Mexican Wolf

(*Canis lupus baileyi*)

5-Year Status Review:

Summary and Evaluation

U.S. Fish and Wildlife Service

Mexican Wolf Recovery Program

Albuquerque, New Mexico

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5-YEAR REVIEW

Mexican Wolf (*Canis lupus baileyi*)

1.0 GENERAL INFORMATION

1.1 Listing History

Species: Wolf, Mexican (*Canis lupus baileyi*)
Date listed: 4/21/1975; 1/16/2015
FR citation(s): 40 FR 17590; 80 FR 2488
Classification: Endangered wherever found, except where included in an experimental population

Critical habitat/4(d) rule/Experimental population designation/Similarity of appearance listing: Experimental population (portions of Arizona and New Mexico) 1/12/1998; 1/16/2015; 7/1/2022 (63 FR 1752; 80 FR 2512; 87 FR 39348).

In accordance with section 10(j) of the Endangered Species Act of 1973, as amended (Act) and our implementing regulations at 50 CFR 17.81, the U.S. Fish and Wildlife Service (Service) may designate a population of endangered or threatened species that we will release into habitat that is capable of supporting the experimental population outside the species' current range, as an experimental population. The Mexican Wolf Experimental Population Area (MWEPA) is a large geographic area in Arizona and New Mexico that includes Federal, State, Tribal, and private land. It contains three managements zones (Zone 1, Zone 2, and Zone 3) that provide areas for release, translocation, and occupancy of Mexican wolves. The boundaries of the MWEPA are the portions of Arizona and New Mexico that are south of Interstate 40 (I–40) to the international border with Mexico (see map at 50 CFR 17.84(k)(4)), and the MWEPA is wholly geographically separate from any nonexperimental populations of Mexican wolves in the U.S. and Mexico. The MWEPA is determined to be nonessential because the loss of all reintroduced Mexican wolves within the MWEPA is not likely to appreciably reduce the likelihood of survival of the subspecies in the wild. This determination is based on the existence of a second wild population of Mexican wolves in Mexico, our increased capability to initiate and maintain a reintroduced population of Mexican wolves, and the ongoing maintenance of a captive population (87 FR 39348).

1.2 Methodology used to complete the review:

In accordance with section 4(c)(2) of the Act, the purpose of a 5-year review is to assess each threatened species and endangered species to determine whether its status has changed and if it should be classified differently or removed from the Lists of Threatened and Endangered Wildlife and Plants. The Service evaluated the biology and status of the Mexican wolf as part of the recovery planning process for the first and second revisions to

the Mexican Wolf Recovery Plan (Service 2017a, 2022a). The Service developed the revised Recovery Plans using information from the Biological Report for the Mexican Wolf (Biological Report; Service 2017b), which represents our evaluation of the best available scientific information, including the resource needs and the current and future condition of the subspecies. The Biological Report is supplemented by a population viability analysis (PVA) that assesses the conditions needed for Mexican wolf populations to maintain long-term viability (Miller 2017), and a habitat suitability analysis that assesses the current condition of the landscape in portions of Arizona, New Mexico, and Mexico (Martínez-Meyer et al. 2017). Together, the Biological Report, PVA, and habitat suitability analysis serve as a foundation for our strategy to recover the Mexican wolf. Contributions to these documents were provided from interagency and tribal partners, previous recovery team members, participants in recovery planning workshops, colleagues in Mexico, members of the Mexican Wolf Tribal Working Group, Species Survival Plan (SSP) institutions, local communities in the MWEPA in the U.S., and the general public. We also sought the expert opinion of independent specialists regarding scientific data and interpretations contained in these documents.

Additionally, the Service evaluated the biology and status of the Mexican wolf as part of a revision to the nonessential experimental population in the MWEPA under section 10(j) of the Act (10(j) rule). The purpose of this revision was to make the 10(j) rule more consistent with the Mexican wolf recovery strategy and criteria, contributing to the long-term conservation and recovery of the Mexican wolf by alleviating demographic and genetic threats to the subspecies. We collaborated closely with the States of Arizona and New Mexico, as well as our Federal, local and tribal partners, and sought comments on the proposed 10(j) rule revision and on a draft supplemental environmental impact statement during a 90-day comment period ending January 27, 2022 (86 FR 59953). New information for the 10(j) rule revision was provided by interested parties during the public comment period and during public information sessions and public hearings. The final 10(j) rule was published on July 1, 2022 (87 FR 39348).

