

Wolf Monitoring

By Steve Arthur

Denali National Park and Preserve's wolves have been studied by researchers since 1939. Population estimates were not very accurate until 1986, when a large-scale wolf research project was initiated by David Mech and others. This project provided basic information necessary for effective wolf management. The current monitoring program consists of maintaining one or two radio-collared wolves in each known pack inhabiting the park north of the Alaska Range. Radio-collared wolves are located about twice per month, with additional locations during late September to early October to determine fall pack sizes and to count pups, and during March to determine late winter pack sizes. In recent years, the use of GPS/ARGOS collars that upload locations daily or even more often has greatly increased the number of locations available for most collared wolf packs. Telemetry locations acquired over one year (April—March) are used to determine the area of each pack territory. Counts of wolves in these packs and the area encompassed by the combined pack territories are used to estimate abundance and density of wolves. In addition, monitoring data are used to determine wolf movements, den locations, mortality factors, behavior, and population dynamics.

During 2013-2014, we monitored a total of 17 wolves from 10 packs with territories at least partly within Denali (Figure 1). In March 2014, these packs included 51 wolves, and their combined territories covered an area of 17,640 square kilometers. This produced an estimated density of 2.9 wolves per 1,000 square kilometers, which is the lowest density since monitoring began in 1986 (Table 1). During the past 10 years, we have increased our use of GPS collars, which locate the wolf automatically and much more frequently than our twice-monthly tracking flights. This has improved our ability to estimate territory size, and increased the size of our estimate of the combined area occupied by wolves. This is partly why the current density estimate is low. However, it seems likely that the population has declined from levels seen during 2001-2003 (5.6 – 6.4 wolves per 1,000 square kilometers), likely influenced by low snowfall during the past several winters, which has reduced the vulnerability of caribou and moose to wolf predation.

At least 6 of the 10 collared packs denned during 2014, and produced a minimum of 14 pups that survived until fall. Seven collared adult wolves died during 2014; one was killed by other wolves, one died of apparent old age, one drowned, one starved, one was legally shot by a trapper outside the park, and cause of death could not be determined for two wolves. One additional wolf died during late February 2015, after becoming caught in a snare set outside the park. The wolf was able to break free from the snare's anchor wire and return to the park, but subsequently died due to blood loss caused by the snare.

As of March 15, 2015, there were 10 wolf packs in Denali with collared wolves, and tracks indicated the presence of one additional pack with no collared wolves. One lone male wolf was collared in early March; this wolf will be monitored during 2015 to determine if it is a resident or transient wolf. Two types of collars were used. One wolf wore a conventional VHF radio collar. Another 16 wolves carried GPS collars that determine the animal's location once or more times per day, store the data, and upload it through the ARGOS satellite system. An additional 5 wolves were captured during March 2015 and equipped with newly-developed collars that

include three-dimensional accelerometers, enabling researchers to more precisely determine the animals' activity (e.g., running, walking, resting) as well as their locations.

Wolf Viewing Project

By Bridget Borg

From 2000 until 2010, the State of Alaska prohibited wolf hunting and trapping in two areas bordering the park, the Stampede and Nenana Canyon Closed Areas, in order to protect two of the park's three most-commonly viewed wolf packs. At the spring 2010 meeting of the Alaska Board of Game, the National Park Service submitted a proposal to extend the eastern boundary of the Stampede Closed Area. Instead, the Board of Game decided to eliminate both closed areas and allow hunting and trapping wolves in all areas bordering the park.

In 2010, Denali National Park and the University of Alaska Fairbanks, with the cooperation of the Alaska Department of Fish and Game, began a study of wolf movements, wolf survival, and wolf viewing opportunities along the Denali Park Road. This study is investigating a variety of factors that might influence sightings of wolves on the park road including;

- Wolf abundance
- Harvest of wolves outside of park boundaries
- Den location
- Pack size and composition (adults, pups, etc.)
- Individual behavior
- Pack social structure
- Pack proximity to the road

