PETITION TO LIST THE MEXICAN GRAY WOLF, *CANIS LUPIS BAILEYI,* AS AN ENDANGERED SUBSPECIES OR DISTINCT POPULATION SEGMENT UNDER THE U.S. ENDANGERED SPECIES ACT

Center for Biological Diversity

August 11, 2009

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Mr. Ken Salazar
Secretary of the Interior
Office of the Secretary
Department of the Interior
18th and "C" Street, N.W.
Washington, D.C. 20240

The Center for Biological Diversity, Michael J. Robinson and Noah Greenwald hereby formally petition to list the Mexican gray wolf (*Canis lupis baileyi*) as an endangered subspecies or distinct population segment pursuant to the Endangered Species Act, 16 U.S.C. §§ 1531 et seq.

This petition is filed under 5 U.S.C. § 553(e) and 50 C.F.R. § 424.14 (1990), which grants interested parties the right to petition for issuance of a rule from the Assistant Secretary of the Interior. Petitioners also request that critical habitat be designated for the Mexican gray wolf concurrent with its listing, pursuant to 16 U.S.C. § 1533(a)(3)(A), 50 C.F.R. § 424.12, and pursuant to Section 553 of the Administrative Procedures Act, 5 U.S.C. § 553.

Petitioners understand that this petition action sets in motion a specific process placing definite response requirements on the U.S. Fish and Wildlife Service (FWS) and very specific time constraints upon those responses. This petition presents evidence that the Mexican gray wolf merits protection as a separate subspecies or as a distinct population segment under the Endangered Species Act.

Petitioner:

Center for Biological Diversity. Center for Biological Diversity ("Center") is a non-profit, 501(c)(3), international conservation organization based in Tucson, Arizona with over 220,000 members and online activists. The Center has been intimately involved with Mexican gray wolf recovery. The Center has submitted comments for the record and/or spoken at public meetings at every formal opportunity for public participation in policy formation since before reintroduction began in 1998. Center members and staff have spent thousands of hours in the field in historic and occupied Mexican wolf habitat, including the Blue Range Wolf Recovery Area, since 1998. Center members and staff have observed, heard and tracked Mexican wolves in the wild, studied their habitat use, and have sedulously tracked federal, state and local government policies, procedures and their on-the-ground effects on the Mexican wolf through (among other means) filing dozens of Freedom of Information Act and state open record act requests, and investigating conditions and management in the field.

Executive Summary

The Mexican gray wolf is the smallest and southernmost subspecies of gray wolf in North America, and is the most genetically and taxonomically distinct of extant gray wolves. Its historic range is not precisely known, but is believed to have consisted of the Sierra Madre archipelago in Mexico, the Sky Island Mountains of northern Mexico, southeastern Arizona and southwestern New Mexico, far western Texas and potentially the Mogollon Plateau of Arizona and New Mexico. It is likely that there was considerable movement across the boundaries of this range, including intergradation with wolves to the north.

Federal predator control eliminated breeding Mexican wolves from the U.S. in the 1920s; dispersing animals from the Republic of Mexico were never allowed to re-establish populations north of the border. Starting in 1950, U.S. Fish and Wildlife Service poisoning and shooting greatly diminished wolf numbers in Mexico, until by 1981 an estimated 30 or fewer survived; the subspecies is believed to have been extirpated from Mexico in the 1980s or 1990s (Brown, 1983; Robinson, *Predatory Bureaucracy*, 2005). A captive population that began with seven founding wolves, the last of which was caught in 1980, was bred in three lineages that were merged beginning in 1995 (Fredrickson & Hedrick, 2002).

In 1998, an "experimental, non-essential" population of Mexican gray wolves was reintroduced into the White Mountains of Arizona and New Mexico. Federal predator control has kept the reintroduced population suppressed; at the end of 2008, only 52 wolves and two breeding pairs existed in the wilds. Furthermore, predator control is undoing some of the effects of merging the three lineages in the wild population, and is thus perpetuating inbreeding depression – with concomitant small litter sizes, low body weight, and suspected infertility among males (Fredrickson & Hedrick 2002; Fredrickson et al. 2007).

Although currently listed as endangered along with all other wolves in the lower 48 states, excluding the northern Rocky Mountains and Great Lakes where wolves have or are in the process of being delisted, the Mexican gray wolf has currently not been formally protected as a subspecies or distinct population segment and is as a result receiving insufficient recovery attention. The Mexican wolf recovery plan, for example, has not been revised in over 25 years.

This listing petition reasserts the intention in the Endangered Species Act and implementing regulations that any designation of subspecies or DPS's should be for the purpose of conserving imperiled populations and their ecosystems. Petitioners request designation of the Mexican gray wolf as either an endangered subspecies or DPS. Petitioners also request concurrent designation of critical habitat, which is necessary for the Mexican wolf's conservation within the ecosystems on which it depends.

I. Introduction

The Mexican gray wolf was formally listed under the Endangered Species Act in 1976 (41 FR 17742), but subsumed in 1978, when the species as a whole south of Canada was listed (43 FR 9607). In 2003, listing of the gray wolf was modified to include three DPS, including a southwestern DPS (68 FR 15804). This rule was later overturned by two courts thereby removing the Mexican gray wolf's status as a DPS (Defenders of Wildlife v. Norton, 1:03-1348-JO, D. OR 2005; National Wildlife Federation v. Norton, 1:03-CV-340, D. VT. 2005). In recent rules designating and delisting Great Lakes and northern Rocky Mountains DPS of wolves, FWS nominally retains listing of the remainder of wolves in remainder of the lower 48 states, including the Mexican grey wolf. In so doing, however, FWS failed to issue a rule describing any listed entity besides the two populations to be delisted. This leaves the Mexican gray wolf's status unclear. This petition seeks to remedy this situation by petitioning to have the Mexican gray wolf listed as either a subspecies or distinct population segment.

The Mexican wolf is an engine of evolution and biological diversity for southwestern ecosystems, contributing to the strength and vigor of elk, the alertness of deer, and the agility and sense of balance of bighorn sheep. The "lobo" also provides carrion for scavenger species such as eagles, badgers and bears, and may subtly change the relationships between other species, such as foxes and coyotes, and between herbivores such as elk and the vegetation they utilize. In other regions, the restoration of gray wolves has been linked to increases in biological productivity and diversity.

As the southernmost and smallest gray wolf subspecies in North America, the Mexican wolf likely evolved to depend on the smaller ungulates, such as collared peccary (*Tayassu tajacu*) and Coues white-tailed deer (*Odocoileus virginianus couesi*). Mexican wolves may have adopted larger home ranges than other gray wolves to compensate for the sparser prey base in its arid range. (U.S. Fish and Wildlife Service 1982).

All Mexican wolves known in the world are either held in zoos and other facilities as part of a species survival plan in which they are bred, or exist in the wild as a result of reintroduction to the Blue Range Wolf Recovery Area (BRWRA).[1] Captive animals can undergo evolutionary degradation over time due to the selection for traits that are adaptable in captivity, but adverse in the wild, thus lowering survival and recruitment rates in future reintroduced populations. The reintroduction program, while intended to correct a historic mistake and save an endangered species and the ecosystems of which it is a part, has not been wholly successful. The wolves have proven successful at hunting natural prey, establishing home territories, reproducing, and raising pups. But the reintroduction program and the wolves' chances of success, have been undermined by excessive removal of wolves and a failure to take measures to prevent conflicts between wolves and livestock. As a result, the wild population suffers from low numbers, unnaturally limited distribution, inbreeding-depression, reduced breeding success, and a population decline since 2003.

In sum, absent the benefits of listing the Mexican wolf as endangered, the recovery efforts on behalf of the subspecies have proven inadequate to conserve it and the ecosystems on which it depends. This subspecies should therefore be returned to listed status under the ESA.

[1] The BRWRA is defined by the boundaries of the Apache National Forest in Arizona and New Mexico and the Gila National Forest in New Mexico.

