Mexican Gray Wolf

Management

The Arizona Game and Fish Department has been actively involved in reintroducing Mexican gray wolves to portions of their historical range since the early 1990s. Management action activities have included public opinion surveys, site feasibility studies, surveys along the Mexican border for naturally occurring wolves, and intensive coordination with other cooperating agencies, primarily the U.S. Fish and Wildlife Service (FWS).

The Mexican Wolf Recovery Project is a cooperative effort currently administered by six primary agencies: U.S. Fish and Wildlife Service, Arizona Game and Fish Department, New Mexico Department of Game and Fish, White Mountain Apache Tribe, USDA – Wildlife Services, and USDA Forest Service. Involved agencies are utilizing an adaptive management approach.

In early 1998, in cooperation with FWS, eleven wolves were released into the Blue Range Wolf Recovery Area (BRWRA) in eastern Arizona. In subsequent years, additional releases have occurred. With the birth of the first wild-born litter from a wild-born parent, in 2002, the recovery project has evolved into a new phase whereby natural reproduction is replacing reintroduction from captive populations.

Program Goal

The Mexican Wolf Recovery Plan, adopted under the authority of the Endangered Species Act, has a primary goal of re-establishing at least 100 wild wolves, within a portion of the subspecies' historical range, located in east-central Arizona and western New Mexico. A secondary goal is to manage wolves and their habitat in a manner that will not negatively impact the lifestyles and economy of local residents. Cooperating agencies will closely monitor and study the reintroduced wolves, contributing to the conservation of the gray wolf species as a whole. Management of the reintroduction will be constantly evaluated and adapted as new circumstances arise. Full recovery of the Mexican wolf subspecies likely will require additional reintroduction projects elsewhere, and may take several decades to accomplish.

Habitat

Mexican wolves were recorded in a variety of vegetation types in Arizona prior to their extirpation in the early 1900's. Some sources state that wolves were never abundant in the state, with the lowest densities occurring on the North Kaibab Plateau. Early naturalists may have often confused coyotes with wolves, confounding early estimates. Most wolf reports came from the mid- to high elevation woodlands within vegetation including oak, pinyon pine, juniper, ponderosa pine, and mixed conifer high elevation

forests. Almost all historical records of Mexican wolves in Arizona occurred above 4,500 feet in elevation.

Vegetation type influences wolf density and distribution indirectly through the support of prey, upon which the wolf is dependent. Since wolves can be found in almost every vegetation type in the northern hemisphere, except for arid deserts and tropical rainforests, vegetation type as a component of the wolf's habitat does not appear to be limiting as long as it can support a healthy ungulate population. Wolves have not persisted in areas that do not support large ungulate prey animals.

Wolves occurred mostly in Arizona's mountainous woodlands prior to European settlement, and were gradually eliminated first in the more accessible areas as livestock production became more common and depredations increased. Most wolves were gone from Arizona by the 1950s, but occasional sightings were still reported, mostly along the Mexican border. The last known wolf killed in Arizona is thought to have occurred in 1970.

Habitat characteristics, other than vegetation types, that are probably important for wolves include road and human density, as well as current land uses and patch size of relatively intact habitat. Studies in Wisconsin indicate that road density can be used as an index to evaluate the quality of wolf habitat. However, wolf/human interactions are more complex than just estimating road density, as different types of activities at different seasons have variable impacts on wolves. It appears that mere disturbance by humans may not negatively impact wolves, but direct killing or accidental vehicle collisions can have a significant impact. As patch sizes of intact, remote habitat become smaller, more wolf/human interactions will result, usually to the demise of the wolf.