Lastly, we conducted a literature search and a review of information in our files as part of our status evaluation of the Mexican wolf.

1.3 FR Notice citation announcing the species is under active review:

On March 13, 2023, the Service published a Notice of Initiation in the Federal Register, announcing that the Service would be conducting a 5-year status review for the Mexican wolf (88 FR 15451). A 5-year status review is based on the best scientific and commercial data available at the time of the review. We requested submission of any such information that has become available since the last review for the species, such as new information on: (A) Species biology, including but not limited to population trends, distribution, abundance, demographics, and genetics; (B) Habitat conditions, including but not limited to amount, distribution, and suitability; (C) Conservation measures that have been implemented that benefit the species; (D) Threat status and trends in relation to the five listing factors (as defined in section 4(a)(1) of the Act); and (E) Other new information, data, or corrections, including but not limited to taxonomic or nomenclatural changes, identification of erroneous

information, and improved analytical methods. We received public comments on the Notice of Initiation from three interest groups and one State agency. We considered those comments that provided new information that was useful in evaluating the ongoing recovery program for the Mexican wolf. Comments that expressed a statement or opinion without providing supporting information or relevance, called for policy or management changes, or that restated data or information that we already have were not considered.

2.0 REVIEW ANALYSIS

Section 4 of the Act (16 U.S.C. 1533) and its implementing regulations (50 CFR part 424) set forth the procedures for determining whether a species meets the definition of "endangered species" or "threatened species." The Act defines an "endangered species" as a species that is "in danger of extinction throughout all or a significant portion of its range," and a "threatened species" as a species that is "likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range." The Act requires that we determine whether a species meets the definition of "endangered species" or "threatened species" due to any of the five factors described below.

Section 4(a) of the Act describes five factors that may lead to an endangered or threatened status for a species. These include: A) the present or threatened destruction, modification, or curtailment of its habitat or range; B) overutilization for commercial, recreational, scientific, or educational purposes; C) disease or predation; D) the inadequacy of existing regulatory mechanisms; or E) other natural or manmade factors affecting its continued existence.

The identification of any threat(s) does not necessarily mean that the species meets the statutory definition of an "endangered species" or a "threatened species." In assessing whether a species meets either definition, we must evaluate all identified threats by considering the expected response of the species, and the effects of the threats—in light of those actions and conditions that will ameliorate the threats—on an individual, population, and species level. We evaluate each threat and its expected effects on the species, then analyze the cumulative effect of all of the threats on the species as a whole. We also consider the cumulative effect of the threats in light of those actions and conditions that will have positive effects on the species—such as any existing regulatory mechanisms or conservation efforts. The Service recommends whether the species meets the definition of an "endangered species" or a "threatened species" only after conducting this cumulative analysis and describing the expected effect on the species now and in the foreseeable future.

2.1 Distinct Population Segment (DPS) policy (1996):

Not applicable

2.2 Updated Information and Current Species Status

2.2.1 Biology and Habitat:

The Mexican wolf is the smallest, rarest, and most genetically distinct subspecies of gray wolf (*Canis lupus*). The subspecies historically inhabited portions of the southwestern U.S. and central and northern Mexico. The Mexican wolf's current range includes central and southern Arizona and New Mexico in the U.S, and portions of the States of Sonora and Chihuahua in Mexico. Similar to other gray wolves, Mexican wolves are social predators that live and hunt in packs with an established territory. Territories are dozens to several hundred square miles in size, and individual wolves may disperse long distances to establish a new territory. Mexican wolves typically live for 4 to 5 years in the wild, although they have been documented to survive up to 13 years. Females are capable of producing a litter of pups, usually four to six, each year. Mexican wolves predominantly prey on elk in the U.S., but other sources of prey throughout their current range include deer, small mammals, birds, and occasionally livestock. Below we summarize new information relevant to our assessment of the Mexican wolf's current status that has become available since the last Mexican wolf 5-year review (Service 2018) through 2022. More detailed information on the Mexican wolf's distribution, life history, ecology, habitat characteristics, and current conditions can be found in the Biological Report (Service 2017b).

