

## INFORMATION BULLETIN

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### Wolves in The National Park System

#### HISTORICAL BACKGROUND:

...Historical evidence documents the presence of wolves (Canis lupus) throughout most of the contiguous United States and Alaska prior to the arrival of European Americans. As the earlier immigrants to this country cleared the land for farms and villages, they killed the wolves they encountered--mostly, the eastern timber wolf (subspecies Canis lupus lycaon).

...Later, and most particularly during the second half of the 19th century, as settlers (often accompanied by domestic livestock), buffalo hunters, and others populated the plains and areas further west, they decimated the bison herds and other ungulates of those areas, destroying the local wolves' prey base. When the wolves made substitutionary prey of the animals suddenly available to them--the settlers' livestock--the irate newcomers, aided by many buffalo hunters who had become "wolfers," essentially destroyed the wolf subspecies (or populations) found in each of the regions they had entered. (Some of these subspecies were the C.l. nubilus, C.l. irremotus, C.l. fuscus, C.l. youngi, C.l. mogollonensis, C.l. monstrabilis, and C.l. baileyi.) The remaining wolves retreated into remote wilderness areas and other places where there were very few or no humans.

#### STATUS OF THE WOLF:

...The gray, or western timber, wolf (Canis lupus) is listed officially by the U.S. Fish and Wildlife Service as an endangered species in the U.S.A.'s contiguous 48 states, except in Minnesota (where it is threatened). It is within the purview of the Endangered Species Act of 1973 (ESA).

...One of the stipulations of the ESA is the establishment of a recovery process whose goal is to increase the numbers of each endangered species to the point where the species no longer needs protection under the law for its survival, in other words, to restore viable populations of species listed officially as being in danger of extinction.

### WILDLIFE AND VEGETATION DIVISION

National Park Service  
U.S. Department of the Interior



## SUBSPECIES:

...The issue of gray wolf subspecies has become important because some people feel that only members of the same subspecies as that of the animals that originally occupied any given area should be used in the restoration of an endangered species to that area.

...However, correct taxonomic classification of the wolf--one of the most variable of all animals--is difficult to accomplish. It is based on subtle differences in sizes of various parts of the skull: While among widely separated groups these differences may seem evident when scientific measurements are taken, among populations living nearer each other, the differences grade into one another. Furthermore, the largest skulls in one population cannot be distinguished from the smaller skulls of another population. -- Additionally, no differences based on behavior have been identified across gray wolf populations.

...Half a century ago, it was thought that there may be as many as 30 valid subspecies of wolf. Today, wolf taxonomists talk in terms of 23-24 subspecies, and think there is a possibility that there may be fewer. Findings of the current wolf DNA studies at the University of California (Los Angeles) may prove helpful in determining actual subspecies.

## PHYSICAL ASPECTS AND SOCIAL BEHAVIOR:

...Physical Aspects. As mentioned above, there is great variability among individual gray wolves. Especially is this true in the colors and patterns of their fur, which are easily noted and are used by many wolf-studying scientists to recognize individuals in a pack. The colors range from white to black, with many gradations of tan, brown, and gray occurring as solid tones or mixtures. The fur, of course, is the animal's major protection against the weather: In winter's cold it becomes very thick (up to 2.5 inches) and woolly, and in rain its 3 overlapping back "capas" act like raincoats.

...Most adult gray wolves stand about 2.5 feet tall at the shoulders, with the adult males ranging from 5 to 6.5 feet long (tail tip to nose tip), and averaging 90-100 pounds in weight. Adult females are usually smaller, ranging from 4.5 to 6 feet in length, and averaging 75-85 pounds in weight. (Wolves in Alaska tend to be larger.) Both sexes have long legs, strong toes (on which they run), relatively large feet (up to 5.5 inches long), narrow chests, and well developed muscles--an ideal frame and musculature for chasing and bringing down large prey, such as elk, moose, and deer, and for travelling far and fast.

...The senses important to gray wolves' survival are excellent. Their ears are able to hear other wolves 6 miles distant and are capable of turning from side to side to determine a sound's direction. Their nose is capable of smelling prey more than a mile away. And their vision seems sharp, at least in detecting movement. In addition, the wolves have very strong jaws which, along with their long, pointed front teeth (canines), make it possible for them to grab and hold onto prey.