II. Species Description

As previously noted, the Mexican gray wolf, or "lobo," is the southernmost and smallest subspecies of the gray wolf (*Canis lupus*) in North America. Adults weigh 50 to 90 lbs., average 4'6" to 5'6" in total length, and reach 26" to 32" in height at the shoulder. This subspecies exhibits a small skull, slender rostrum and widely spreading zygomata. Its winter pelage is buffy or tawny along flanks and on the outer surfaces of limbs, and pale pinkish buff heavily overlaid with black on upper parts. The Mexican wolf's short-furred face is a grizzled mixture of varying shades of tawny, buff, black and cinnamon, often richly rufescent (Young and Goldman 1944). In summer, Mexican wolves appear scraggly and can easily be mistaken for coyotes (*C. latrans*). In general, their skulls are less massive and dentition is lighter than that of other gray wolves. Altogether, the Mexican wolf's build and stature appears more gracile and lithe than that of other gray wolves.

III. Taxonomy

The Mexican gray wolf is a mammal in the order *Carnivora*, family *Canidae*, genus *Canis*, species *Canis lupus*, and subspecies *Canis lupus baileyi* (Young and Goldman 1944; Hall 1981; Bogan & Mehlhop 1983; Hoffmeister 1986; Nowak 1995; Leonard et al. 2004). Numerous studies conducted since the subspecies was originally described have universally recognized the Mexican gray wolf as a valid subspecies, including both studies using multivariate statistical analyses of morphological traits (Bogan & Mehlhop 1983; Hoffmeister 1986; Nowak 1995) and genetic analyses (Wayne et al. 1992; Garcia-Moreno et al. 1996; Hedrick et al. 1997; Leonard et al. 2004). Nowak (1995), for example, concluded that: "Quite different is the situation of baileyi, which lies almost entirely outside the range of variation of the other groups." And Garcia-Moreno et al. (1996) found that their molecular genetic analyses of Mexican gray wolves supported "their designation as an endangered subspecies." In sum, the Mexican gray wolf is a recognized subspecies of the gray wolf.

IV. Historic and Current Distribution

Before European settlement of North America, gray wolves roamed most of the conterminous United States, except for the Gulf coast region east of Texas where the red wolf (*Canis rufus*) occurred (Young and Goldman 1944, Nowak 1983). The Mexican gray wolf's historic range is not precisely known, but all researchers agree that it included the Sierra Madre Mountains in Mexico, almost as far south as Mexico City, and the Sky Island Mountains of northern Mexico, southeastern Arizona, southwestern New Mexico and southwestern Texas. Young and Goldman (1944) delineated the northern boundary of *C. l. baileyi* approximately at today's Interstate 10 where it crosses from New Mexico to Arizona. Bogan and Mehlhop (1983) extended the Mexican wolf's range to include the Mogollon Rim in Arizona, the entire southern half of New Mexico, and the Chihuahuan Desert of west Texas. Finally, based on extensive analysis of skulls, Nowak (1995) placed the boundary of the subspecies at just north of the Gila River.

Despite the efforts of the above studies to clearly demarcate the Mexican gray wolf's range, substantial evidence indicates that Mexican gray wolves regularly dispersed north of the above boundaries, suggesting that the Mexican gray wolf's range was fluid over time and will likely never be precisely known. Indeed, Nowak (1995) concluded: "It is likely that individuals from the geographic range of *baileyi* regularly dispersed into the range of [gray wolf] populations to the north and vice versa." Likewise, Leonard et al. (2004) in a study of mtDNA found that haplotypes characteristic of Mexican gray wolves were found over a large area well beyond recognized subspecific boundaries and concluded; "The wide distribution of the southern clade suggests that gene flow was extensive across the recognized limit of the subspecies," further stating that "Our results suggest that Mexican grey wolves or a mix of Canadian and Mexican grey wolves could be introduced to a wider area of the cUS to mimic past intergradation."

Currently, reintroduced Mexican wolves are limited to the BRWRA, which includes the Apache and Gila National Forests, as well as the adjacent Fort Apache Indian Reservation.

V. Natural History and Habitat Requirements

Gray wolves, including the Mexican gray wolf, are social animals, living in family groups called packs, which cooperate in preying on ungulates, and, individually and opportunistically, also feed on other mammals, birds, reptiles, fish and large invertebrates. Wolves are usually monogamous, become fertile at age two, and give birth once a year in the spring after a 63-day gestation period. They typically bear litters averaging about five pups in dens excavated from earth, in downed logs or in other geologic or vegetative features, or appropriated and enlarged after use by another animal. Adult wolves move pups from their den to a rendezvous site during their first summer, cooperate in rearing, and cultivate and inculcate the pups' hunting and social behaviors. Wolves establish home territories, which they delineate through urinary scent marking and through howling, and packs may attack and kill interloping wolves in their territory. Adult and subadult wolves often leave their natal packs through dispersal to locate other single wolves, establish their own packs and claim new territories. Wolves compete for carcasses with coyotes, mountain lions (*Puma concolor*), grizzly bears (*Ursus horriblis*), black bears *(U. americanus*), and jaguars (*Panthera onca*). Wolves have been known to be preyed upon by mountain lions, and to suffer fatal wounds from the ungulates they attack. Wolves have the physiological capacity to live fifteen or more years, although anthropogenic mortality (primarily) and natural hazards (secondarily) typically result in much shorter life spans. (Audubon & Bachman 1854; Mech 1970; Carbyn et al. 1995; Mech & Boitani 2003; Berger & Gese 2007)

In general, wolves can live anywhere that hosts an adequate prey base of ungulates and where humans do not kill them excessively. Given the historical and current pattern of scapegoating wolves that depredate, habitat without livestock or very low livestock numbers comprises the most secure habitat. Likewise, habitats that do not offer easy vehicular access are also favorable for wolf survival. Studies of roads impacts on wolf habitat in the northern Great Lakes region are likely to be applicable to the Mexican wolf, as well. Mladenoff et al. (1995) found that few portions of any wolf pack territory throughout this region were located in areas of road density greater than 0.45 km/km^2. Core areas (defined as 40 percent use) did not exceed road densities of 0.23 km/km^2 and no portion of any pack area was in an area of road density greater than 1.0 km/km^2. Thiel (1985) reported that wolves in Wisconsin could not survive in areas with road densities higher that 0.6 km/km^2. Jensen et al. (1986) documented a maximum road density for wolf occupancy of 0.6 km/km^2 on the Ontario-Michigan border. Mech et al. (1988) found wolves absent in northern Minnesota areas with road densities above 0.58 km/km^2. Mech (1989) later reported that wolves persisted in areas with road densities greater than 0.58 km/km^2 if they were adjacent to extensive roadless areas.

The Mexican gray wolf is capable of adapting to any natural ecosystem in the American Southwest or the highlands of the Republic of Mexico, as long as its range contains sufficient prey animals. Semi-arid grasslands, ponderosa parks, and piñon/juniper and oak woodlands – all of which may be expected to support natural ungulates – were the signature habitats of the Mexican wolf (Brown 1983; McBride 1980).

Wolves traveled between mountain ranges and may also have utilized desert habitats. Young (1944:276) recorded a wolf that lived from 1916 to 1924 in the Sonoran and Mojave deserts at 3,000 feet and lower elevation, subsisting on cattle and sheep. Arizona Department of Game and Fish wildlife manager Kim Murphy observed a wolf in May 1961 near Hyder, Arizona north of the Cabeza Prieta National Wildlife Refuge in southwestern Arizona (Murphy, personal communication).[2] Trapper Roy McBride killed a pair of wolves in Chihuahuan Desert, and recorded at least four wolf den sites[2] in Chihuahua, Mexico within Chihuahuan Desert, according to subsequent GPS analysis.

Because the arid landscapes in the Mexican wolf's range support ungulates at lower densities, Mexican wolves may have roamed larger home ranges than other wolves (U.S. Fish and Wildlife Service 1982; Mexican Wolf Blue Range Adaptive Management Oversight Committee & Interagency Field Team 2005; Mech & Boitani 2003).