Population Status

The 2022 10(j) rule revision updated the Mexican wolf population objective that was established in the 2015 10(j) rule (300-325 wolves) to be consistent with the recovery criteria identified for the U.S. population. Based on end-of-year counts, the revised 10(j) rule and recovery criteria state that a population average of at least 320 Mexican wolves must be achieved and sustained in Arizona and New Mexico. This average must be achieved over an 8-year period, the population must exceed 320 Mexican wolves each of the last 3 years of the 8-year period, and the annual population growth rate averaged over the 8-year period must demonstrate a stable or increasing population ($\lambda \geq 1$). The wild Mexican wolf population within the U.S. has maintained a trend of steady growth in recent years with an average population growth rate of 1.107 (Table 1, Figure 1). The 2022 end-of-year minimum population count in the U.S. is estimated to be 241 wolves, which is more than double the population size in 2017 (Service 2023).

Table 1. Annual minimum population estimates and growth rates for Mexican wolves in the U.S. from 2015-2022. *Note: the finite population growth rate below is the population estimate at time t +1 divided by the population estimate at time t.*

Year	Minimum Population Estimate	Arizona Population Estimate	New Mexico Population Estimate	Finite Population Growth Rate (λ)
2015	98	50	48	0.875
2016	114	64	50	1.163
2017	117	63	54	1.026
2018	131	64	67	1.120
2019	163	76	87	1.244
2020	186	72	114	1.141
2021	196	84	112	1.054
2022	241	105	136	1.230

In addition to meeting the revised population objective within the U.S., an average annual population of at least 200 Mexican wolves in Mexico is needed for recovery of the subspecies. Since 2011, the Service and Mexican Wolf SSP captive propagation program have been supporting reintroduction efforts in Mexico by providing suitable wolves for release from both the wild U.S. population and captive pre-release conditioning facilities in the U.S. Currently, there is a single wild population of Mexican wolves in the Sierra Madre Occidental Mountains in Mexico, and approximately 35 Mexican wolf releases into this population have occurred since 2018 (Service files). Unlike the U.S. population, the wild population of Mexican wolves in Mexico have fluctuated in recent years, with an average population growth rate of 1.314 (Table 2, Figure 2). The 2022 end-of-year minimum population count is estimated to be 20 wolves (A. Narvaez, National Commission for Natural Protected Areas (CONANP), pers. comm., February 21, 2023). Our recovery strategy calls for Mexico to release captive or translocated Mexican wolves to help increase abundance until such time as natural reproduction is sufficient to sustain the wild population.

Table 2. Annual minimum population estimates and growth rates for Mexican wolves in Mexico from 2015-2022.

Year	Minimum Population Estimate	Finite Population Growth Rate (λ)
2015	13	1.857
2016	20	1.538
2017	8	0.4
2018	21	2.625
2019	19	0.905
2020	26	1.368
2021	30	1.154
2022	20	0.667

Currently, the captive population of Mexican wolves managed by the Mexican Wolf SSP includes over 360 individual wolves housed in approximately 60 facilities in the U.S. and Mexico (Service files). This exceeds the target population size of 300 wolves to ensure the security of the subspecies in captivity and produce animals for reintroduction (Scott et al. 2022, E. Spevak, St. Louis Zoo, pers. comm., September 29, 2022). A bio-banked population consisting of semen, oocytes and reproductive tissue from more than 300 individual Mexican wolves is also stored at the St. Louis Zoo in Missouri and Chapultepec Zoo in Mexico City. In addition, approximately 500 whole carcasses and more than 7000 blood samples have been collected and stored at the Museum of Southwestern Biology at the University of New Mexico.

Distribution

Since 2018, the Mexican wolf population in the U.S. has shown a general upward trend in occupied range area (Service 2019, 2020, 2021, 2022b, 2023). In 2022, the occupied range in the U.S. was estimated to be 60,524 km^2 (37,608 mi^2), with approximately 54,914 km^2 (34,122 mi^2) of this occupied area located within the MWEPA (Service files). During this time, a total of three Mexican wolves dispersed outside the

boundaries of the MWEPA (e.g., north of I-40). In 2018, one male (m1561) traveled northwest and was subsequently captured south of the Grand Canyon in Arizona. This individual was translocated back into the MWEPA per the 2015 10(j) Rule and subsequently killed by illegal gunshot (Service 2019). In late 2021, one male (m2520) traveled north toward Flagstaff, Arizona, and was subsequently killed by illegal gunshot (Service files). In 2022, one female (f2694) traveled northwest of Mt. Taylor in New Mexico, and then returned to the MWEPA on her own where she formed a new pack in New Mexico (Service files).