During the course of the study in 2012, the death of a breeding female from a pack that lived along the Denali Park Road was followed by a drop in wolf sightings. This was one of several instances where the death of an individual wolf, from legal trapping or hunting, sparked widespread media attention and concern in recent years. In order to improve our understanding of the implications of breeder mortality, we looked at changes in wolf pack fate, reproduction, and population growth following the death of breeders using data collected on 70 packs during the long-term study of wolves in Denali National Park. We published our findings in *Journal of Animal Ecology*:

Borg, B.L., Brainerd, S.M., Meier, T.J. & Prugh, L.R. (2015) Impacts of breeder loss on social structure, reproduction and population growth in a social canid. *Journal of Animal Ecology*, 84, 177–187

We found that breeder loss preceded or coincided with most documented cases of wolf pack dissolution (when a pack disbanded or was no longer found). However, the death of a breeding individual did not always lead to the end of a pack. In approximately two out of three cases where a breeder died, the pack continued. The sex of the lost breeder and the pack size prior to

loss were important factors explaining pack fate following the death of a breeder as the probability of a pack continuing was less if a female died or if the pack was small prior to the death. The analysis also suggested that the death of a breeder had a greater influence if the wolf died during the pre-breeding or breeding season. Human-caused mortality rates were highest during the winter and spring, which correspond to the pre-breeding and breeding seasons for wolves such that harvest may lower the odds of pack survival because of this timing, especially when pack sizes are small. However, higher rates of breeder mortality and pack dissolution did not correspond to lower population growth, indicating that the wolf population was resilient to the loss of breeding individuals at a population level. Wolves may compensate for the death of breeders in a variety of ways, such as rapid replacement of breeders or increased reproductive success the following year.

Additionally, as part of this study, we developed and report an annual wolf sighting index, which is a measure of how often observers on westbound trips to Eielson Visitor Center saw a wolf in a given year. We present the index in recent years using only trips by experienced observers (Table 1). We believe that changes in this index are a good indicator of how overall chances of seeing a wolf might change over time; however, these rates should not be interpreted as a direct estimate of a visitor's chances of seeing a wolf in any given year.

**Table 1. Wolf Survey Data, Spring (approx. 15 March)
Denali National Park and Preserve, 1986-2015**

YEAR	NUMBER OF PACKS MONITORED	TOTAL WOLVES IN PACKS MONITORED	MEAN PACK SIZE	COMBINED AREA OF MONITORED PACKS (KM²)	ESTIMATED DENSITY: WOLVES / 1000 KM²	POPULATION ESTIMATE INSIDE THE PARK*	WOLF VIEWING INDEX**
1986	4	26	6.5	7,380	3.523	61	
1987	8	37	4.6	12,125	3.052	53	
1988	14	69	4.9	15,355	4.494	78	
1989	13	98	7.5	16,810	5.830	101	
1990	10	106	10.6	13,930	7.609	131	
1991	13	111	8.5	14,275	7.776	134	
1992	15	103	6.9	13,620	7.562	131	
1993	12	68	5.7	9,900	6.869	119	
1994	10	61	6.1	11,145	5.473	95	
1995	12	59	4.9	12,120	4.868	84	
1996	11	69	6.3	12,640	5.459	94	
1997	11	78	7.1	13,080	5.963	103	
1998	12	61	5.1	13,121	4.649	80	
1999	13	69	5.3	12,699	5.433	94	
2000	17	71	4.2	14,378	4.938	85	
2001	16	87	5.4	13,802	6.303	109	
2002	15	73	4.9	13,026	5.604	97	
2003	18	75	4.2	11,682	6.420	111	
2004	14	78	5.6	16,061	4.856	84	
2005	15	66	4.4	14,630	4.511	78	
2006	15	103	6.9	15,367	6.703	116	
2007	16	93	5.8	17,439	5.333	92	
2008	20	99	5.0	17,757	5.575	96	
2009	16	65	4.1	16,607	3.914	68	
2010	12	59	4.9	17,061	3.458	60	0.45
2011	10	71	7.1	17,994	3.946	68	0.21
2012	10	70	7.0	18,340	3.817	66	0.12
2013	11	49	4.5	15,473	3.187	55	0.04
2014	10	51	5.1	17,640	2.891	50	0.06
2015***	12	52	4.3	Unavailable	Unavailable	Unavailable	Unavailable

*Population estimate = wolf density x available habitat.