VI. The Mexican Gray Wolf qualifies as a Distinct Population Segment

In addition to being recognized as a subspecies, the Mexican gray wolf also qualifies as a distinct population segment. To be considered for listing as an endangered DPS a population must be "discrete" in "relation to the remainder of the species to which it belongs" and "significant" to the species to which it belongs. 61 Fed. Reg. 4722, at 4725 (1996). According to Fish and Wildlife Service's current DPS policy regarding recognition of distinct vertebrate populations, a species is considered discrete if it is "markedly separated from other populations of the same taxon" because of "physical, physiological, ecological, or behavioral factors;" *or* if it is "delimited by international governmental boundaries within which differences in control of exploitation, management of habitat, conservation status, or regulatory mechanisms exist that are significant in light of Section 4(a)(1)(D)." *Id*. The policy further clarifies that a population need not have "absolute reproductive isolation" to be recognized as discrete. *Id.*, at 4724.

A population is considered significant based on, but not limited to, the following factors: 1) "persistence of the discrete population in an unusual or unique ecological setting;" 2) "loss of the discrete population would result in a significant gap in range;" 3) the population "represents the only surviving natural occurrence of an otherwise widespread population that was introduced;" or 4) the population "differs markedly in its genetic characteristics." *Id*., at 4725.

The ensuing discussion demonstrates that the Mexican gray wolf is markedly separated from other populations of the same taxon because of physical, physiological, ecological and behavioral factors; and therefore that it is discrete. We also demonstrate that the population persists in an unusual or unique ecological setting, helps fill an enormous, and therefore significant range gap, and is markedly different genetically; and therefore that it is significant.

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[2] According to Mr. Murphy, fellow AZDGF employees Don Smith and Don Moon, both now deceased, also saw the wolf on the same occasion.

[2] the first in Chihuahuan Desertscrub as defined by Brown, Lowe, Pace, and the other three in Chihuahuan Desert as defined by the Nature Conservancy ecoregions map): Tierras Prietas (Lat 30.75 Long 107.05); Casas Grandes (Lat 30.3667 Long 107.95); Colonia Juárez (Lat 30.31667 Long 108.0833);.Namiquipa (Lat 29.25 Long 107.4167). (Brown 1983:150; with his locations identified separately via GPS

1. Discreteness. The Mexican gray wolf is markedly separate from other gray wolves because of physical, physiological, ecological and behavioral factors. The reintroduced population is over 700 miles from the nearest other wolves in the northern Rockies, which is farther than the longest recorded dispersal distance of wolves (see Leonard et al. 2004). Even if wolves were to disperse this distance, it would be a rare event and would not disqualify the population from being considered discrete.

2. Significance. The Mexican gray wolf is significant because it occurs in an unusual and unique ecological setting. The vegetation, prey and climate in the range of the Mexican gray wolf are all highly unique when compared to the remainder of the gray wolf's range in North America. According to Bailey (1995), the range of the Mexican gray wolf includes a combination of four primary ecosystem provinces, including the 1.) "Arizona-New Mexico Mountains Semidesert--Open Woodland-- Coniferous Forest--Alpine Meadow Province," 2.) "Colorado Plateau Semidesert Province," 3.) "American Semidesert and Desert Province," and 4.) "Chihuahuan Desert Province". By comparison, wolves in the Great Lakes our found in the "Laurentian Mixed Forest Province" and wolves in the northern Rockies are found in the "Northern Rocky Mountain Forest-Steppe--Coniferous Forest--Alpine Meadow Province" and "Middle Rocky Mountain Steppe--Coniferous Forest--Alpine Meadow Province" (Bailey 1995).

The vegetation of the mountains of Arizona and New Mexico share some similarities to the mountains of the northern Rockies where wolves are found. These vegetation communities, however, are found at higher elevations in the Mexican gray wolf's range and also contain a mix of Mexican pines and other species that are not found in the northern Rockies (Bailey 1995). At lower elevations, vegetation in the range of the Mexican gray wolf is substantially different than the northern Rockies with desert vegetation, woodlands and grasslands that reflect a more arid climate than in the northern Rocky Mountains (Bailey 1995). Vegetation in the range of the Mexican gray wolf shares few characteristics with the vegetation found in the range of wolves in the Great Lakes, which is characterized by a mix of boreal forest and eastern deciduous forest (Bailey 1995).

Likewise, there are substantial differences in climate between the range of the Mexican gray wolf, where winters are milder, there is less precipitation, and overall temperatures are warmer, than in either the northern Rockies or Great Lakes (Bailey 1995). Generally, the Mexican gray wolf occurs in a more arid landscape than other wolf populations. The Mexican wolf adapts to this more arid landscapes in part by having larger home ranges than other wolf populations (Mexican Wolf Blue Range Adaptive Management Oversight Committee & Interagency Field Team, 2005:TC-10,16; Mech & Boitani, 2003:20-22).

Perhaps the most important differences between the range of the Mexican gray wolf and other areas where wolves occur is in the composition of prey species. The prey base in *baileyi*'s range (as recognized by Young and Goldman 1944, Leopold 1959, Hall 1959, 1981, Nowak 1995) includes collared peccary (*Tayassu tajacu*) and Coues white-tailed deer (*Odocoileus virginianus couesi*), both of which are among the smallest of ungulates species in North America. These correspondences suggest that the Mexican wolf's small size is intimately linked to its preying on smaller ungulates, which are in turn connected to the drier types of habitats in which the Mexican wolf evolved.

The Mexican gray wolf's range is also home to a large diversity of ungulate species: bison (*Bison bison*), elk (*Cervus elaphus*), mule deer (*Odocoileus hemionus*), Coues white-tailed deer (*O. virginianus couesi)*, pronghorn (*Antilocapra americana*), bighorn sheep (*Ovis canadensis*), and collared peccary (*Tayassu tajacu*). Nowhere else in North America do these seven species coexist, each of them potential prey for gray wolves. For all of these reasons and others, the Mexican gray wolf occurs in a unique or unusual ecological setting.

The petitioned DPS is significant because its loss would result in a significant gap in the range of the species. The gray wolf once ranged throughout North America from the arctic down into Mexico nearly to Mexico City. The only area where gray wolves were believed to not have occurred is the southeastern U.S., where the red wolf was found. The gray wolf was extirpated from the entire southern portion of its range nearly to the border with Canada, or in other words all of Mexico and nearly the entire United States. The reintroduction of the Mexican gray wolf extends the range of the gray wolf by nearly 700 miles into its historic range. Loss of this population would thus create a highly significant gap in the range of the species. This gap is also significant because it includes habitats that are unique for the species and harbors a wolf population with marked genetic differences.

Finally, the Mexican gray wolf is significant because it is markedly different in its genetic characteristics. Leonard et al., (2004) compared mtDNA from museum specimens of Mexican gray wolves, as well as wolves from the extirpated portion of the interior U.S., with mtDNA from extant wolves and coyotes from Canada, Alaska and Europe, and identified four unique haplotypes that define "a unique southern clade." The authors conclude:

> "The divergence within this southern clade ranges from two to six substitutions (0.5-1.4%) and although bootstrap support is weak in the neighbour-joining tree, the clade was present in the maximum likelihood tree and 99% of the most parsimonious trees."

One purpose of the study by Leonard et al., (2004) was to determine whether the decline of the wolf from the U.S. and Mexico had resulted in loss of genetic diversity, speculating that the high mobility of the wolf and the relatively large number of wolves remaining in Canada may have mitigated loss of range in terms of genetic diversity. Instead, the authors found that the portion of range lost, namely Mexico and the southwestern U.S., contained more genetic diversity than where wolves are currently extant, reflecting the fact that these areas had served as Pleistocene refugium. Leonard et al., (2004) stated:

> "Therefore, an unfortunate consequence of southern cUS and Mexico being a late Pleistocene refugium is that the eradication of grey wolves from these areas disproportionately affected the current genetic diversity of North American grey wolves… *Consequently, with regard to genetic diversity, refugial populations should have high priority for conservation.*" (Emphasis added).

In other words, the reintroduced population of Mexican gray wolves harbors genetic diversity not found in any other wolf population and is thus highly significant. For all of the above reasons, the Mexican gray wolf qualifies as a distinct population segment.