It is currently estimated that Mexican wolves occupy approximately 6,590 km^2 (2,544 mi^2) of habitat in the Sierra Madre Occidental Mountains in Mexico (A. Narvaez, CONANP, pers. comm., February 21, 2023). Since 2018, three Mexican wolves have dispersed outside this area and across the border into the U.S. In 2021, one subadult male (m1898) wolf dispersed from its pack in Chihuahua and traveled northwest across the border into Arizona along the east side of the Chiricahua Mountains. This individual was subsequently killed on Interstate 10 from a vehicle collision (CONANP 2021). In 2022, a male (m1582) and female (f1828) wolf dispersed together from their release area in Mexico and successfully crossed Mexican Federal Highway 2 and the border into the U.S., where they established a home range (Soluciones Ambientales Itzeni 2022).

Genetics

The 2022 10(j) rule revision established a new genetic objective for the U.S. population consistent with the recovery criteria for the U.S., which states that a sufficient number of releases into the MWEPA must result in at least 22 released Mexican wolves surviving to breeding age. It is estimated that when the U.S. population reaches this genetic objective, 90 percent of the available gene diversity from the captive population will have been transferred to the MWEPA. In addition to meeting the genetic objective for the U.S., a sufficient number of releases into the Mexico population must result in at least 37 released or translocated Mexican wolves surviving to breeding age for the subspecies to be recovered. To help meet the genetic criteria needed for recovery, the Mexican Wolf SSP captive breeding program provides suitable wolves for release into the MWEPA and Mexico. Since 2018, the Service and our partners have conducted 73 initial releases (i.e., wolves from captivity with no previous free-ranging experience) into the MWEPA, and 35 into the Sierra Madre Occidental Mountains in Mexico. Management strategies for these releases include the fostering of captive pups into wild dens, the release of adults or sub-adults individually, the release of pairs with and without pups, the release of multigenerational packs; and translocations of wild wolves from one location to another.

The revised 10(j) rule also temporarily restricts three take provisions during the near-term period in which we are trying to improve the gene diversity of the MWEPA, to include: (1) take on Federal land, (2) take on non-Federal land in conjunction with a removal action, and (3) take in response to an unacceptable impact to a wild ungulate herd. Under these restrictions, the Service will not issue permits for take of Mexican

wolves on Federal and non-Federal land unless conditional benchmarks toward recovery are met, or accept requests to take wolves in response to an unacceptable impact to a wild ungulate herd until the genetic objective is met. The growth of the U.S. population in recent years necessitates a strong temporal focus on improving gene diversity in the near term because it will be more difficult to improve gene diversity and alleviate genetic threats at larger population sizes.

Habitat

Mexican wolves historically occupied montane woodland habitats ranging from foothills characterized by evergreen oaks (*Quercus* spp.), pinyon (*Pinus edulis*) and juniper (*Juniperus* spp.) to higher elevation pine (*Pinus* spp.) and mixed conifer forests. Factors making these habitats suitable to Mexican wolves likely included an abundance of prey, availability of water, the presence of cover, and suitable den sites (Service 2017b). The 2017 Mexican wolf habitat analysis evaluated the habitat suitability for the reintroduction and long-term persistence of the Mexican wolf across the entire historical range of the subspecies, including portions of Arizona and New Mexico and western Texas, in the U.S., to central Oaxaca, Mexico (Martínez-Meyer et al. 2017). The analysis found that large, relatively continuous extensions of high-quality habitat remain mainly in the Arizona-New Mexico region in the U.S. and in the Sierra Madre Occidental area in Mexico. In the U.S., it is estimated that there is approximately 33,674 km^2 (13,002 mi^2) of high quality Mexican wolf habitat within Arizona and New Mexico, and in Mexico, it is estimated that there are two large patches of high quality habitat consisting of 25,311 km^2 (9,773 mi^2) and 39,610 km^2 (15,293 mi^2) in the Sierra Madre Occidental Mountains, connected by areas of lower quality habitat and small interstitial patches of high quality habitat. Some high-quality habitat also exists in the Sierra Madre Oriental Mountains in Mexico, with high-quality patches between the two Sierra Madre mountain ranges, suggesting that dispersal or natural recolonization is possible (Martínez-Meyer et al. 2017).

