MEXICAN WOLF RECOVERY PROGRAM

PROGRESS REPORT # 27

PREPARED BY: U.S. FISH AND WILDLIFE SERVICE

COOPERATORS: ARIZONA GAME AND FISH DEPARTMENT • BUREAU OF LAND MANAGEMENT • NATIONAL PARK SERVICE • NEW MEXICO DEPARTMENT OF GAME AND FISH • USDA-APHIS WILDLIFE SERVICES • U.S. FOREST SERVICE • WHITE MOUNTAIN APACHE TRIBE

Mexican Wolf Recovery Program

PROGRESS REPORT #27

Reporting period: January 1—December 31, 2024

TABLE OF CONTENTS

FOREWORD

The U.S. Fish and Wildlife Service (Service) is the lead agency responsible for recovery of the Mexican wolf *(Canis lupus baileyi)*, pursuant to the Endangered Species Act of 1973, as amended (Act). The Mexican Wolf Recovery Program has two interrelated components: 1) Recovery – includes aspects of the program administered by the Service with assistance from partner agencies that pertain to the overall goal of Mexican wolf recovery and delisting from the list of threatened and endangered species, and 2) Monitoring and Management – includes aspects of the program implemented by the Service and cooperating States, Tribes, other Federal agencies, and counties that pertain to the monitoring and management of the reintroduced Mexican wolf population in the Mexican Wolf Experimental Population Area (MWEPA). This report provides details on both aspects of the Mexican Wolf Recovery Program. The reporting period for this progress report is January 1—December 31, 2024.

BACKGROUND

The Mexican wolf is listed as endangered under the Act in the southwestern United States and Mexico (80 FR 2488-2512, January 16, 2015). It is the smallest, rarest, southernmost occurring, and most genetically distinct subspecies of the North American gray wolf (*Canis lupus*).

Mexican wolves were extirpated in the wild in the southwestern United States by 1970, following several decades of private and governmental efforts to reduce predator populations due to conflict with livestock. Recovery efforts for the Mexican wolf began in 1976 with its listing as an endangered species. In the late 1970s and early 1980s, the initiation of a binational captive breeding program originating from seven wolves prevented the extinction of the Mexican wolf.

As recommended in the Mexican Wolf Recovery Plan, Second Revision (Service 2022) (Recovery Plan), recovery efforts for the Mexican wolf focus on the reestablishment of two Mexican wolf populations in the wild, one in the United States and one in Mexico, and on maintenance of the captive breeding population. Mexican wolves were first released to the wild in the United States in 1998. In Mexico, Mexican federal agencies initiated a reintroduction effort in 2011 pursuant to Mexico's federal laws and regulations.

Today, the wild population in the United States is managed and monitored by an Interagency Field Team (IFT) comprised of staff from the Service, Arizona Game and Fish Department (AZGFD), New Mexico Department of Game and Fish (NMDGF), White Mountain Apache Tribe (WMAT), U.S. Forest Service (USFS), and U.S. Department of Agriculture-Wildlife Services (USDA-WS).

PART A: RECOVERY ADMINISTRATION

1. MEXICAN WOLF CAPTIVE BREEDING PROGRAM

Saving Animals From Extinction Mexican Wolf The Saving Animals From Extinction Mexican Wolf program (SAFE, formally known as the Species Survival Plan-SSP) is a binational captive breeding program between the United States and Mexico for the Mexican wolf. SAFE's mission is to reestablish the Mexican wolf in the wild through captive breeding, public education, and research. While Mexican wolves are maintained in numerous captive facilities in both countries, they are managed as a single population. SAFE member institutions routinely transfer Mexican wolves among participating facilities for breeding to promote genetic exchange and maintain the health and genetic diversity of the captive population and the wild population. Wolves in these facilities are managed in accordance with a Service-approved standard protocol. Without SAFE, recovery of the Mexican wolf would not be possible.

In 2024, SAFE's binational meeting to plan and coordinate wolf breeding, transfers, and related activities among facilities was hosted by the Cincinnati Zoo and held in Cincinnati, OH. The meeting included updates on the reintroduced populations in the United States and Mexico; discussion on gamete banking needs; evaluation and selection of release candidates for both the United States and Mexico; and reports on research including advances in gamete banking, contraception and assisted reproductive technologies, and progress toward a lifetime reproductive plan for wolves to maximize an individual's potential to contribute to the population.