Distribution

Wolf distribution in Arizona is currently limited through the Nonessential Experimental Special Rule for the reintroduced population, and the lack of any naturally occurring, fully protected wolves. Wolves are now allowed to establish home ranges only within the Apache National Forest and the White Mountain Apache Reservation. However, if the Special Rule is changed through an extensive National Environmental Policy Act (NEPA) process in the future, the boundaries of the area where wolves would be allowed to colonize could change. There are currently no formal, agency-sponsored evaluations of other reintroduction sites within Arizona, although the North Kaibab Plateau has been proposed by some environmental groups and may provide potential wolf habitat. Wolf distribution within the reintroduction area can vary from easy road access to a day's mule ride on rough mountain trails or cross-country. However, Mexican wolves do not appear to heavily select for roadless wilderness areas or steep, inaccessible rocky terrain.

- **Pack size**

Mexican wolf pack size has averaged between four and five wolves per pack. Historical pack sizes were reported to be from three to eight animals. In Yellowstone National Park, where a northern subspecies of the wolf has been reintroduced, the average pack size in 2002 was 10.6 animals.

- **Density**
  Mexican wolf density is unevenly distributed across their home range as they often travel together as a pack and appear to make disproportionate use of the landscape. Some areas near prime elk calving grounds appear to receive heavier use than other areas, and established foot and horse stock trails are commonly used. In other areas, wolves have used valley bottoms and more accessible areas in a higher proportion than their availability.

  Colonizing Mexican wolves occur in an overall density of about one wolf per 20-63 square miles of occupied wolf range. Densities of other subspecies of wolves range from one wolf per three square miles on Coronation Island to one wolf per 100-200 square miles in northern Ontario. Currently, there are about 12 wolves free-ranging in Arizona on non-tribal lands, not counting this year's pups. The estimated carrying capacity within the reintroduction area of Arizona is at most about twice this current population.

Status

The U.S. Fish and Wildlife Service, under the Endangered Species Act of 1973, listed the Mexican gray wolf as Endangered. The Mexican wolf is considered the most rare of all extant gray wolf subspecies.

The reintroduced Mexican wolf population in the BRWRA of east-central Arizona has been designated as a nonessential experimental population under Section 10(j) of the Endangered Species Act. This designation allows for additional management flexibility than if the species were fully protected, however, all management actions must still strive for recovery.

General Information

Wolf/Human Interactions

Wolves can become acclimated to humans if fed, just like bears, foxes, and coyotes. Fortunately, Mexican wolf range does not overlap with significant human population centers. However, the potential for acclimation and its related problems still exist at developed and dispersed campgrounds within the Mexican wolf reintroduction area. Once acclimated to humans, wolves pose a higher risk of causing damage to pet dogs, people, and themselves.

Although a free-ranging Mexican wolf has never injured anyone, they need to be managed like other wildlife to limit the potential for negative interactions or dependencies. Over the course of the current reintroduction project, some Mexican wolves that had become acclimated to people and frequented campsites could not be discouraged from the area, even after intensive hazing responses. These wolves had to be recaptured and returned to captivity. Other wolves that moved to areas near humans experienced extremely high mortality rates and died before they could be recaptured.

Wolves in other parts of the U.S. also pose little, if any, threat to human safety, unless they are sick, injured, or cornered. Dogs, captive wolves, and wolf-dog hybrids pose a much more significant risk to human safety, especially if "released."

Attacks on people

Very few reliable accounts exist of attacks of healthy gray wolves on humans, and none involving death. This is despite the fact that millions of people work and recreate each year in wolf range in Canada, Alaska, Minnesota, and other areas.

Wolves can contract rabies, and then pass the disease to humans, but this has only rarely been documented. Although wolves could act as a host or vector for this disease, their low population densities and remote habitat will minimize their importance to humans, compared to bats, skunks, and foxes. Rabid wolves have, on extremely rare occasions, attacked people, who then died of rabies. There are two cases from Alaska of this occurring (the last one 53 years ago, in 1943) and one suspected case in the Lower 48 states, from Wyoming in 1833.

No accounts exist of Mexican gray wolf attacks on humans. Nevertheless, humans should be aware and cautious when traveling in wolf range, as they should when near any wild predator.