2.2.2 Threats Analysis (threats, conservation measures, and regulatory mechanisms):

Since listing in 1975, threats to the Mexican wolf across its range have remained consistent over time and include demographic stochasticity (fluctuations in survival and reproduction associated with small population size); genetic issues including inbreeding, loss of heterozygosity, and loss of adaptive potential (Factor E); and excessive human-caused mortality, including illegal killing (Factor E). Conditions that may influence the current and ongoing recovery potential of the Mexican wolf also include adequate habitat availability and suitability (Factor A). Below we summarize the current status of these threats and the ongoing conservation measures and regulatory mechanisms being implemented to alleviate them. A more detailed analysis can be found in the Biological Report (Service 2017b) and Recovery Plan (Service 2022a).

Demographic Stochasticity

With each continued year of positive population growth trajectory, the threat of demographic stochasticity in the U.S. lessens. We estimate that when the U.S. population reaches and maintains the revised population objective of an average of at least 320 Mexican wolves, the population will have a 90 percent likelihood of persistence over 100 years (Miller 2017). We consider this level of persistence to demonstrate that demographic threats have been alleviated to an extent that is consistent with our recovery strategy and criteria for the Mexican wolf. The Mexican wolf population within the U.S. can grow in abundance to designated management target levels as long as annual adult mortality rates are below 25 percent; however, discontinuing wolf releases from the SSP would result in effective isolation of the U.S. population into the future, destabilizing the population and inhibiting continued growth (Miller 2017).

The Mexican wolf population in Mexico can be characterized as an extremely small, establishing population. Since the population in Mexico was established much more recently in 2011 and the first successful reproductive event occurred in 2014, we don't have detailed knowledge of the population's demographic dynamics. It is evident; however, that direct addition of wolves to the Mexico population through releases and translocations results in a reduction in demographic risks to that population. The existence of this population also contributes significantly to the overall viability of the Mexican wolf in the event of local decline or extirpation of the U.S. population (Miller 2017).

Genetic Diversity

The captive Mexican wolf population is descended from seven founders, and was historically maintained as three separate lineages prior to establishment of the Mexican wolf SSP. Because of this historic management, much of the existing genetic variability had been lost within lineages. Combining of the lineages within the Mexican Wolf SSP starting in the 1990's has helped to preserve a greater proportion of gene diversity. Currently, the gene diversity in the captive population is measured at 83.29 percent retention and mean kinship (relatedness of individuals in a population to each other) is measured at 0.1672 (Scott et al. 2022).

The infusion of available gene diversity into the U.S. and Mexico populations is expected to alleviate the risk of genetic threats such as inbreeding, lack of heterozygosity, and lack of adaptive potential. As of December 31, 2022, we have documented 13 released wolves surviving to breeding age in the MWEPA that contribute to meeting the genetic objective and recovery criteria in the U.S (Service 2019, 2020, 2021, 2022b, Service files). Between 2018 and 2021, we have seen a steady increase in gene diversity (from 74.54 to 76.23 percent) in the U.S. population, and a decrease in mean kinship (from 0.2546 to 0.2377) (Scott et al. 2019, 2020, 2022). Between 2021 and 2022; however, gene diversity in the U.S. population decreased slightly to 76.20 percent and mean kinship increased slightly to 0.2380 (E. Spevak, St. Louis Zoo, pers. comm. September 29, 2022). As the population in the U.S. grows, maintaining and increasing genetic diversity in the wild will become more challenging.

As of December 31, 2022, we have documented nine released wolves surviving to breeding age in the Sierra Madre Occidental Mountains that contribute to meeting the recovery criteria in Mexico (A. Narvaez, CONANP, pers. comm., February 21, 2023). Between 2018 and 2021, gene diversity in the Mexico population has also increased (from 75.53 to 79.95 percent), and mean kinship has decreased (from 0.2447 to 0.2005) (Scott et al. 2019, 2020, 2022). Between 2021 and 2022; however, gene diversity in the Mexico population decreased slightly to 79.74 percent and mean kinship increased slightly to 0.2026 (; E. Spevak, St. Louis Zoo, pers. comm., April 11, 2023). We expect to continue documenting the number of released wolves that survive to breeding age, including their reproductive activity, and to track population-level genetic metrics to validate improvements in the genetic status of the population in Mexico.

Human-caused Mortality

Human-caused mortality remains the most significant threat to the Mexican wolf. Sources of human-caused mortality may include accidental incidents such as vehicle collision, or intentional incidents such as shooting (including legal shooting to protect livestock, pets, or rarely for human safety), trapping, and poisoning. Inherent in our efforts to achieve the population targets for the U.S. and Mexico is our recognition that Mexican wolf mortality from all sources, including human-caused mortality, must be sufficiently low to support population growth and persistence.