As of July 2024, the SAFE population included 347 Mexican wolves managed in approximately 60 facilities in the United States and Mexico. SAFE's goal is to house a minimum of 240 wolves, with a target population size of 300, to ensure the security of the subspecies in captivity and produce animals for reintroduction.

The SAFE population has served as the sole source population to reestablish the subspecies in the wild. Mexican wolves released to the wild from the SAFE population also serve a critically important role in improving the gene diversity of the wild populations. Wolves that are considered genetically well-represented in the SAFE population may be designated for release. Suitable release candidates are determined based on criteria such as genetic makeup, reproductive performance, behavior, and physical suitability. We perform analyses to ensure the released wolves are beneficial to the genetic diversity of the wild populations while minimizing adverse effects to the genetic integrity of the captive population if wolves released to the wild do not survive. Since 2016, the Service and its partners have focused on pup fostering as the primary genetic management action in the United States. While much consideration is given to breeding captive wolves that will produce pups that genetically benefit the wild population, the selection of pups to use in fostering efforts is ultimately determined by timing and synchrony of wild and captive litters. See below (page 24; releases and translocations) for more discussion on fostering.

a. *Mexican Wolf Pre-Release Facilities*

Prior to release to the wild, Mexican wolves are acclimated in captive facilities designed to house wolves in a manner that furthers wild behaviors (e.g., increasing natural fear of human presence, and acclimation to an intermittent, unpredictable feeding regimen). The Service oversees the management at the Ladder Ranch and Sevilleta Wolf Management Facilities, located in New Mexico. At these facilities, wolves are managed with minimal exposure to humans to minimize habituation to humans and maximize pair bonding, breeding, pup rearing, and healthy pack structure development. These facilities have been successful in breeding wolves for release in the United States (including pups for fostering) and Mexico and are integral to Mexican wolf recovery efforts. To further minimize habituation to humans, public visitation to the Ladder Ranch and Sevilleta facilities is not permitted.

Wolves in the facilities are fed carnivore logs and a zoo-based exotic canine diet formulated for wild canids. In addition, we supplement their diet with carcasses of road-killed ungulate species, such as deer and elk, and scraps (meat, organs, hides, and bones) from local game processors from wild game/prey species only. Wolves in the facilities are given annual examinations, are vaccinated for prevention of common canine diseases (e.g., parvo, adeno2, parainfluenza, distemper, leptospirosis and rabies viruses, etc.), are dewormed, have laboratory evaluations performed, and have their overall health condition evaluated. Animals are treated for other veterinary purposes on an as-needed basis.

Sevilleta Wolf Management Facility

The Sevilleta Wolf Management Facility (Sevilleta) is located on the Sevilleta National Wildlife Refuge near Socorro, New Mexico and is managed by the Service. There are a total of eight enclosures, ranging in size from 0.25 acre to approximately 1.25 acres, and a quarantine pen. Sevilleta National Wildlife Refuge staff assist in maintenance and administration of the wolf pens.

Through the course of the year 26 wolves were housed at Sevilleta. Four wolves were transferred out of Sevilleta to other SAFE facilities, and five wolves were transferred into Sevilleta from other SAFE facilities, including on international transfer to support SAFE's mission of maintaining wolves in captivity to support recovery efforts. Two wolves were translocated back into the wild. Eight pups were born at Sevilleta, and four of which were fostered into wild dens. No deaths occurred at Sevilleta in 2024.

Ladder Ranch Wolf Management Facility

The Ladder Ranch Wolf Management Facility (Ladder Ranch), owned by R. E. Turner, is located on the Ladder Ranch near Truth or Consequences, New Mexico. The facility consists of five enclosures, ranging in size from 0.3 acre to approximately 0.70 acre. The facility is managed and supported financially by the Service, and caretaking of wolves at the facility is carried out by an employee of Turner Natural Resources.

Through the course of the year, 12 wolves were housed at the Ladder Ranch. Four wolves were transferred into the Ladder Ranch from other SAFE facilities, and four wolves were transferred out of the Ladder Ranch to other SAFE facilities to support SAFE's mission of maintaining wolves in captivity to support recovery efforts. One wolf was translocated back into the wild. No births and no deaths occurred at the Ladder Ranch in 2024.