Mortality and lifespan

Wolves die from a variety of causes, ranging from disease, malnutrition, debilitating injuries, and inter-pack strife to human exploitation and control. In areas with little or no human exploitation, the primary causes of mortality are disease and malnutrition in pups or yearlings. Deaths of adults often result from other wolves. Mortality rates in unexploited populations can average about 45% for yearlings and 10% for adults. Ten years is an old age for a wild wolf.

Fall and winter are critical periods for wolf survival. Beginning in the fall, wolf mortality rates are most influenced by the degree of exploitation and control by humans. Overwinter (October to March) mortality rates within packs range from 0% to 33% for a minimally exploited population to 14% to 88% for a heavily

exploited population. Established wolf populations apparently can withstand annual human-caused mortality rates of 28% to 35%.

Reintroduced Mexican wolves have experienced mortality causes similar to other wolf populations exposed to high levels of human activity. During the first five years of the project, the highest cause of mortality has been human-related, through gunshot and vehicle collisions (56%). Natural causes accounted for 24% of total mortality, leaving 20% unknown. The Greater Yellowstone Area is experiencing similar trends in mortality causes, as 55% of wolf mortality is human caused, 26% is natural, and 19% is unknown. Wisconsin experienced 72% human-caused mortality during the early years of recovery, but this number fell to just 22% after 1985.

Approximately 24% of the wolves released or known to have been born in the wild have died during the first five years of the project. Yearling Mexican wolves have the highest mortality rate, accounting for about 36% of all mortality. Detailed, age-specific mortality rates for the Mexican wolves have not been calculated, partially due to the regular artificial manipulation of the population through releases and removals for various reasons. Colonizing wolves in Wisconsin experienced a 39% mortality rate from 1979 to 1985, which dropped to 18% from 1985 to 1992. Some wolf populations have sustained about 30% human-caused mortality and still persisted. Wolves are vulnerable to control efforts as their populations can be reduced in an area, but if a reservoir population is nearby, recolonization can occur within a few years.

Outreach efforts are intended to inform the public of the presence of wolves and their similarities to coyotes, and will hopefully decrease the number of accidental shootings of wolves. Ongoing telemetry monitoring and analysis should reveal specific causes of mortality.

Wolves are susceptible to a number of diseases and parasites already circulating in other canids in the reintroduction area. The most significant to wolves will be canine parvovirus and distemper, as at least one pup has died from parvovirus in a relatively remote area. The colonizing Wisconsin population was thought to have been suppressed by a widespread exposure of pups to parvovirus, with subsequent low pup survival. The infectious agents of parvovirus probably exist widespread within potential wolf habitat, so wolves will have to develop a natural immunity to the virus or pup recruitment could be compromised.

Program Status

Population:

- Approximately 50 wolves free-ranging in Arizona and New Mexico, not counting pups born this year.

- Approximately 10 distinct packs, distributed across the Apache-Sitgreaves National Forests and Fort Apache Indian Reservation in Arizona, and Gila National Forest in New Mexico.
- About 30 wolves have radio collars and are located once a week on average to determine movements, home range, prey selection, and other behavioral information.
- Close to 100 wolves have been released through the first five years of the project.

Reproduction:

- At least 18 pups were documented in seven packs during the summer of 2004.
- Recruitment of pups into their second year is increasing.
- Wolves born in the wild have successfully had pups themselves.

Food Habits:

- Preliminary diet analysis reveals about 75% is elk, 11% is small mammals and unknown, 10% is deer, and 4% is livestock.
- Wolves have scavenged commonly when carrion is available.
- Intensive predation monitoring this past winter reveals prey to be mostly young elk.

Cattle Depredation:

- Although small in comparison to all available livestock present, depredation is measurable and usually focused on one or two allotments.
- If a depredation is found, ranchers can be reimbursed by Defenders of Wildlife (DOW).
- Compensation programs for depredations not found are being discussed.
- To date, there have been about 70 possible or confirmed depredations or injuries, with $34,000 paid out to date by DOW.