Finally, Mexican wolves are significant because they profoundly influence the ecosystems they occupy (Miller et al. 2001; Ripple & Beschta 2003, 2004; Hebblewhite et al. 2005; Ray et al. 2005). By primarily preying on vulnerable ungulates, wolves allow greater numbers of healthier, more robust and more alert animals to survive and pass on the genes that determine these adaptive attributes. Wolves may prevent the spread of epizootic diseases amongst prey species through culling sick animals before they infect others (White & Garrott 2005). Prey animals also modify their behavior, distribution and movements in response to wolves. In Yellowstone National Park, the 1995 reintroduction of wolves has led elk (*Cervus elaphus*) to spend less time in low-visibility areas where they are more vulnerable to surprise attack, such as in valleys with steep embankments, and this has resulted in growth of riparian trees that previously were eaten as saplings. Such localized reduction in elk herbivory has provided trees for food and dams for beavers (*Castor canadensis*), and those dams in turn have increased riparian extent (Ripple & Beschta 2003, 2004). Birds have increased from the re-growth of trees along stream banks, and fish have benefitted from the beavers' transformation of the hydrology and from the trees' shading of streambanks (Berger et al. 2001; Hebblewhite et al. 2005).

Another series of changes in Yellowstone similarly precipitated by wolves' presence involves the competitive relationships between canines: wolves kill coyotes, and coyotes kill foxes (*vulpes ssp.*), but wolves apparently do not view foxes as competitors and don't consistently attack them. Wolf reintroduction led to declines in coyote numbers where wolf packs established, and may result in an increase in foxes (Smith et al. 2003; Berger & Gese 2007).

VII. Population Status

The wild Mexican gray wolf population comprised approximately 52 animals and two breeding pairs at the end of 2008[3]. The population was projected to reach 102 wolves, including 18 breeding pairs, by end of 2006, but has not reached that level because of the combined effects of federal predator control and private poaching.

In total since reintroduction began, 100 captive-born wolves have been released into the wild. Mortality has overwhelmingly been due to anthropogenic causes: 11 wolves have been shot in authorized federal predator control actions, 18 wolves (including a litter of five pups conceived in the wild and born in captivity) have died inadvertently due to capture, 32 wolves are known to have been shot illegally, and 12 wolves have been killed in vehicle strikes, for a total of 73 wolves. In addition, 37 other wolves have been captured alive and not re-released; nine of those have died from age-related ailments and most of the others will never be released. Comparatively few wolves have died of natural causes: five mortalities to non-predatory natural deaths, and two killed by mountain lions.[3]

The impact of human-caused mortality (N=73) on population growth from 1998 – 2008 is profound. Given that the population was predicted to exceed 100 animals in the wild by 2006, human-caused mortality more than accounts for the deficit in sheer numbers of animals in the wild population. When the number of management related mortalities (N=29) is combined with the number of non-lethal removals (N=37), it is clear that management removals are the primary hindrance to population growth to date.

The population has also undergone significant fluctuation from the end of 2003 to the end of 2008, as indicated by the chart below.

[3] According to the definition of breeding pair in 63 Fed. Reg. 1752 at 1771 (1998)

[3] An additional mortality sometimes attributed to a rattlesnake bite actually resulted from asphyxiation by radio collar, after the wolf's neck swelled from the snake venom; there is no way to know whether the alpha male of the Lupine Pack would have survived absent this anthropogenic factor.

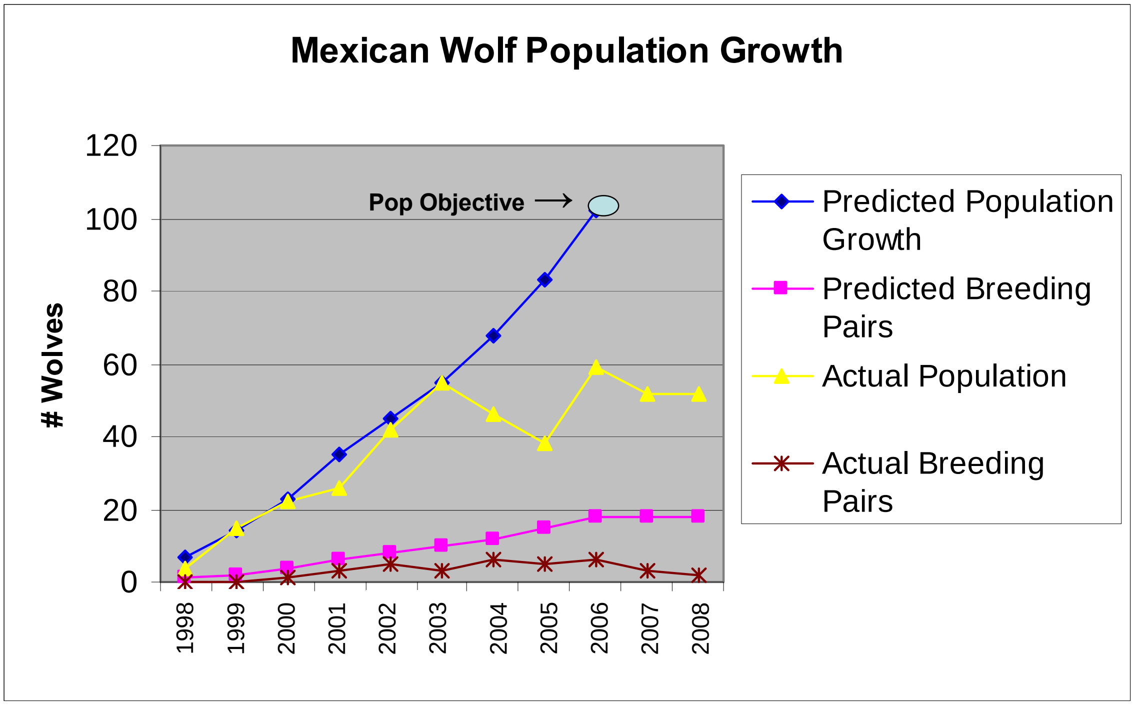

Figure 2. Mexican Wolf Population Growth, 1998 – 2008. Projected end-of-year figures from *Final Environmental Impact Statement on Reintroduction of the Mexican Wolf* (U.S. Fish and Wildlife Service 1996). Actual figures from end-of-year counts conducted by Mexican wolf interagency field team and published in annual reports,, with a breeding pair adjustment of minus one in 2006 and 2007 to comply with Federal Register (U.S. Fish and Wildlife Service 1998) definition of breeding pair for consistency.

The Mexican gray wolf population shows effects of inbreeding depression, including low litter size, possible infertility in some males and low body weights (Fredrickson & Hedrick 2002; Fredrickson et al. 2007). This population is clearly at risk of extinction from stochastic and genetic factors, and their synergistic effects, independent of the current high mortality and removal rates resulting from federal predator control and illegal killings (Parsons & Ossorio 2007; Vucetich et al. 1997).

VIII. ESA Listing Factor Analysis for the Mexican Gray Wolf Subspecies.

The Mexican gray wolf is in danger of extinction due to four of the five factors set forth at 16 U.S.C. § 1533(a)(1)(A-E) which test whether it qualifies as an endangered species. This subspecies needs to meet only one of these factors to qualify for ESA listing. In addition to analysis under these five factors, FWS is required to make listing determinations "solely on the basis of the best scientific and commercial data available," without reference to the possible economic or other impacts of such a determination. 16 U.S.C. § 1533(b)(1)(A); 50 C.F.R. § 424.11(c).

The primary threat facing the Mexican gray wolf subspecies in the wild is human persecution as a response to potential or actual conflict with domestic livestock and negative attitudes towards wolves.

Continued degradation and fragmentation of habitat also pose long-term threats (Carroll et al. 2006) that should be addressed through critical habitat designation. Below, we explore each applicable category of threat as it applies to the Mexican wolf, and as it applies to the need to designate critical habitat.

1. Present or threatened destruction, modification or curtailment of the Mexican gray wolf's habitat or range. Habitat within the range of the Mexican gray wolf is undergoing adverse modification, curtailment and destruction, and this threat is escalating.

Habitat fragmentation. Human impacts pervade most North American ecosystems. Exploration and development of oil and gas, minerals, and forest products; the expansion of rural and suburban housing; and increases in leisure, travel, and recreation activities have resulted in a greater presence of people across areas that were once exclusive habitat for native flora and fauna (Ceballos and Ehrlich 2002). The range of potential and documented effects is extensive and often varies across species, populations, and time, including seasons or following a period of exposure (Blumstein et al. 2003, Beale and Monaghan 2004).

