National Park Service
U.S. Department of the Interior

Denali National Park and Preserve

Wolf Monitoring 1986 - 2011

More than 360 wolves have been collared for monitoring since 1986. The information gathered from tracking wolves has provided information on wolf population size, diet, mortality, and movements outside the park.

In 1939...scarcely anything was known about the wolf's home life or his relationships to mountain sheep, caribou, moose, and other smaller species.
—Adolph Murie
A Naturalist in Alaska

On spring days in 1985, Denali employees found the skinned carcasses of seven wolves in remote parts of the park. The resource manager at the time, John Dalle-Molle, concerned that little was known about the park's wolves, decided that a radio-collaring study of wolves would reveal how widespread such aerial poaching was, what caused most wolf mortality, and how commonly wolves traveled beyond park boundaries.

Researchers L. David Mech and Layne Adams (both now with the U. S. Geological Survey) initiated a wolf collaring project in early 1986. For the last 25 years, the effort has continued, with field work headed up by John Burch, Tom Meier, and Layne Adams at various times.

More than 360 wolves have been captured and collared. Collared wolves are monitored from antenna-equipped Supercub aircraft about twice per month. In recent years, wolf locations have also been monitored with GPS/ARGOS collars that determine a wolf's location once each day and upload the data through the ARGOS satellite system.

Wolf numbers

Each year in late winter, biologists produce a map of wolf pack territories from the telemetry data, and estimate the density and numbers of wolves in the park (see lower map on reverse). At the start of the study in 1986, wolf density in the park was very low. A series of mild winters had made it difficult for wolf packs to obtain food in winter, and poaching may also have lowered wolf numbers. A series of deep-snow winters benefited the wolf population, and numbers increased rapidly as many wolves were born and survived, and few left their packs. One pack, the East Fork Pack, increased from 6 to 29 wolves in three years. Since then, the density of wolves in the park has fluctuated between 3.1 and 9.8 wolves per 1000 square kilometers (8.0 to 25.4 per 1000 square miles), a low density when compared to more temperate climates with more abundant food.

Wolf food habits

Following collared wolves has provided an opportunity to learn a great deal about wolf diets. When biologists locate wolves, they often find them interacting with prey animals or feeding on kills.

Researchers visited more than 850 kill sites between 1986 and 1993, to learn what prey animals wolves were selecting. Among the results: Wolves kill many very young animals (moose and caribou calves, Dall sheep lambs), many older animals, but few young adults of the three major prey species. In winters without much snow, wolves feed mainly on moose, which make up the largest share of food available in the park. In winters with deep snow, wolves kill more caribou. Some wolf packs learn locations and techniques for killing Dall's sheep and obtain a large portion of their diet from them.

Photo by Lucy Tyrrell

Biologists collar two or three wolves from each pack to maintain accurate estimates of population size (upper photo).

Observers in a plane can pick up the radio signal from collared wolves and are able to count other nearby wolves, and learn wolf food habits.

This alpha female, seen near the park road scanning a rock outcrop (hunting for sheep), is wearing a GPS collar that signals a location daily.

Denali's wolves, like wolves everywhere, rely mostly on ungulates (hoofed animals) for their food, but also have other important food sources, including beavers in summer, snowshoe hares when they are plentiful, and, most surprisingly, salmon.

Three species of salmon are found in the park, having traveled more than 1000 miles from the ocean to spawn here. Dr. Adams has calculated that chum salmon alone contribute as much biomass of potential food to the northwestern areas of Denali each year, as the mass of ungulates (moose and caribou) that live there.

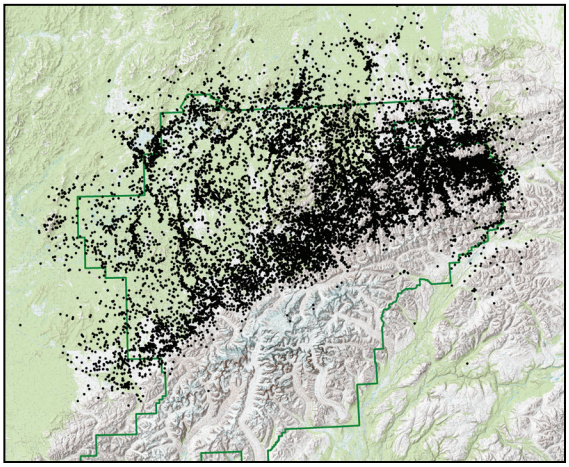
Areas of upwelling where rivers remain open in winter provide predictable sources of dead salmon for a wide variety of birds and mammals, including wolves. Some of the concentrations of wolf locations in remote parts of the park are at such areas. Salmon carcasses may be a food of last resort for starving wolves. It is common to find packs and individual wolves traveling long distances to get to salmon springs and to find wolves being killed by other wolves as packs interact there.