Between 2018 and 2022, 74 known human-caused Mexican wolf mortalities have occurred in the U.S., with 15 attributed to vehicular accidents and 59 to illegal causes (Service 2019, 2020, 2021, 2022b, Service files). The impact of this mortality has been minor to the overall population growth since 2018. When the Mexican wolf population was at lower levels, human-caused mortality occurred at levels significant enough to cause a population decline or hindered how quickly the population grew (i.e., the population is still able to grow, but at a slower rate than it otherwise would). In recent years, the Mexican wolf population has grown such that human-caused mortality is having a minimal impact on growth. Also, ongoing and increased law enforcement presence and education to reduce misinformation will continue to be necessary in the U.S. for the full extent of the recovery effort.

In Mexico, approximately 18 known human-caused Mexican wolf mortalities have occurred since 2018 with 3 attributed to vehicular accidents and 15 to illegal causes (A. Narvaez, CONANP, pers. comm., February 21, 2023). The Mexican wolf is protected by federal regulation as a subspecies in Mexico; however, unlike in the U.S., large tracts of federally owned lands managed solely for conservation do not exist in Mexico. A few Natural Protected Areas do exist in Mexico, but many have native or rural communities living within their boundaries, and are a mix of private, federal, and communal land. Ongoing and increased enforcement presence and education to reduce human-caused mortality is necessary in Mexico for the full extent of the recovery effort.

The Service and our partners continue to monitor key demographic rates, balance our utilization of nonlethal and lethal management techniques to address conflict situations, and strengthen efforts to reduce the illegal killing of Mexican wolves.

Habitat Availability and Suitability

While habitat destruction, modification, or curtailment are not currently threatening or endangering the Mexican wolf, ensuring that adequate habitat is available to support recovered Mexican wolf populations into the future is central to the recovery effort for the subspecies. The suitability of an area to sustain Mexican wolves is influenced by both biophysical (vegetation cover, water availability and prey abundance) and socioeconomic (human population density, road density, and land status) factors. Results from Martínez-Meyer et al. (2017) suggest that there is still sufficient suitable habitat for the Mexican wolf both in the U.S. and Mexico. We expect that over the next few years the distribution of the population will continue to expand naturally within the MWEPA as the size of the population increases, indicating that habitat availability and suitability may be a future stressor that may influence the recovery potential of the Mexican wolf. Although there are three natural protected areas in Chihuahua, one in Sonora, and one in Durango, most of the high quality habitat areas for wolves in Mexico occur on private lands. Specific sites for future reintroductions in Mexico need to consider field data of prey density, cattle density, land tenure, natural protected areas, safety to the field team, and acceptability of wolves by local people.

Conservation Measures and Regulatory Mechanisms

The wild Mexican wolf population in the United States is continually managed and monitored by an Interagency Field Team comprised of staff from the Service, Arizona Game and Fish Department (AGFD), New Mexico Department of Game and Fish (NMDGF), White Mountain Apache Tribe (WMAT), U.S. Forest Service, and U.S.D.A.-APHIS Wildlife Services. The Mexican Wolf SSP captive breeding program remains the sole source population to reestablish the subspecies in the wild, providing genetically well-represented wolves for release into the MWEPA and Mexico. In addition, the Service continues to manage pre-release facilities, designed to house wolves in a manner that fosters wild behaviors, minimizing habituation to humans and maximizing pair bonding, breeding, pup rearing, and healthy pack structure development.

More than $18 million has been expended by the primary agencies involved in Mexican wolf recovery and management between 2018 and 2022, which includes funding provided by the Service to AGFD and NMDGF for Mexican wolf recovery through Section 6 of the Act, which requires 25 percent matching funds from each state (Service 2019, 2020, 2021, 2022b, Service files). During this time, the Service also provided over $1.9 million for cooperative agreements with the Mexican Wolf Fund, Turner Endangered Species Fund (TESF), The Living Desert, Cincinnati Zoo, University of Idaho, University of New Mexico, and WMAT. These agreements convey funding for the monitoring and management of captive and wild Mexican wolves (AGFD,

NMDGF, TESF, The Living Desert, Cincinnati Zoo, and WMAT), administration and facilitation of recovery planning and implementation efforts (Mexican Wolf Fund), and genetic analysis and preservation of biomaterials (University of Idaho and University of New Mexico) (Service 2019, 2020, 2021, 2022b, Service files).