The construction of facilities, such as roads, trails, or buildings, and increased presence of humans, beyond some threshold, will result in a direct loss of habitats, or indirectly following avoidance behavior of affected wildlife (McLellan and Shackelton 1988, Cameron et al. 1992, Mace and Waller 1996, Stevens and Boness 2003). Human facilities, especially roads, trails, pipelines and other linear developments, also can fragment and isolate habitats (Baldwin et al. 2004, Deng and Zheng 2004, Jedrzejewski et al. 2004, McDonald and St. Clair 2004, Vistnes et al. 2004).

In addition to a loss or reduction in the effectiveness of habitats, disturbance may result in response behaviors with negative social or physiological consequences (Van Dyke et al. 1986, Skogland and Grøvan 1988, Bradshaw et al. 1997). Disruption of breeding or rearing activities, for example, can reduce fecundity and recruitment (White and Thurow 1985, Goodrich and Berger 1994, Linnell et al. 2000, Mullner et al. 2004). The nutritional or hormonal costs of avoiding or responding to a disturbance may have cumulative and important implications for individual fitness and population productivity (MacArthur et al. 1979, Fowler 1999, Kerley et al. 2002, Constantine et al. 2004). More directly, human access can increase mortality through non-monitored and controlled hunting, vehicle collisions, or the removal or destruction of problem animals (Johnson and Todd 1977, Johnson 1985, Del Frate and Spraker 1991, Wilkie et al. 2000, Johnson et al. 2004). Human presence and activities also can alter interspecific interactions, namely rates of predation (Rich et al. 1994, James and Stuart-Smith 2000, Marchand and Litvaitis 2004).

Developed areas also create disturbance zones that extend beyond the actual development and into adjacent natural habitat. Predation by household pets (cats are particularly destructive), the spread of noxious weeds, increases in aggressive human-adapted species (e.g., raccoons, *Procyon lotor*, striped skunks, *Mephitis mephitis*, or starlings, *Sturnus vulgaris*), introduction of detrimental wildlife attractions (e.g., trash cans), and increases in recreational activity surrounding developed areas greatly affect ecological integrity (Knight 1995). The extended zone of negative effect for songbirds and medium-sized mammals is similar around low-density housing development and dense development; indeed, low-density housing may produce a greater overall impact due to the larger landscape area required (Odell and Knight 2001).

Studies of the cumulative impacts of human developments (mines, other energy extractive developments, housing developments) on large carnivores indicate that such developments have a significant negative impact on habitat effectiveness. In one study, wolves strongly avoided major developments (Johnson et al. 2005). Since social carnivores such as wolves often require larger territories than solitary species of similar size, they may be even more vulnerable to landscape fragmentation (Carrol et al 2003).

Carroll et al. (2006) made clear that suitable breeding habitat, or what Vucetich et al (2006) call high-density wolf habitat, within the historic range of the Mexican wolf subspecies is threatened by future development trends. In particular, their model suggested that development trends over 25 years could significantly depress a future New Mexico wolf population (Carroll et al. 2006). Several aspects of human development—including roads and the border wall—significantly fragment Mexican wolf range and habitat.

Roads and off-road vehicle route creation and access. Roads are known to have significant harmful effects on native species and ecosystem function (Schoenwald-Cox and Buechner 1992, Trombulak and Frissell 2000). The negative impacts of roads include:

- Greater human access to habitat interiors for activities such as fuel-wood gathering, hunting, poaching, plant gathering, and motorized recreation in those areas (Lyon 1983; Trombulak and Frissell 2000);
- Increased dispersal of some edge-adapted, weedy, aggressive, predatory, and parasitic species due to the travel corridor effect (Tysor and Worley 1992, Parendes and Jones 2000);
- Increased wildlife mortality due to automobile collisions (Bangs et al. 1989, Fuller 1989);
- Reduced species mobility, including both small and large animals, due to the barrier effect (Fahrig et al. 1995, Foster and Humphrey 1995);
- Increased sediment and pollution runoff into nearby streams and wetlands (Bauer 1985; Forman and Deblinger 2000);
- Increased likelihood of severe erosion of roads on steep slopes (Trombulak and Frissell 2000).

These factors interact in myriad ways, fragmenting and isolating natural habitat, leaving formerly intact vegetation patches subdivided and creating a "road effect zone" that changes the habitat conditions and species compositions well into the interiors of adjacent natural habitat (Reed et al. 1996, Forman 2000).

The relative impact of roads is influenced by a variety of factors, including type (dirt or paved) and width of road, volume and speed of traffic, and areal road density. Management options such as road closure during animal breeding or "mud season" may mitigate some negative ecological effects, but still fail to address the cumulative impacts of the vast reach of road networks. Further, roads provide a means of ingress for humans that may ultimately result in harm to wolves (Lyon 1983; Trombulak and Frissell 2000). For example, many if not most of the 32 Mexican wolves known to have been killed illegally were apparently shot alongside roads; petitioners are aware of only one of those animals known to have been shot in a roadless area. Within the range of the Mexican wolf, roads and other vehicular trails have fragmented the landscape, and although wolves are highly adaptive habitat generalists, the ubiquity of roads may have a significant impact on the long-term viability of a restored Mexican wolf population (Carroll et al. 2006).

Collisions with vehicles. Studies in Italy have found that collisions with vehicles are the primary detectible source of mortality for wolves there (Lovari et al. 2007). In Canada, studies have shown that collisions with vehicles are a significant cause of mortality for large carnivores (Waters 1988, Kansas et al. 1989, Woods 1991, Gibeau 1993, Paquet 1993, Thurber 1994). Further, studies suggest a correlation between time spent on the roadway and probability of lethal collisions (Waller 2005). A total of 12 Mexican wolves have died due to vehicle collisions since the outset of the reintroduction program, a rate of more than one per year in a very small population that is situated in an area that has one of the lightest road densities of all landscapes within the Mexican wolf's range. These deaths are part of the impact of a road network that fragments habitat used by such a wide-ranging animal as the wolf.

Effects of roads on wolf and prey habitat use and distribution. Studies of a wide variety of species demonstrate that high road densities lower the likelihood of wildlife persistence due to an aversion to roads or negative impacts from increased human hunting, poaching, and harassment (Lyon 1983, Van Dyke et al. 1986, McClellan and Shackleton 1988). Indirect impacts from roads such as habitat fragmentation, direct habitat loss, increased human development, increased motorized access, and habitat displacement also account for substantial human-caused mortality of predators (Ruediger 1996). A study of the effects of roads and trails on the behavior of wolves in Jasper National Park (Canada) suggests that, although roads and trails were not complete impediments to wolf movement, they altered wolf movements across their territories (Whittington et al. 2004). Notably, wolves in this study avoided crossing high use roads and trails more than they avoided crossing low use roads and trails, indicating a clear impact on habitat quality as it relates to wolves.

Roads and road density may also affect wolves indirectly, via their impacts upon prey species such as elk. Wildlife biologists have been researching the relationship between roads and elk in the Western United States for several decades. This research overwhelmingly demonstrates that elk avoid forest roads (Lyon 1983, Thomas et al. 1979, Christensen et al. 1993, Lyon and Jensen 1980). Elk aversion to roads is mostly associated with vehicular traffic. Therefore closing (or obliterating) roads is an important management option for improving elk habitat. Lyon (1983) showed that elk habitat effectiveness could be expected to decrease by at least 25% with a density of one mile of road per square mile of land (m/m^2), and by at least 50% with a density of 2 m/m^2. This same study concluded that the best method for obtaining full use of habitat is effective road closures.

Most of the BRWRA outside of designated Wilderness Areas are open and accessible to vehicular use, and off-road vehicle drivers are creating new vehicle routes on a continuous basis out of pedestrian and equestrian trails and across open terrain. Nearly 80% (>800,000 hectares) of the Apache-Sitgreaves NF and nearly 72% of the Gila NF (~790,000 hectares) are open to Off-Highway Vehicle (OHV) traffic (USFS 2004). The proliferation of roads and vehicle routes modifies wolf habitat by reducing areas in which wolves and their prey may be secure from poachers and from traffic. As discussed previously, roads provide a means of ingress for humans that may ultimately result in harm to wolves (Lyon 1983; Trombulak and Frissell 2000).