**Viewing index = proportion of westbound trips where wolves were observed.

***Preliminary data.

Spring 2014 Wolf Population Estimate

National Park Service
U. S. Department of the Interior
Denali National Park and Preserve

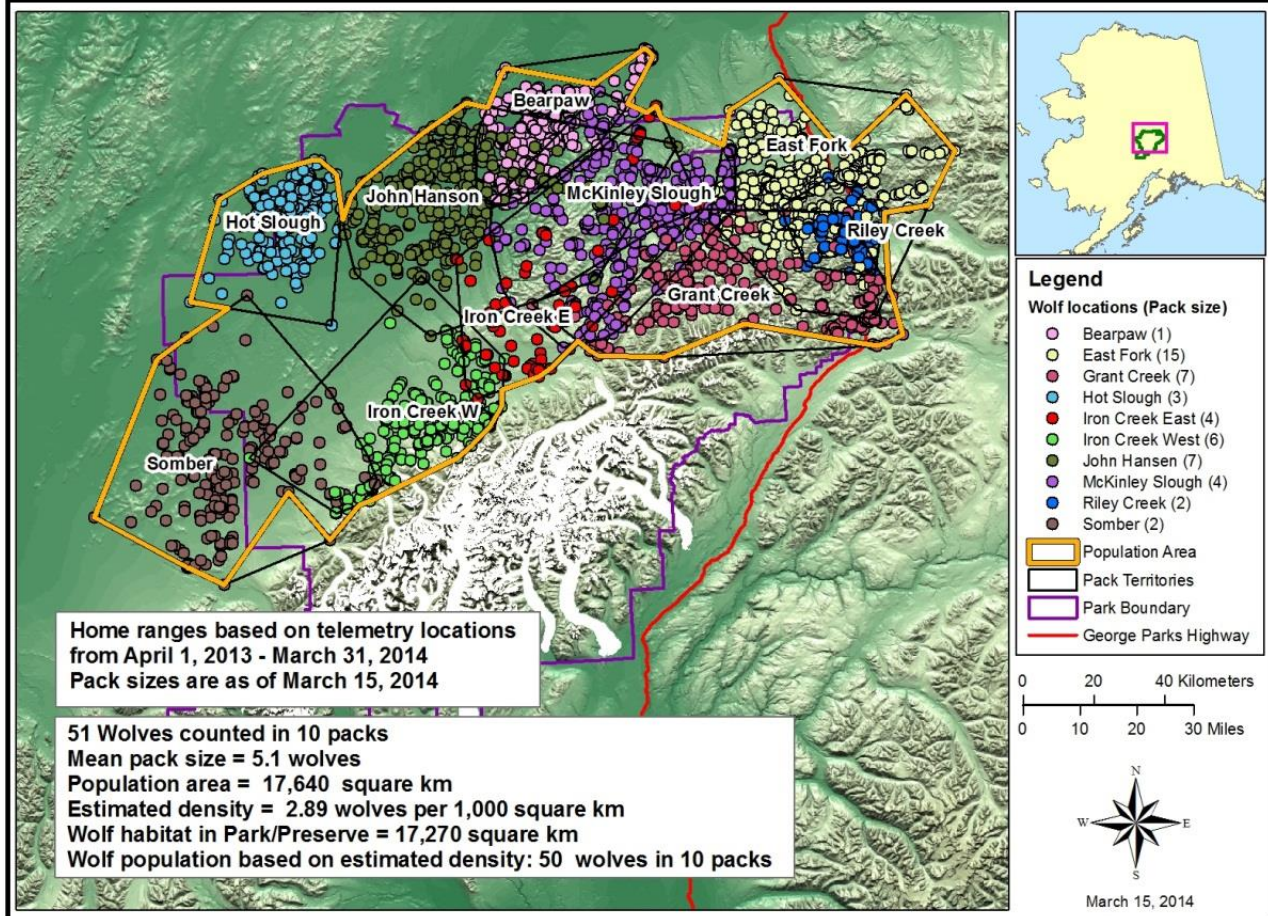


Figure 1. Wolf pack territories in Denali National Park and Preserve, March 2014.