Mortality of collared wolves

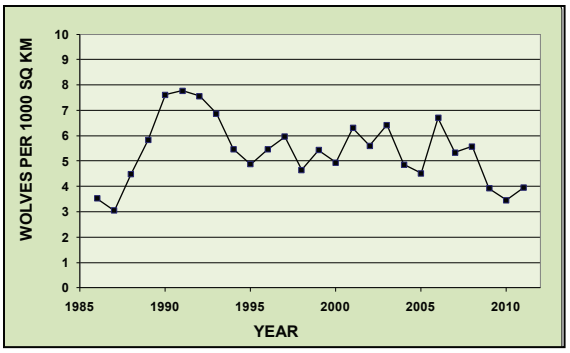
Denali is one of the few areas in the world where humans are not the primary cause of wolf mortality. Of 190 collared wolves that have died, about 20% were killed by humans (mostly legal harvest when they ventured outside park boundaries). At least 40% were killed by neighboring wolf packs, generally in winter when packs roam beyond their usual territories. Another 40% died of natural causes. Many of these wolves were too decomposed or consumed to determine the cause of death, but some were undoubtedly also killed by wolves. Other known causes of natural mortality include avalanche, starvation, drowning, old age, and disease.

Wolf management

Wolf monitoring has had many benefits for park management, including achieving the original goal of assessing the causes of wolf mortality and the degree to which park wolves travel outside the park boundary. Another benefit has been knowledge of where active wolf dens and rendezvous site are, so that closures can be created to protect wolf pups from human interference. The wolf management goal is to maintain natural and healthy wolf populations where predator/prey systems are intact. Wolf numbers and distribution has been identified as a vital sign for long-term monitoring by the Central Alaska Network Monitoring Program.



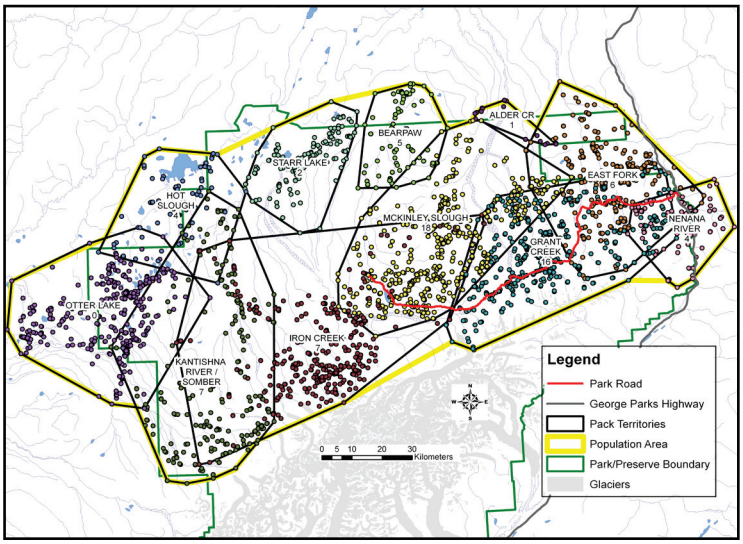
A map of over 21,000 wolf locations from the study. Areas where wolves are more likely to be found (concentrated wolf locations) might be dens, travel routes, or predictable food sources.



Estimate of Denali wolf population 1986 to 2011.

NPS photo by Kent Miller

Monitoring wolves results in information about den and rendezvous sites, so park managers can post wildlife closures to protect pups from human interference.



A map showing wolf pack territories or home ranges (black lines) within the population area monitored (yellow) based on telemetry locations April 2010 to April 2011. Numbers are pack sizes in spring 2011. Black dots indicate locations of collared wolves.

For more information

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