Home Range Size:

- Most packs utilize about 150-250 square miles.
- Most packs consist of three to five wolves.
- Large migrations between summer and winter ranges have not been seen, although packs along the Mogollon Rim use areas of high elk density just below the rim in the winter.

Causes of Death:

- At least 20 wolves have been shot.
- Nine wolves have been hit by vehicles.
- One wolf each died from snakebite, a mountain lion, an infection, helicopter capture, brain tumor, dehydration, and parvovirus.
- Two wolves died of unknown causes.

Additional Information

- **Prey – diet and feeding strategies, impacts**
  It has been estimated that the average Mexican wolf will consume about 2,800 pounds of prey per year, approximately 80% of that being deer and elk. No detailed food habit study has been conducted on Mexican wolves. However, a preliminary scat analysis of released Mexican wolves revealed that about 75% of the scats contained hair from elk. Deer was found in about 10% of the scat content, livestock was found in 4% and 11% of the scat content was small mammals and unknown items. Wolves in Yellowstone National Park killed mostly elk (84%), with bison (6%), and deer (1%) making up only a fraction of the wolves' total diet in 2002.

  Observations of wolves attacking live animals also reveals a preponderance of elk predation, possibly due to the higher abundance of elk compared to wolves' other main prey item, which is deer. Seasonal variations are likely to occur with calves and fawns being a primary food source during the summer. Mexican wolves commonly feed on gut piles and wounded game in the fall, but the importance of scavenging as a food source has not been determined. Mexican wolves only need to feed a couple times a week as their highly elastic stomachs allow them to gorge on up to 20 pounds of food at a time. It appears that prey biomass has a direct influence on population increases and wolf density.

- **Influence on ungulate populations**
  Wolves have been shown to have the potential to limit prey populations in certain situations. Wolves can have the most impact on prey populations when other limiting factors are also stressing the prey population, such as deep snow, a long winter, or disease. However, most wolf predator-prey studies reveal that wolves do not eliminate their prey, but rather reduce the magnitude in prey population fluctuations.

  Computer modeling on a population of wolves, based on the reintroduction goal of 100 animals for Arizona and New Mexico, revealed varying effects on the prey, depending on other factors. For instance, if an ungulate population was decreasing anyway because of other factors (i.e. drought), wolves would cause the decrease to be accelerated. Also, if the prey population were to plausibly increase without wolves (i.e. increased precipitation), then that population would still increase with the presence of wolves, but not as quickly. Annual changes in prey populations due to wolves never exceeded 3% for deer or elk, but could accumulate over time. When the reintroduction goal of about 100 wolves is reached, it is theorized they could consume the equivalent of about 1/3 of an elk and 1/8 of a deer per square mile per year, based on various assumptions.

  Reintroduced Mexican wolves will probably not exert a totally additive or totally compensatory level of predation on the existing prey populations. Only a

detailed study will reveal this information. For the purposes of a Mexican wolf computer model designed to estimate the impacts on existing prey populations, estimates of 0% and 25% alternate prey were used as well as compensatory mortality levels of 17% and 50%.

Mexican wolves will also exert a different type of influence on their prey populations, compared to cougars, coyotes, and bears. A wolf pack's cursorsial type of hunting behavior should select for less fit animals within the prey population. Cougars and bears tend to stalk and ambush their prey, exerting less of a selective pressure on unfit prey animals. However, a clear difference between wolves and lions was not found in a recent study near and in Glacier National Park in Montana.

- **Influence on other predators**
  Although no studies were conducted to investigate the impacts of Mexican wolves on other predators before the wolves were eliminated in Arizona, anecdotal evidence suggests that coyotes and lions may have been suppressed by wolf populations, and expanded their range considerably once wolves were eliminated from the state.

  In other areas where wolves have recently colonized, coyote avoidance of these areas has been documented. Wolves can affect coyote populations, either through direct killing of coyotes or coyote avoidance of wolf territories. Wolves have been cited killing lions, but lions have also been documented killing Mexican wolves. It appears that wolf packs are less vulnerable to lion and bear attacks, but young, individual wolves could be at a disadvantage.