2. RECOVERY PLAN IMPLEMENTATION / PROGRESS TOWARD RECOVERY

The Recovery Plan provides downlisting and delisting criteria for the Mexican wolf, as well as recovery actions that, if implemented, will achieve the criteria (Service 2022, pp. 19-21, 29-35). To assist the Service and our partners in the implementation of the Recovery Plan, we developed a Recovery Implementation Strategy (RIS) www.fws.gov/library/collections/mexican-wolf-recovery-planning-documents. We intend to update the RIS as needed during recovery.

In 2024, we implemented a number of recovery actions associated with the objectives in the RIS; including the following: survey and monitor Mexican wolves to determine population status including Mexican wolves on the Fort Apache Indian Reservation and San Carlos Apache Reservation; reduce Mexican wolf-livestock conflicts; develop plans for and implement releases (via fostering) and translocation of Mexican wolves; monitor the genetic health of the population; and manage the SAFE population. See Part B of this report for more detail on these activities as they pertain to management of the Mexican wolves in the MWEPA.

Recognizing the challenges inherent in Mexican wolf recovery, the Recovery Plan recommends progress evaluations at five and ten years into plan implementation to ensure the recovery strategy and actions are effective (Service 2022, pg. 27-28). The five-year evaluation (based on data through 2022 and some 2023 data) was published in December 2024 and considers progress on the recovery objectives for the Mexican wolf, assessment of each population's progress towards interim abundance and release targets (Table 1), comparisons between observed metrics and those predicted in 2017 modeling efforts (Table 2), and next steps for furthering progress towards Mexican wolf recovery. The full report can be accessed at: www.fws.gov/media/5-year-evaluation-mexican-wolf-recovery-strategy.

Table 1: Summary of observed metrics at the 5-year evaluation mark (2022) compared to interim abundance and release or release and translocation targets in the United States and Mexico.

	United States Target	**United States Observed**	**Mexico Target**	**Mexico Observed**
Abundance[1]	145	242	100	35
Release and Translocation[2]	9	13	25	9

[1] *Abundance metrics are minimum population counts.*

[2] *Release and translocation targets are the number of released wolves surviving to breeding age in the United States and the number of released and translocated wolves surviving to breeding age in Mexico.*

Table 2: Summary of predicted versus observed metrics from wild populations compared to PVA model predications (Miller 2017). Dates for the analysis for the United States population are from 2015 through 2023 and for the Mexico population 2015 through 2022.

	United States Prediction	United States Observation	Mexico Prediction	Mexico Observation
Prediction[1]	229±85	257	124±39	35
Mean annual growth rate	11%	13%	33%	11%
Gene diversity retained	74.99%	76.09%	79.8%	79.74%
Mean inbreeding coefficient	0.234	0.211	0.181	0.166
Adult mortality	18.9%	15.8%	18.9%	39.0%
Pup mortality	28.2%	32.3%	28.2%	N/A[2]

[1] *Predictions for population size were total abundance and observations are minimum counts.*

[2] *The sample of wild pups with radio collars was too low to estimate a survival rate.*

For the 10-year evaluation (based on data through 2027), the Recovery Plan provides the following demographic and genetic benchmarks:

- Interim abundance targets of approximately 210 wolves in the United States and 167 wolves in Mexico.
- Interim release and translocation targets of a sufficient number of wolves to result in approximately 16 released wolves surviving to breeding age in the United States and 37 released and translocated wolves surviving to breeding age in Mexico.

We will begin conducting the 10-year evaluation in 2028, using data through 2027, inclusive of the 2027 year-end annual population count. We will conduct a portion of the 2027 annual population count in early 2028 and will start the evaluation 11 years after finalization of the Recovery Plan. Based on this information, we will make a determination whether the recovery strategy is proving effective/feasible or needs to be revised.

As of this annual report, the minimum population in the United States is 286 Mexican wolves and 20 released wolves have survived to breeding age to count toward the genetic recovery criteria. For the 2024 annual report, Mexico provided a minimum count for its population

of Mexican wolves instead of the population estimate provided in previous years. For 2024, Mexico reported a minimum of nine Mexican wolves in the Mexico population, and that 10 released or translocated wolves had survived to breeding age to count toward the genetic recovery criteria.