In 2022, the Service, AGFD, NMDGF, Mexico's Ministry of Environment and Natural Resources (SEMARNAT) and National Commission for Natural Protected Areas (CONANP), and Mexico's Directorate General for Wildlife, signed a Letter of Intent to collaboratively continue to conserve, manage, and recover the Mexican wolf in the U.S. and Mexico. Coordination between these participants to carry out specific conservation and management activities will advance the implementation of the revised Recovery Plan and contribute to achieving the recovery criteria in both countries.

The Service and our partners regularly provide film and photography opportunities for members of the media interested in documenting Mexican wolf recovery efforts. Recently, we have been featured in a National Geographic documentary series, the Washington Post, CBS evening news, and NPR as well as numerous local media outlets. We conduct education and outreach at events at local zoos and community events, providing opportunities for the public to learn about Mexican wolves. We also provide regular updates to the public on our social media accounts and website at https://www.fws.gov/program/conserving-mexican-wolf.

2.3 Synthesis:

The recovery strategy for the Mexican wolf is to establish and maintain a minimum of two resilient, genetically diverse populations distributed across ecologically and geographically diverse areas in the subspecies' range in the U.S. and Mexico. This strategy addresses the threats of extinction risk associated with small population size, loss of gene diversity, and human-caused mortality. Moreover, it ensures that Mexican wolf populations can achieve the resiliency, representation, and redundancy needed for recovery (Service 2022a).

Recovery objectives for the Mexican wolf include:

1. Increase the size of two Mexican wolf populations;
2. Improve gene diversity and maintain the health of Mexican wolves;
3. Ensure adequate habitat availability to support viable Mexican wolf populations;
4. Maintain the Mexican Wolf SSP captive breeding program to improve the status of wild populations;
5. Promote Mexican wolf conservation through education and outreach programs; and
6. Ensure recovery success.

The Recovery Plan identifies the following objective, measurable criteria for downlisting and delisting the Mexican wolf:

Downlisting Recovery Criteria

Option 1:

The Mexican wolf will be considered for downlisting when:

a) The United States population average over a 4-year period is greater than or equal to 320 Mexican wolves; and
b) Gene diversity available from the captive population has been incorporated in the United States population through the scheduled releases of wolves surviving to breeding age as identified in delisting criteria.

-or

Option 2:
The Mexican wolf will be considered for downlisting when a minimum of two populations (one in the United States and one in Mexico) meet abundance and genetic criteria as follows:

a) Each population average over the same 4-year period is greater than or equal to 150 wolves with an annual positive population growth rate; and
b) Gene diversity available from the captive population has been incorporated into both the United States and Mexico populations through the scheduled releases of wolves surviving to breeding age as identified in delisting criteria.

Delisting Recovery Criteria

The Mexican wolf will be considered for delisting when:
1. A minimum of two populations meet all abundance and genetic criteria as follows:

United States

a) The population average over an 8-year period is greater than or equal to 320 wolves (e.g., annual wolf abundance of 200, 240, 288, 344, 412, 380, 355, and 342 averages 320 wolves);
b) The population must exceed 320 wolves each of the last 3 years of the 8-year period;
c) The annual population growth rate averaged over the 8-year period is stable or increasing (e.g., annual averages of 1.2, 1.2, 1.2, 1.2, 1.2, 0.9, 0.9, and 1.0 averages 1.1); and
d) Gene diversity available from the captive population has been incorporated into the United States population through scheduled releases of a sufficient number of wolves to result in 22 released Mexican wolves surviving to breeding age in the United States population. "Surviving to breeding age" means a pup that lives 2 years to the age of breeding or an adult or subadult that lives for a year following its release. "Scheduled releases" means captive releases and translocations that achieve genetic representation, as described in Rationale for Recovery Criteria.

Mexico

a) The population average over an 8-year period is greater than or equal to 200 wolves;
b) The population must exceed 200 wolves each of the last 3 years of the 8-year period;
c) The annual population growth rate averaged over the 8-year period is stable or increasing; and

d) Gene diversity available from the captive population has been incorporated into the Mexico population through scheduled releases of a sufficient number of wolves that results in 37 released Mexican wolves surviving to breeding age in the Mexico population. "Surviving to breeding age" means a pup that lives 2 years to the age of breeding or an adult or subadult that lives for a year following its release. "Scheduled releases" means captive releases and translocations that achieve genetic representation, as described in Rationale for Recovery Criteria.