  However, direct interactions are probably not common and interspecific mortality may not be significant for wolves or other large predators. A more important influence may be exerted through the usurping of lion and bear kills by wolf packs. The other predators must either make another kill, move to a different area, or lose weight because of a missed meal. At least a portion of wolf predation is thought to be compensatory with other types of predation, but no detailed studies have verified this.

- **Pack organization and home range**
  If held in a chain link release pen for a few weeks up to two months prior to release, released Mexican wolves have established home ranges relatively quickly. Wolves have also shown high site fidelity if they are released with a litter of young pups. Home range size of colonizing Mexican wolves, using the 95% minimum convex polygon method, varies from about 100 sq. miles to over 250 sq. miles. One researcher felt Mexican wolf home ranges would be around 200 sq. miles. No habitat selection studies have been conducted on the reintroduced wolves. Home range sizes vary from 36 sq. miles in Minnesota to over 5,000 sq. miles in Alaska.

Since releases of wolves from captivity without any prior wild experience will be minimal in the future, it is expected that the Mexican wolf population will resemble other colonizing wolf populations with regard to home range and dispersal. Wolves colonizing Montana in the 1980s sometimes took over part of their natal territory, sometimes established a territory adjacent to their natal territory, and sometimes made long distance movements for hundreds of miles. Mexican wolves appear to be exhibiting the same behavior.

Active defense of a territory, in the form of a physical encounter resulting in injuries between different packs, has not been observed in the reintroduced Mexican wolf population. However, preliminary analysis of location data shows relatively little temporal overlap in home range use between most packs, indicating typical territorial behavior.

About 15% of the Mexican wolves released eventually dispersed from their release areas, and did not return before either dying or being recaptured. This proportion is smaller than found in other wolf dispersal studies, where up to 40% of the wolves moved more than 20 miles. Another 15% of the released Mexican wolves moved away from their release site after an alpha died, or they were hard released with no acclimation period. The reintroduced wolves were actively pursued with capture attempts if they left the reintroduction area so their movements may have been influenced by the field crew trying to capture them. The farthest known Mexican wolf dispersal was around 300 miles in movement from its release site before it was struck and killed by a vehicle near Flagstaff. Dispersing wolves in Montana moved an average of 165 miles for females and 95 miles for males. Females tended to disperse when they were about two years old and males mostly dispersed a year later, both sexes predominantly during the winter months. The longest documented dispersal was at least 570 miles.

The nonessential experimental population of reintroduced Mexican wolves is being managed under a special rule, which limits their distribution to east-central Arizona. However, this rule may be changed, so the biological dispersal potential of the wolf must be considered.

- **Wolf movements**
  Three key types of movements could be displayed by reintroduced Mexican wolves, which are homing, pack territory shifts, and dispersal from packs.

  <u>Homing</u>
  This is the movement of displaced wolves toward their place of origin. Mostly this behavior has been observed in releases of translocated wild wolves. However, in a 1972 experimental release of five captive-raised wolves in Alaska, three of the animals traveled toward the town where they were raised, 175 miles away. The animals used in this experiment were “hard released,” that is; they were let go without prior acclimation through holding them in pens in the release area. This is the only previous case of releasing captive-raised gray wolves on

the mainland; two other releases occurred on islands, inhibiting any homing tendency.

In a review of all documented U.S. releases of both captive and wild-raised wolves, it was found that 10% of the wolves actually returned to their place of capture or prior holding facility. Several others apparently attempted to do so. Homing was least likely to occur under the following circumstances: the released animal was a pup; the release site was more than 40 miles from the animal's place of origin; and the animal remained around the release site initially after release. If captive-raised Mexican wolves homed, they likely would head toward the eastern part of the Sevilleta National Wildlife Refuge, located near Socorro, New Mexico, to the Mexican Wolf Captive Management Facility where they came from. This is more than 120 miles northeast of the Blue Range Wolf Recovery Area primary recovery zone.