...Social behavior. The primary social unit of the gray wolf is the pack--a "family" that usually consists of 2 to 20 members, and most often of 6 to 8. Usually, the members are 1 dominant (alpha) male, 1 dominant (alpha) female, other close relatives (who help in rearing the young), and offspring. The alpha pack members have the best chance of reproducing successfully, and this dominant pair usually tries by harassment to keep other adults in the pack from mating.

...The 4 factors that seem to determine pack size (outside mortality and reproductive rates) are (1) the smallest number necessary to find and kill prey effectively, (2) the largest number that available prey can be expected to feed, (3) the number of other pack members each individual wolf can form social bonds with, and (4) the amount of social competition each pack member can tolerate. -- The density of wolves (i.e., number of wolves per square mile) seems to be regulated only by nutritional and social factors.

...Most reproducing gray wolf packs exist in exclusive territories, a behavior that provides the means of apportioning food resources in areas where prey does not make major seasonal movements and is randomly distributed. Where wolves do not practice pack territoriality because of mobile prey species (e.g., bison), the packs may practice mutual avoidance. A pack's territory may remain stable over time, or it may shift due to prey distribution and lower numbers, interpack conflict, disrupted hierarchies, formation of new wolf packs, etc.

...Male and female gray wolves have separate social hierarchies (power rank), and those subordinate to the alpha pair have dominance relationships among themselves. Although a hierarchy is an established framework for gray wolf social behavior and aids the maintenance of social order and stability, it is a dynamic framework and, as young pack members near sexual maturity, they may challenge the dominant members. Such a contest can lead to disruption in pack stability, and may end with the eviction of individuals from the pack. Having social hierarchies benefits the pack by minimizing internal conflict, as ritualized behavior patterns are substituted for in-fighting. For instance, snarling and teeth-baring but no fighting occur whenever there is a question as to which animal is to get its way. Then the lower-ranked animal rolls onto its back, thereby making itself completely vulnerable while the other stands over it with tail raised high--obviously the victor.

...Gray wolves communicate (exchange information) with each other within packs and between packs. This is viewed as helping both to keep stress within a pack to the minimum and to prevent interpack conflicts. The two most important means of communication are howling and scent-marking.

...Howling functions to identify, locate, and assemble separated members of a pack; to signal members' exact location to each other when engaged cooperatively in bringing down prey; and to serve the purely social function of greeting each other when a pack's members gather around the alpha individuals. It seems to

ease the moving of pups and adults from one rendezvous site to another. It also is a method for announcing the presence of the pack within its territory, thereby maintaining the advantages of territoriality and helping to prevent direct interpack conflicts. Sometimes, however, gray wolves howl as a group simply to enjoy themselves. One pack member will begin to howl, another will come close and join in, followed by others, with no discernible purpose other than to howl together.

...Scent-marking--the application of an animal's odor to its environment--is another communication behavior. It conveys messages regarding territory, food locations, and even certain conditions of individual animals. It may involve urinating, defecating, or the rubbing of certain parts of the wolf's body on objects in its environment. By interpreting the scent-marking of fellow pack members, wolves can determine their proximity, who is travelling with whom, and which areas have been hunted lately. Besides "reading" their own pack members' scent marks, wolves are able to detect those left by wolves of other packs.

...Playing--performing an act with no apparent utilitarian purpose for the activity--is something wolves do at all ages. They wrestle, throw and retrieve sticks either alone or with other wolves, run, and howl as a group. A wolf often will invite another to play by approaching with non-threatening mannerisms, bowing down with front legs spread wide apart and head up, then turning and running away, perhaps looking back to see if the second wolf has responded.

#### BREEDING AND MORTALITY

...Gray wolf breeding season occurs from late January through April; wolves living the farthest north generally have the latest season. Pups are born in late March to May after a 63-day gestation period, with litter sizes usually varying from 4 to 7 pups. Much larger litters are usually found after several years of exploitation of a wolf population.