Studies of roads impacts on wolf habitat in the northern Great Lakes region are likely to be applicable to the Mexican wolf, as well. Studies suggest that wolves generally do not persist where road densities exceed 0.45 km/km^2 (Mladenoff et al. 1995, Potvin et al. 2005). Assuming the road impacts on Great Lakes wolves are equally applicable to Mexican wolves, road densities of many federally managed lands within Arizona and New Mexico are presently trending above the threshold limit identified by Mlandenoff et al; as discussed in Carroll, et al. (2006). This trend threatens to reduce significantly the amount and quality of habitat available for Mexican wolves by 2025. In particular, the road density within significant parts of the Sky Islands ecosystem of southeastern Arizona would likely preclude wolf survival presently. The Arizona Department of Game and Fish (Johnson et al. 1992) studied three broad areas of the Sky Islands for their potential to support wolves, and listed road densities in each area according to kilometers of road/square kilometer. The Galiuro/Pinaleno Mountain had 1.45 km/km^2, Chiricahua Mountains 1.77 km/km^2, and Atascosa/Patagonia Mountains 2.25 km/km^2 of road. These parts of the Sky Islands would need significant restoration (i.e. road closure or removal and revegetation) in order to support wolf persistence. Yet, given the ongoing proliferation of roads and motorized trails within the range of the Mexican wolf, it is reasonable to expect that increasing road density will continue to threaten wolf habitat.

Wildlife-proof border wall. In 2008, the U.S. Department of Homeland Security installed multiple several-mile segments of a double-layer steel wall along the U.S. - Mexico border that will block movements of Mexican gray wolves, and thereby drastically curtail their ability to access and use habitats in the Republic of Mexico, in which most of the Mexican wolf's historic range occurs. As construction of the border wall continues, Mexican wolf habitat faces significant threat of further curtailment (Bies 2007; McCain & Childs 2008; Flesch et al. 2009).

Livestock grazing. Livestock and associated management drastically degrade western ecosystems (Fleischner 1994; Noss & Cooperrider 1994; Donahue 1999). In arid regions, livestock degrade riparian areas and hydrological function through herbivory and trampling, which removes vegetation and renders the ground less porous. Livestock grazing ultimately destroys riparian areas and reduces the populations of native prey of wolves, such as elk and beaver, which are commonly associated with riparian forests and adjacent uplands. Through removing grasses, livestock also drastically reduce fire frequency, enabling the growth of woody thickets that will support fewer elk than the park-like grasslands they replace; when fires eventually burn these thickets, the ensuing conflagration may scorch the soil so much hotter than a grassfire would that it may render the area even less amenable to ungulates, and hence to wolves. Noss and Cooperrider (1994:230) state that livestock grazing is the "most insidious and pervasive threat to biodiversity on rangelands."

Despite ongoing degradation and loss of Mexican wolf habitat and range to livestock, federal and state agencies maintain high stocking rates and forage allocations for stock within the Blue Range Wolf Recovery Area and other lands that are necessary for survival and recovery of the Mexican wolf. In 1996, livestock grazed roughly 69% of the BRWRA (U.S. Fish and Wildlife Service 1996), most of it year-round, leaving Mexican wolves little spatial or temporal respite from stock.

Other threats to habitat and range. Residential and commercial development, gargantuan open-pit copper mines and associated tailings ponds, and row-crop agriculture are destroying, degrading and curtailing the Mexican wolf's habitat and range, and will likely continue to do so in the future. For example, copper mines and associated tailings ponds south and east of Silver City, New Mexico, at Morenci, Arizona,[4] and southwest of Tucson, Arizona[5] have obliterated historic Mexican wolf habitat and block potential movement of wolves between mountain ranges, thus curtailing use of their historic

[4] For more information, see: http://www.mining-technology.com/projects/morenci/ (Accessed July 14, 2009)

[5] For more information, see http://www.elmhurst.edu/~chm/vchembook/330copper.html (Accessed July 14, 2009).

habitats in the Sky Islands region. Another such mine is being excavated north of Safford, Arizona, and another mine is being planned at the edge of the Santa Rita Mountains of Arizona.

As discussed above, human development often yields a direct loss of habitats, or indirectly following avoidance behavior of affected wildlife (McLellan and Shackelton 1988, Cameron et al. 1992, Mace and Waller 1996, Stevens and Boness 2003). Further roads, trails, pipelines and other linear developments often associated with mines can fragment and isolate habitats (Baldwin et al. 2004, Deng and Zheng 2004, Jedrzejewski et al. 2004, McDonald and St. Clair 2004, Vistnes et al. 2004).

Studies of the cumulative impacts of human developments (mines, other energy extractive developments, housing developments) on large carnivores indicate that such developments have a significant negative impact on habitat effectiveness. In one study, wolves strongly avoided major developments (Johnson et al. 2005). Since social carnivores such as wolves often require larger territories than solitary species of similar size, they may be even more vulnerable to landscape fragmentation (Carroll et al 2003).

With similar efficacy in fragmenting wolf ranges, exurban development outside Silver City and Deming, New Mexico and Tucson, Arizona (among other towns) is likely to curtail wolves' access to and re-occupancy of historic ranges. Residential subdivisions increase vehicle use, further fragmenting wildlife habitats. Fuller et al. (1992) were the first to incorporate human density into studying wolf occupancy thresholds. They found that the higher the human population density, the lower the threshold for persistence of wolves; with a maximum threshold of 0.7 km of roads/km^2 with 4 humans/km^2, or 0.5 km of roads/km^2 with 8 humans/km^2. Moreover, maintained and irrigated cotton fields in the Bootheel region of New Mexico no longer provide habitat for wolf prey such as deer and javelina, and thus are being eliminated as Mexican wolf habitat.[6]

In addition to the Mexican wolf habitats that are being paved for development, excavated for mining, and cleared and planted for agriculture, additional habitats consisting of riparian areas are destroyed and severely modified as a result of the water depletion entailed by mining, sprawl development and irrigated agriculture. The water derives from surface (streams and rivers) and underground (aquifers) sources, and its depletion is resulting in the destruction of such historic Mexican wolf habitat as the riparian forests alongside the San Pedro River in Arizona, and threatening the riparian forests alongside the Gila River in New Mexico and Arizona (Pepin et al 2002).

Grasslands and riparian areas are also undergoing modification and destruction as a result of the proliferation of non-native vegetation. Cheatgrass (*Bromus tectorum*) is spreading throughout the historic range of the Mexican wolf, including in the Blue Range Wolf Recovery Area. Cheatgrass replaces native grass species and does not provide the same grazing value to ungulates such as elk and pronghorn (Billings 1994; Donahue 1999). As these ungulates decline, the habitat becomes less useable for wolves as well. Similarly, tamarisk (*Tamarix gallica*) is spreading along streamsides in Mexican wolf range, including the Gila and San Francisco River drainages. Tamarisk is less edible for elk, beaver and other wolf prey species than the native riparian vegetation such as cottonwoods (*Populus ssp.*) and willows (*Salix ssp.*) which tamarisk displaces.

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[6] For more information, see: http://southwestfarmpress.com/mag/farming_new_mexicos_cotton/ (Accessed July 14, 2009)

2. <u>Disease and Predation</u>.

A number of viral, fungal, and bacterial diseases and endo- and ectoparasites have been documented in gray wolf populations (Kreeger 2003). Typically, diseases are transmitted through direct contact (e.g., feces, urine, or saliva) with an infected animal, or by aerosol routes. Parasites are picked up through water, food sources, or direct contact; wolves are able to tolerate a number of parasites, such as tapeworms or ticks, but at times, such organisms are lethal (Kreeger 2003). Although the taxon is generally susceptible to these diseases, only canine distemper and canine parvovirus have been documented in the wild population of Mexican wolves in the BRWRA.

Canine distemper, caused by a paramyxovirus, is a febrile disease typically transmitted by aerosol routes or direct contact with urine, feces, and nasal exudates. Symptoms of distemper may include fever, loss of appetite, loss of coordination (ataxia), shortness of breath (dyspnea), swollen feet, and eye and nose discharge. Death from distemper is usually caused by neurological complications (e.g., paralysis, seizures). Once an animal is infected, distemper is untreatable. Although wolf populations are known to be exposed to the virus in the wild, mortality from distemper in wild wolves is uncommon.

