total (including sheep seen on and off transect). The preliminary ewe to lamb ratio was 19 lambs: 100 ewe-like sheep.

Wolf Monitoring

From April 1, 2019 to March 31, 2020, 68 wolves were monitored in 12 groups for a mean pack size of 5.7 wolves. March capture efforts were cut short by Covid-19. Visit Denali's wolf webpage for more data and information. <https://www.nps.gov/dena/learn/nature/wolves.htm>

Alpine Wildlife Project (no change from Oct 2019 update)

In 2019, researchers conducted visual and acoustic surveys at 45 different locations and installed 17 cameras throughout Denali National Park and Preserve to map the distributions of several key alpine vertebrates on the landscape: collared pikas, arctic ground squirrels, hoary marmots, dall sheep, and ptarmigans. Data from these surveys will enable researchers to predict how these species will respond to changing abiotic and biotic habitat conditions. Survey efforts were suspended in 2020 due to Covid-19. Field work will continue in 2021 with plans to add a citizen science program to engage park visitors in the process of ecological science, while contributing data that can be used to address the study objectives.

A summary of ongoing bird-related projects in Denali National Park and Preserve for 2020 – many of the projects were suspended in 202 due to Civid-19 and planned to resume in 2021

Please contact Carol McIntyre, Denali wildlife biologist, if you have any questions about any of these programs, projects or studies. Carol_McIntyre@nps.gov, 907-455-0671

1. Programs, Projects and Studies led by NPS scientists

Details and results of most of these can be found on Denali's website at:

<https://www.nps.gov/dena/learn/nature/birds.htm>

- *Monitoring golden eagle and gyrfalcons territory occupancy and reproductive success (1988-present):* We annually collect data to document trends in occupancy and reproduction at approximately 90 golden eagle and 15 gyrfalcon territories in the northeastern portion of Denali. We analyze these data to identify trends in occupancy and reproduction and the mechanisms driving them. This project is a component of the NPS Central Alaska Network monitoring program. Carol McIntyre, Denali wildlife biologist, is the project leader.
- *Quantifying annual cycle movements of golden eagles raised in Denali (1997 to present):* We track the year round movements of a sample of golden eagles raised in Denali to quantify the areas they use throughout the year and identify sources of mortality. A recent mortality in January 2020 was due to lead toxicosis. Lead poisoning is a significant source of mortality for golden eagles in the United States. In this project, we use small lightweight solar-powered satellite transmitters to track movements. This is a collaborative study with NPS, US Fish and Wildlife, US Geological Survey, Alaska Department of Fish and Game, and Conservation Science Global, Inc. Carol McIntyre, Denali wildlife biologist, is the project leader.
- *Monitoring changes in occupancy and distribution of passerine birds (1992-present):* We collect data using a series of standardized surveys to document trends in occupancy and distribution of passerine birds in the northeast portion of Denali. We analyze the data to identify trends and the mechanisms driving them. This is a component of the NPS Central Alaska Network monitoring program. Carol McIntyre, Denali wildlife biologist, is the project leader. Jeremy Mizel, NPS quantitative ecologist, oversees the sampling design and data analysis for this project.
- *Critical Connections Program (2015-present):* We are developing annual cycle studies for a suite of passerine birds to identify the factors affecting their survival and reproductive success. This is a collaborative program with NPS and Biodiversity Research Institute. Other project participants include Smithsonian Migratory Connectivity Program and Indiana University. Carol McIntyre, Denali wildlife biologist, is the project leader.
- *Canada Jay Ecology study (2016-2020):* We quantified the nesting and foraging ecology of Canada Jays in a study area at the eastern end of the Denali Park Road. This was a collaborative study with NPS, University of Washington, and University of Guelph (Canada).
- *Youth-mentoring program (2017-2020):* We use bird-focused classroom and field-based activities with TriValley school students to teach them about the ecology of birds that live in the area. Emily Williams, Denali avian biologist, is the project leader.
- *Tracking population cycles of snowshoe hare and willow ptarmigan (1988 to present):* We collect data to track the population cycles of hares and willow ptarmigan. We collect the data while we are conducting the golden eagle and passerine bird surveys. We analyze the data to document trends, frequency and amplitude of hare and ptarmigan cycles. Carol McIntyre, Denali wildlife biologist, is the project leader. Josh Schmidt, quantitative ecologist for the NPS Central Alaska Network oversees the data analysis.
- *Minimizing injuries from window strikes in Denali (2017 to present):* We work closely with park staff to apply effective treatments to windows to minimize bird collisions that may cause injury or mortality. Emily Williams, Denali avian biologist, is the project leader.
- *Prevent bird injuries and fatalities at SST facilities (2017 to present):* We work with park staff to attach screens on SST (vault toilets) vents to prevent birds from flying down them. Emily Williams, Denali avian biologist, is the project lead. (A nice article about this project was featured in the July 2018 Ruralite).

2. Bird-related studies being conducted in Denali by other agencies or research groups

- *Monitoring population trends of ptarmigan in Alaska (2014 to present)*: Scientists annually collect data to track the population trends of willow and rock ptarmigan in Alaska. This study conducted by Alaska Department of Fish and Game. Rick Merizon, ADFG small game biologist, is the project leader.
- *Disease dynamics of migratory birds (2018, 2019, 2020)*: Scientists are quantifying annual cycle movements of American Robins and Dark-eyed Juncos and the presence of avian malaria, other diseases and parasites in these and other migratory species. The study is conducted by Environmental Resilience Institute, Indiana University. Dr. Alex Jahn, Indiana University research ecologist, is the project leader.

3. New projects for 2020 that were suspended due to Covid-19

- *Continuation of Trumpeter Swan surveys*. NPS personnel will conduct the surveys in Denali in 2020 to continue to document changes in abundance and distribution of nesting Trumpeter Swans.
- *Nesting ecology of shrub-nesting passerines (2020, 2021)*: This study focuses on the nesting ecology of a suite of common passerines such as White-crowned Sparrow and American Tree Sparrows. It will quantify the role of nest predators on nest success. Steve Matsuoka, research wildlife biologist, US Geological Survey, Alaska Science Center, and Carol McIntyre, wildlife biologist, Denali are project co-leaders.

Fish (no from Oct 2019 update)

A summary of fisheries work for 2018 through 2020 includes:

- A literature and program review. This document will review previous scientific research and fish observations to summarize what is known about fish in Denali. The report will review NPS management of fish resources and provide recommendations for the stewardship of fish and their habitat in the future. This report is currently in final draft form.
- Surveys on the West Fork Chulitna River to document the fish species present and to look for salmon. These surveys found that Dolly Varden and Slimy Sculpin were abundant but did not find salmon upstream of where they have been documented previously (Robert Piorkowski, a Denali backcountry ranger out on patrol in 1979, observed spawning Chum Salmon approximately 370 meters upstream of the park boundary).
- Inspection of park road culverts for fish passage status and recommendations for improvements.
- Ongoing surveys for Arctic Grayling on Eldorado Creek, near Kantishna. This project was originally to monitor possible Grayling responses to a small-scale mining operation approved by Denali in 2016. To date the surveys have found that Grayling are absent from an upstream portion of the creek that was highly productive in the past. Rather than implicating the current mining operation these results highlight the complex history of Eldorado Creek, and many possible causes for changes to Arctic Grayling habitat use.
- Fish habitat permit applications for vehicle crossings and culvert replacements