...There are a number of causes of wolf mortality: disease, malnutrition, enfeebling injuries, interpack conflict, and human exploitation and control. For gray wolves that live in the northern sections of the country, the fall and winter seasons appear critical for survival, with mortality rates depending on the degree of exploitation/control by humans. Winterkill mortality rates for a minimally exploited population have ranged from 0 to 33 percent; for a heavily exploited population they have ranged from 14 to 88 percent. While established populations seem to be able to withstand mortality rates of 30 to 50 percent, protected wolf populations actually can increase at 20 to 50 percent rates.

#### PREDATION

...Gray wolves, for the most part, are opportunistic predators. However, when they have a choice of selection between species, they tend to select the smaller of a species or the easiest to catch, not the species in greatest abundance. They also select the most vulnerable individuals of a species as they are the easiest to catch: older members, those obviously weakened or handicapped, pups or yearlings (depending on maternal defense), and males alone.

...Gray wolves, in general, depend upon ungulates for their winter food and supplement their diet with beaver and other smaller animals during spring, summer, and autumn. In areas where beaver are not so abundant, ungulates usually constitute more than 90 percent of the food wolves consume. In the Rocky Mountains of North America, the principal prey species are elk, moose, mule deer, and white-tailed deer. Other ungulate species eaten are bison, sheep, mountain goat, caribou, and perhaps antelope.

...The rate of kill by wolves is determined by the size of the wolf pack; snow conditions; how quickly the prey carcasses are eaten; diversity, density, and population structure of the prey complex; and the amount of food each kill provides. With its large stomach capacity, the wolf is well adapted for the cycle of fasting and feasting it must undergo. Nevertheless, on the average a pack of wolves requires at least 8 pounds/wolf/day during winter for all members to survive and be able to reproduce successfully and rear new pups the following spring. -- In normal situations, wolves do not deplete their prey populations.

...Studies of gray wolf-livestock relationships in Minnesota and Canada have indicated that most wolves living near livestock areas where native prey is available do not prey on the livestock. Those instances where wolves do prey on livestock are neither widespread nor as serious as generally believed. (In Minnesota, over a 3-year period only 0.2 percent of the farms in the wolf range sustained any losses to wolves.) The studies also found that wolf problems are localized, with few wolves being involved. Where sheep and cattle are present but there is no native prey (i.e., ungulates, beavers), wolves seem to select sheep.

...There are no recorded cases of attacks on humans in North America by wild gray wolves, except when the wolves have been rabid.

#### HABITATS

...Nearly every habitat in the Northern Hemisphere, except true deserts, has been a home for wolves. Until recently, a habitat for gray wolves was an area that contained year-round prey in numbers and quality sufficient to provide adequate nutrition for the animals, and suitable denning and rendezvous sites. Now it is recognized that a third factor is also required: sufficient space that presents minimal exposure to human interests and uses. -- Gray wolf denning sites (where the pups are born) are areas dug out on moderately steep slopes with well drained soils, or in rock caves or abandoned beaver lodges; are usually within 400 yards of surface water; and at elevations that can overlook surrounding areas. Specific resting and gathering places that wolves occupy during summer and early fall after the denning site has been abandoned are called rendezvous sites.

#### WOLVES IN NATIONAL PARK SERVICE AREAS

...As wolves ranged over much of North America before European settlers



arrived, many areas now part of the National Park System were at one time part of wolf ranges. Some areas, upon becoming part of the System, still provided habitat to the wolf (e.g., Glacier National Park, MT; Yellowstone National Park, WY/MN/ID; White Sands National Monument, NM). On the other hand, as far as it is known, wolves have never stopped living in the NP areas of Alaska.

...At present there are wolves living in the following NPS areas in the lower 48 contiguous states:

Chiricahua National Monument, AZ	Isle Royale National Park, MI
Glacier National Park, MT	Saint Croix National Scenic River-
Grand Portage National Monument, MN	way, WI/MN
	Voyageurs National Park, MN

Among these areas, major wolf studies are being conducted at Isle Royale and Glacier National Parks.