Two Mexican wolf pups brought to a wolf management facility in 2000 from the wild were diagnosed with distemper, indicating they were exposed to the disease in the wild and died in captivity (AMOC and IFT: TC-12). These are the only known mortalities due to distemper documented in relation to the Blue Range population, and are considered captive deaths rather than wild mortalities (U.S. Fish & Wildlife Service 2008: Population Statistics).

Canine parvovirus is an infectious disease caused by a virus that results in severe gastrointestinal and myocardial (heart disease) symptoms. Canine parvovirus can be transmitted between canids (e.g., wolves, coyotes, dogs), but not to other hosts such as humans or cats (although there are other strains of parvovirus that can infect both). Canine parvovirus is typically transmitted through contact with feces or vomit, where it can survive for months. Symptoms of an infected adult animal may include severe vomiting and diarrhea, resulting in death due to dehydration or electrolyte imbalance. Pups may die from myocardial (heart) disease if infected with canine parvovirus while *in utero* or soon after birth from cardiac arrhythmias. Although canine parvovirus has been documented in wild wolf populations, there are few documented mortalities due to parvovirus; it is hypothesized that parvovirus is a survivable disease, although less so in pups. Captive wolves have been successfully treated with fluid therapy until symptoms abated.

Three Mexican wolf pups brought to wolf management facilities from the wild died from canine parvovirus in 1999, indicating that they had been exposed to the disease in the wild (AMOC and IFT 2005: TC-12). Mortality from canine parvovirus has otherwise not been documented in the Blue Range population.

3. <u>Inadequacy of Existing Regulatory Mechanisms</u>. Existing regulatory mechanisms greatly imperil the Mexican gray wolf, as demonstrated below.

U.S. Fish and Wildlife Service. On January 12, 1998, the U.S. Fish and Wildlife Service issued a final rule for the reintroduction of the Mexican gray wolf (63 Fed. Reg. 1752 (1998)) that includes provisions that have since been shown to block conservation of the subspecies. The 1998 rule designates the wolves as "experimental, non-essential" under Section 10(j) of the Endangered

Species Act, 16 U.S.C. § 1539(j). The rule authorizes federal take of wolves without any demographic threshold that would ensure a minimal number of individual wolves and breeding pairs survive. Furthermore, the rule fails to set forth any criteria for maintaining or enhancing the genetic diversity of the population. As a result, the population has declined over the past five years, increasing the risk of stochastic extinction, and wolf numbers and breeding pairs remain below the established objective and predictions. The rule requires the Fish and Wildlife Service to remove from the wild wolves that establish territories on public lands wholly outside of the BRWRA or on any tribal or private lands outside the recovery area where landowners request their removal. Not only has this provision cost the lives of several wolves, but by blocking wolves from all parts of the Mexican wolf's core historic range, the rule prevents Mexican wolves from contact with the landscape in which they evolved. These xeric landscapes and the unique evolutionary pressures they exert on wolves may enable perpetuation of the Mexican wolf's unique genome, and thus may be necessary for the survival and recovery of the Mexican wolf (Povilitis et al. 2006).

The rule fails to require livestock owners to remove or render inedible the carcasses of livestock that die of non-wolf causes, and that wolves may scavenge upon. Such scavenging may predispose wolves to prey on livestock and be subject to predator control (Paquet et al. 2001).[5] Paquet et al. (2001:67) reported that within the first three years of the Mexican wolf reintroduction program "at least 3 packs were removed from the wild because they scavenged on dead livestock on national forest lands."

The rule prohibits the release of wolves from the captive breeding population into the New Mexico portion of the BRWRA, despite the need to release wolves with valuable genetic background from the captive pool into the wild, and the lack of available (i.e. not already occupied by resident wolves), authorized locales for such releases in Arizona. Each one of these deleterious provisions in the rule has been criticized in the program's independent Three-year Review, also referred to as the *Paquet Report* (Paquet et al. 2001) and characterized as imperiling the population; in particular, Paquet et al. described rescission of the provision requiring removal of wolves that establish territories outside the boundaries as necessary to allow the wolf population to become viable.

An assessment of the progress of the BRWRA Mexican gray wolf reintroduction project by Parsons and Ossorio (2007), presented at the 19th Annual North American Wolf Conference and the 87th Annual Meeting of the American Society of Mammalogists, showed that in the absence of continued new releases of wolves the population would continue to decline. They also documented that actual releases (99) had far exceeded expected releases (66) and occurred for four years beyond expectations set forth in the final EIS. Management-related taking of Mexican wolves under provisions of the non-essential experimental population rule is the primary cause of the failure to reach the reintroduction objective. Irrespective of whether wolf removals are carried out by lethal or non-lethal control, each time FWS removes a wolf from the wild, the overall number of individuals decreases, leaving the wild population incrementally less viable. "From the perspective of a free-ranging population, returning a wolf to captivity…is equivalent to a mortality event." (Mexican Wolf Recovery: Three-Year Program Review and Assessment:30). "Human-caused mortality can…be an important limiting factor [in population viability]." (Paquet et al., 2001 at 29).

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[5] The Mexican Wolf Blue Range Adaptive Management Oversight Committee and Interagency Field Team (AMOC/IFT) (2005) were agnostic on whether scavenging increases the likelihood of depredations but relied on faulty data. For example, Fish and Wildlife Service documents reveal that wolf 592, which AMOC/IFT showed as depredating prior to scavenging, had actually scavenged prior to depredating. Other wolves' histories were similarly misrepresented in AMOC/IFT.

Finally, current regulatory mechanisms have failed to adequately curtail the incidence of poaching that impacts the imperiled wild population of the Mexican wolf subspecies. Since reintroduction began, poachers have killed at least 32 wolves. Poaching is a significant threat to the success of the recovery program, and without enforcement that is more robust, such illegal activity may continue to thwart recovery.

United States Forest Service. The Forest Service authorizes livestock grazing in the Gila and Apache National Forests, but does not require any management that would reduce and prevent conflicts between Mexican wolves and livestock, and thus reduce the high rate of federal wolf removal. Removing livestock carcasses before wolves scavenge on them and employing herders during calving season are two straight-forward measures that would enhance wolf survival but are not required in Forest Service grazing regulations (Paquet et al. 2001, at 54). The Forest Service also allows the proliferation of roads and all-terrain vehicle routes that curtail the areas in which wolves may seek safety from poachers. Existing regulations pertaining to the Gila and Apache National Forests only prohibit vehicles in areas especially so designated; all other areas are de facto open to vehicle use.[7]

Through the issuance of 10-year term livestock grazing permits, USFS authorizes cattle grazing year round, often in habitats important to Mexican wolves. These habitats, and the species they support, are vulnerable to disturbances, such as vegetation depletion, soil erosion, and water quality deterioration, all of which are caused by grazing. Mexican wolves are routinely shot or removed from the wild for conflicting with domestic cattle within these allotments or on adjoining base properties.

The National Environmental Policy Act of 1969 ("NEPA"), 42 U.S.C. § 4321 et seq., requires USFS to examine and open to public scrutiny how its actions impact threatened and endangered species. When issuing or renewing a 10-year term grazing permit, USFS typically complies with NEPA by completing and publicly disseminating for comment and appeal either an environmental assessment ("EA") or environmental impact statement ("EIS"). Importantly, NEPA acts as both an environmental checkpoint and avenue for public involvement in USFS's grazing management decisions.

At the request of USFS and others, Congress recently allowed a deviation from standard NEPA compliance for grazing management decisions. Section 339 of the 2005 Consolidated Appropriations Act (PL 108-447) ("Appropriations Rider") allows USFS to categorically exclude from NEPA review the authorization or reauthorization of livestock grazing when it can show that such decision satisfies several discrete factors. Normally restricted to small activities like painting a fence or installing a picnic area, categorical exclusions ("CEs") are unusual for grazing permit decisions, as each decade-long management decision may impact tens of thousands of acres. Accordingly, Congress sharply limited USFS's authority to issue CEs under the Appropriations Rider in both scope and duration. Nationwide, USFS could not issue more than 900 CEs by the close of fiscal year 2007. Additionally, the Appropriations Rider specifically provides that CEs may not be used to authorize grazing on USFS allotments where federally protected species and/or their critical habitat will be significantly impacted.