-and

2. States and Tribes will ensure regulatory mechanisms are in place to prohibit or regulate human-caused mortality of Mexican wolves in those areas necessary for recovery such that the Service determines at least 320 Mexican wolves are likely to be maintained in the United States in the absence of Federal ESA protections. In addition, Mexico will ensure regulatory mechanisms are in place to protect Mexican wolves from human-caused mortality, such that the Service determines at least 200 Mexican wolves are likely to be maintained in Mexico.

The Mexican Wolf Recovery Program has transitioned from its previous focus on preventing the extinction of the Mexican wolf to pursuing a binational recovery strategy that we intend to achieve within two to three decades. Since the last status review, the Mexican wolf population in the U.S. has grown in size and is on a trajectory toward meeting the population average needed for recovery. The population in Mexico; however, has not achieved similar success and Mexico is still in the establishment phase of their reintroduction effort. Efforts to improve the genetic status of both the U.S. and Mexico populations are also having a positive effect; however, only the U.S. population is currently on a trajectory toward meeting the genetic objective identified in the revised 10(j) rule and Recovery Plan. A full evaluation of the Mexican wolf's progress toward recovery will be conducted in a separate 5-year evaluation of the Recovery Plan.

The evaluation of threats affecting the species under the factors in section 4(a)(1) of the Act and analysis of the status of the species in our Biological Report, Recovery Plan, and revised 10(j) rule remain an accurate reflection of the subspecies' current status. Human-caused mortality remains the most significant threat to the Mexican wolf in both the U.S. and Mexico, with ongoing and increased enforcement presence and education necessary for the full extent of the recovery effort. While the threat of demographic stochasticity in the U.S. has lessened due to steady population growth in recent years, the population in Mexico has not experienced similar success and is still characterized as an extremely small, establishing population. Genetic threats such as inbreeding, lack of heterozygosity, and lack of adaptive potential are being managed through Mexican Wolf SSP efforts; however, high mean kinship and ongoing loss of gene diversity in the captive and wild populations remain a concern.

After reviewing the best available scientific information, we conclude that the cumulative effect of all threats to the Mexican wolf continue to render the subspecies in danger of extinction throughout all of its range, thus the Mexican wolf still meets the definition of an endangered species under the Act.

3.0 RESULTS

3.1 Recommended Classification:

No change is needed

3.2 New Recovery Priority Number:

No change recommended

Brief Rationale:

The current Recovery Priority Number for the Mexican wolf is 3, meaning that there is high demographic risk but also high recovery potential for the subspecies.

3.3 Listing and Reclassification Priority Number: Not applicable

Reclassification (from Threatened to Endangered) Priority Number: Not applicable
Reclassification (from Endangered to Threatened) Priority Number: Not applicable
Delisting (Removal from list regardless of current classification) Priority Number: Not applicable

Brief Rationale:

4.0 RECOMMENDATIONS FOR FUTURE ACTIONS

The Service recommends the continued implementation of the site-specific recovery actions identified in the Recovery Plan with a focus on the highest priority actions, including, but not limited to:

- Survey and monitor Mexican wolves to determine population status in the U.S. and Mexico (Recovery Actions 1.1 and 1.2)
- Monitor Mexican wolves on the Fort Apache Indian Reservation (Recovery Action 1.3)
- Develop and implement annual plans for Mexican wolf releases, pup-fostering, and translocations in the U.S. and Mexico (Recovery Actions 2.1 and 2.2)

Per the Recovery Plan, the Service and its partners will conduct a separate 5-year evaluation of progress toward recovery, assessing each population's contribution to recovery and identifying aspects of population performance needing improvement. This evaluation, which is independent of the 5-year status review process, will occur in 2023 utilizing data through 2022. The Service also plans to revise the Mexican Wolf Recovery Implementation Strategy (Service 2017c), which describes the near term (1-5 years) stepped-down activities and their estimated costs to carry out the recovery actions identified in the Recovery Plan.

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U.S. FISH AND WILDLIFE SERVICE

5-YEAR REVIEW FOR THE MEXICAN WOLF

Current Classification: Endangered

Recommendation resulting from the 5-Year Review:

No change needed

Appropriate Listing/Reclassification Priority Number, if applicable: Not applicable

FIELD OFFICE APPROVAL:

Lead Field Supervisor, Fish and Wildlife Service, Other appropriate approval: Mexican Wolf Recovery Coordinator, Albuquerque, New Mexico.

Approve BRADY MCGEE Digitally signed by BRADY MCGEE Date: 2023.08.04 09:08:00 -06'00'