Pack Territory Shifts

If, or when, a released group has settled into a definable territory, there is no assurance it will stay there. A newly colonizing wolf pack may shift its territory in response to climate, food availability, human disturbance, and other factors. A colonizing pack may have a larger, more fluid territory than a pack surrounded by other wolf packs. Also, some evidence suggests that wolf packs colonize in areas that were first "pioneered" by dispersing lone wolves.

Dispersal from packs

This occurs when young wolves, often yearlings, disassociate from their natal pack, and either move into a breeding vacancy in another pack or become lone wolves. Dispersal is a key process in wolf re-establishment. It leads to new pack formation, more breeding pairs, and wider areas of wolf occurrence. However, mortality rates during dispersal are high compared to when wolves are in packs.

Wolves exhibit three main dispersal strategies: appropriating part of the territory of the natal pack, establishing a territory adjacent to the natal pack's; and long-distance dispersal. The latter can involve directional dispersal, in which the wolf moves on a relatively straight path, or nomadic dispersal, in which the wolf wanders in various directions.

Little is known about the dispersal patterns of Mexican wolves in particular, although gray wolf dispersal generally has been well studied. Most of these studies have analyzed dispersal in the context of numerous wolf packs within a given area of established wolf range, i.e., northern Minnesota. These findings may not correlate to the situation of wolves being released into an area where no other wolf packs exist.

However, some researchers have studied dispersal from wolf packs that were naturally recolonizing a wolf-free area, a situation most comparable to releasing captive-raised wolves into a wolf-free area. One study examined dispersal from

packs that were recolonizing the northern Rocky Mountains in the 1980s. They found all three types of dispersal behavior, including long-distance directional dispersal in which a few lone wolves traveled for hundreds of miles over several months. Mexican wolves will likely display the types of movements discussed above.

- **Reproduction**
  Wolves are primarily monogamous, even though a pack can include more than one sexually mature female. Behavioral and physiological adaptations usually prevent more than one female per pack from breeding, which usually occurs in February. If a breeder dies or is removed from the pack, another wolf from within or outside of the pack can fill this breeder position immediately, prior to the next breeding season. However, removal of an alpha, or breeding animal, can disrupt the pack to the point where it essentially dissolves and pack members begin moving independently. Mexican wolf dens are located under various objects, including rock ledges, logs, or dug into soft soil. Dens can be reused, but it appears that most reintroduced Mexican wolves move their dens annually, even if just a short distance.

  After about a 63-day gestation, a single litter of four to seven pups are usually born in April. The average litter size midwinter in Yellowstone National Park in 2002 was 4.3. Annual pup mortality is normally around 50% but can vary widely depending on prey density, weather, disease, and other competitors. Pups are weaned at five to six weeks, and remain totally dependent on adult help until they are at least nine to ten months old. After about six weeks the wolves move the pups away from the den site, to another area near water called a rendezvous site. Pups and other pack members use these rendezvous sites as their center of activity during the summer months. Pups begin traveling with the adults by October, sometimes sooner on shorter forays. Sex ratios have been found to be nearly equal between males and females, although in some cases there are more males.

  Wolves in the wild usually are not sexually mature and don't breed until they are at least two years old, but a female in the wild was bred at ten months. Mexican wolves in the wild have been known to breed until at least eight years old for males and seven years old for females, but the maximum age for reproduction is not known. Courtship behavior begins during the winter months, with potential mates staying closer to each other and physically interacting with each other more often. Scent marking activity increases, with the breeding alpha female eventually exhibiting raised leg urinations tinged with pre-estrous blood alongside her mate.

- **Monitoring**
  Mexican wolves can be monitored through a variety of methods. Techniques include tracking, scent posts, howling, photo traps and other methods. In addition, radio-collaring one member of pack will reveal the pack size and other

associates due to their communal behaviors. Once a typical home range size is established for an area, extrapolation can be used to calculate a population over a larger area. These methods have been used elsewhere with success.