...In the vast area of Alaska, wolves are either resident or travel through 14 of its 15 National Park Service areas, and are not considered endangered. These Alaskan National Park areas are:

Aniachak National Monument	Kenai Fjords National Park
Bering Land Bridge, National Pre-	Klondike Gold Rush National Histor-
serve	ical Park
Cape Krusenstern National Preserve	Kobuk Valley National Park
Denali National Park	Lake Clark National Park & Preserve
Gates of the Arctic National Pre-	Noatak National Preserve
serve	Wrangell-St. Elias National Park &
Glacier Bay National Park & Preserve	Preserve
Katmai National Park & Preserve	Yukon-Charley Rivers National
	Preserve

In Alaska, major wolf studies are being carried out at Denali National Park, Gates of the Arctic National Preserve, and Noatak National Preserve.

...The only wolf species other than Canis lupus known to have any members living in the wild in the lower 48 States is Canis rufus, the red wolf. Four of this species are free on Alligator River National Wildlife Refuge in North Carolina as part of the U.S. Fish and Wildlife Service's (FWS) red wolf recovery program. As part of a cooperative effort with the FWS, which is propagating captive-raised red wolves in several places across the country, NPS placed a pair of this species in the Gulf Islands National Seashore, MS/FL, in January 1989. The pair produced 7 pups in June. Although the reproducing female (the mother of the pups) died in September 1989, the pups are still alive, apparently being fed by the male.

...Shortly, separate Information Bulletins will be available on the wolves at Chiricahua NM, Gulf Islands NS, Isle Royale NP, Grand Portage NM and St. Croix NSR, Voyageurs NP, the Alaskan parks, plus one on the possible restoration of gray wolves to the Yellowstone Ecosystem, which includes Yellowstone and

Glacier National Parks.

FOR MORE INFORMATION, CONTACT: Chief, Wildlife and Vegetation Division  
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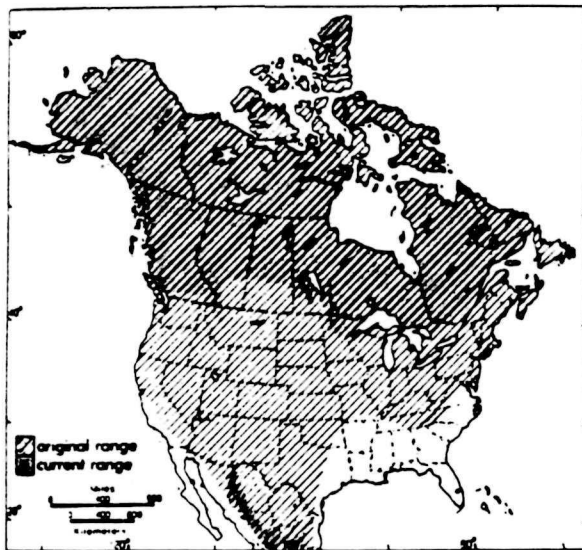


Figure 1. Present and past range of the gray wolf. (After J.L.Paradiso and R.M. Nowak in Wild Mammals of North America, 1982.)

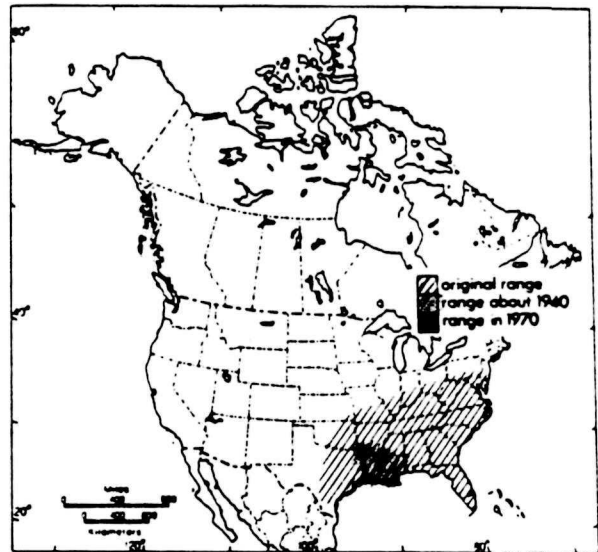


Figure 2. Range of the red wolf originally, about 1940, and 1970. (After J.L.Paradiso and R.M.Nowak in Wild Mammals of North America, 1982.)