In a blatant misuse of authority under the Appropriations Rider's restrictions, USFS has repeatedly issued improper grazing CEs in lieu of formal NEPA documentation when authorizing or reauthorizing

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[7] For more information, see: 1) http://www.fs.fed.us/r3/asnf/projects/docs/modified_proposed_action02122008.pdf (accessed 15 July, 2009; 2)

livestock grazing on the Gila National Forest. Since the Appropriations Rider took effect, USFS has engaged in a *carte blanche* approach to permit renewals by trading in much-needed NEPA analyses for non-appealable CE decision memos ("DMs"). By undertaking the aforementioned actions, USFS has misapplied its limited authority under the Appropriations Rider, unreasonably delayed compliance with NEPA, and unjustifiably barred public participation in the decision-making process in violation of the Administrative Procedures Act ("APA"), 5 U.S.C. §§ 701 – 706.

Mexican wolves are significantly harmed by grazing on the Gila and Apache national forests. In 1998, when wolf reintroduction began, USFS was authorizing approximately 82,600 cattle and 7,000 sheep to graze roughly 69 percent of the BRWRA. Since that time, there have been multiple conflicts between cattle and Mexican wolves that have led to federal removal of wolves from the wild. Yet, stocking rates remain significantly unaltered while USFS has failed to institute any sort of policy or routine procedures to help better avoid wolf-livestock conflicts on the Gila. The absence of federally led proactive measures leaves federal wolf removal as the only "solution" to the conflict. FWS has removed more wolves from the BRWRA for conflicts with livestock than for any other reason.

USFS is a partner in wolf management. As such, USFS is fully aware of the magnitude of wolf-livestock conflicts on the BRWRA and of how these conflicts directly lead to an unsustainable rate of wolf removals. The 3-Year Wolf Recovery Program Review acknowledges that livestock are "omnipresent" in the BRWRA and that USFS should do more to avoid inevitable conflicts. "Because of the extensive temporal and spatial distribution of livestock, interactions with wolves are unavoidable…Livestock producers using public lands can make a substantive contribution to reducing conflicts with wolves through improved husbandry and better management of carcasses." (Paquet et al. 2001, at 54). In its "Overall Conclusions and Recommendations," the Paquet Report goes on to state that, "livestock operators on public land should be required to take some responsibility for carcass management/disposal to reduce the likelihood that wolves become habituated to feeding on livestock." Id. at 67 – 68.

The laissez-faire grazing practices authorized under CEs poses a significant threat to the survival of the Mexican wolf subspecies in the wild. Furthermore, the Forest Service has not implemented "programs for the conservation" of endangered Mexican gray wolves as required by Section 7(a)(1) of the ESA. This ESA requirement is specifically preserved for experimental populations designated under Section 10(j) of the ESA (see Section 10(j)(2)(C)(i)).

Catron County, New Mexico. The Catron County Board of Commissioners has approved a county ordinance authorizing take of Mexican gray wolves (Catron County Ordinance No. 001-2007), in conflict with the 1998 federal rule, and has funded and filled a contractor position authorized to enact such take. The ordinance is illegal on its face, but may still be implemented to the permanent loss of one or more wild wolves.

4. Other Natural or Manmade Factors Affecting the Continued Existence of the Mexican Gray Wolf.

Low population numbers and inbreeding depression. The last count of Mexican wolves in the wild, completed in January 2008, found 52 wolves and only 2 breeding pairs. The present day population is lower in terms of wolf numbers and breeding pairs than the wild population at the end of 2003—five years ago. The BRWRA reintroduction population objective of at least 100 wolves was expected to have been met by the end of 2006. In addition, there are approximately 300 wolves maintained in captivity and managed to conserve the species' remaining genetic integrity. All Mexican wolves known in the world stem from seven founding animals, and contain greatly reduced genetic diversity from their original population (Hedrick et al. 1997; Fredrickson et al. 2007). The wild Mexican gray wolf population has begun to show the signs of inbreeding depression, such as smaller size, reduced fertility and lower litter sizes – including suspected infertility in some males (Fredrickson & Hedrick 2002; Fredrickson et al. 2007). Inbreeding depression not only threatens to reduce recruitment to the population, but also threatens future fitness, viability and resilience.

Genetic adaptation to captive conditions. The captive population is itself likely to be undergoing evolutionary degradation due to the genetic selection for traits that are adaptive in captivity, but maladaptive in the wild. Such adaptations have been documented in captive mammals and other taxa (Frankham 2008). This inevitable process, driven by natural selection, not only lowers survival and recruitment rates in future reintroduced populations, it also results in permanent loss of genetic diversity in precisely the alleles that are more adaptive for life in the wild. The severity of genetic adaptation to captivity partially depends on the number of captive generations (Frankham 2008). In the case of the Mexican wolf, in which three years can be considered the span of a generation (Mech & Seal 1987), some lineages date to fifteen or more generations old (a wolf captured in 1959 and first bred in captivity in 1961, and possibly wolves in the Aragon Zoo whose wild progenitors have been lost to history). Frankham (2008) shows that fifty generations in captivity has resulted in a population containing a relative fitness in the wild environment of only 14% of that of a wild population; recovery to 70% fitness of the wild population was achieved after twelve generations back in the wild, but the original fitness was not fully regained (Frankham 2008). In the case of the Mexican wolf, which has already lost significant genetic diversity, fifty generations in captivity could prove catastrophic and well beyond the point at which recovery from captive stock is still possible. With one or two of the three founding Mexican wolf lineages already over fifteen generations in captivity, there is an approaching limit, even if the date cannot be ascertained precisely, to the point at which further releases from captivity to the wild will no longer retain efficacy at rescuing the wild population from inbreeding depression.

Federal predator control. Predator control by the U.S. Fish and Wildlife Service and its institutional antecedents was the cause of the original extirpation of the Mexican gray wolf from the wild in the United States and Mexico (Robinson 2005). Since reintroduction began, federal predator control has entailed the shooting of eleven wild Mexican wolves and the inadvertent deaths of 18 additional Mexican wolves. Thirty-seven wolves captured from the wild, most for control purposes, have been consigned to indefinite captivity; nine of those have died of age-related infirmities, and most will never be released. Dozens of additional wolves have been captured and re-released, often in unfamiliar terrain, with lowered chances of survival. Predator control, conducted by agents of the U.S. Department of Agriculture/Wildlife Services, resulted in the July 2004 shooting of one wolf, M574, identified by the Fish and Wildlife Service as genetically irreplaceable; thus, predator control exacerbates the inbreeding depression handicapping Mexican wolf recovery. Federal predator control is the primary reason that the Mexican wolf population in the BRWRA has not achieved its intended number of over 100 wolves -- projected to include 18 breeding pairs – that was anticipated to be reached by the end of 2006.

Poaching. Poachers have killed 32 Mexican gray wolves since reintroduction began in 1998 (U.S. Fish & Wildlife Service 2008). Poaching is the second most significant cause of population loss for the Mexican wolf subspecies, and a significant contributor to the stagnation of population growth.

Given the infinitesimally small founding population of Mexican wolves from which the current wild population derives, the loss of these 32 individuals is profoundly problematic to recovery.

Collisions with vehicles. A final factor having a negative effect on the wild population of the Mexican wolf subspecies is collision with vehicles. Vehicles have killed 12 wolves; all were "hit-and-run" incidents that violated the 1998 rule's criteria for legal wolf killing. To be legal, the rule requires vehicle strikes to be reported within 24 hours.

IX. Conclusion

Despite an ongoing recovery program for Mexican wolves within the BRWRA, the species remains poised for a second extinction in the wild. As outlined in this petition, as well as in the original 1976 listing factor analysis for the sub-species, the Mexican gray wolf faces a variety of threats to it's continued existence in the wild, and therefore merits protection under the ESA as a subspecies or DPS, deserving of a scientifically rigorous and modern recovery plan and the designation and protection of critical habitat within the subspecies' range. As stated previously, it is imperative that the FWS issue 90 day and 12-month findings in a timely fashion.

Respectfully submitted,

/s/

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