3. SUMMARY OF LITIGATION

Plaintiffs: Center for Biological Diversity; Grand Canyon Wolf Recovery Project

Defendants: Secretary of the Interior; US Fish and Wildlife Service

Intervenors: State of Arizona (Defendant)

Allegation: APA Violations, NEPA Violations and ESA violations in revising the 10(j) Rule and issuance of associated 10(a)(1)(A) permit

Date NOI Filed: GCWRP 7/1/22 NOI; CBD 8/5/22 NOI

Date Complaints Filed: 7/12/22 CBD filed its complaint, amended in October 2022 to add ESA claims; 10/3/22 GCWRP Complaint;
Case Numbers: No. CV-22-00303-TUC-JAS No. CV-22-00453-TUC-JAS (D. Ariz.)

Status: Court consolidated the two cases on 10/30/22. The United States answered both complaints. On January 19, 2023, the Court issued a scheduling order setting forth the schedule for the case. On June 5, 2023, Plaintiffs filed a joint motion to complete or supplement the administrative record which vacated the schedule for summary judgement until the court ruled on the motion. The Court denied the Plaintiffs' motion to complete or supplement the record on January 31, 2024, and in February 2024 the Court issued a scheduling order setting forth the schedule for the case. On April 19, 2024, Plaintiffs filed their motions for summary judgment. The United States filed their responses and cross motions for summary judgment on June 18, 2024 (CBD) and July 2, 2024 (GCWRP). Plaintiffs' replies were filed on August 16, 2024, and the United States filed their responses on September 16, 2024 (CBD) and September 30, 2024 (GCWRP).

Plaintiffs: Center for Biological Diversity, Defenders of Wildlife, the Endangered Wolf Center, David R. Parsons, the Wolf Conservation Center, WildEarth Guardians, Western Watersheds

Defendants: Secretary of the Interior, US Fish and Wildlife Service, Amy Lueders

Intervenors: New Mexico Department of Game and Fish

Allegation: Violations of ESA and APA regarding the adequacy of the 2017 Mexican wolf Recovery Plan

Date NOI Filed: 11/29/17

Date Complaint Filed: 1/30/18

Case Number: Ninth Circuit, Nos. 22-15029 & 22-15091 (appeals of 4:18-cv-00047-BGM and 4:18-cv-00048-JGZ (D. Ariz.)

Status: District Court of Arizona issued an order on October 14, 2021, remanding the 2017 recovery plan to the Service stating the Service shall produce a draft recovery plan within six

months that includes site-specific management activities and a final plan six months thereafter. The Plaintiffs' appealed to the Ninth Circuit Court of Appeals as the district court had ruled in favor of the United States on most of the points raised in the Complaint; the United States did not appeal. A draft revised recovery plan was published in January 2022 and a final revised recovery plan was published in September 2022. The United States filed a motion to dismiss this case on November 18, 2022. The motion to dismiss was denied without prejudice to allow the Ninth Circuit panel to address it when the panel addressed the full case. On December 13, 2023, the Ninth Circuit held that the lawsuit was moot because the 2017 plan was superseded by the 2022 plan. Plaintiffs filed a motion to vacate the original Ninth Circuit ruling and filed a petition for hearing in December 2023. The motion for vacatur and petition for rehearing were denied on April 18, 2024, and the Ninth Circuit opinion stands. The United States and Plaintiffs negotiated settlement to address attorneys' fees that was entered on May 16, 2024. Payment of attorneys' fees of $72,000.00, as agreed to in the settlement, was paid to Plaintiffs in June 2024. This matter is now fully closed.

4. MEXICAN WOLF EXPERIMENTAL POPULATION AREA MANAGEMENT STRUCTURE

The Memorandum of Understanding (MOU) that guides the reintroduction and management of the Mexican wolf population in the MWEPA was revised in 2024. Signatories of this MOU included the Arizona Game and Fish Department, Bureau of Land Management, National Park Service, New Mexico Department of Game and Fish, U.S. Department of Agriculture-Forest Service, U.S. Department of Agriculture-Wildlife Services, White Mountain Apache Tribe, and the Service, as well as the cooperating counties of Apache, Gila, Graham, Greenlee, and Navajo in Arizona, Catron County and Sierra County in New Mexico, and the Eastern Arizona Counties Organization (EACO). A copy of this MOU can be found at http://www.fws.gov/program/conserving-mexican-wolf/library.

Each year the IFT produces an Annual Report, detailing Mexican wolf field activities (e.g., population status, reproduction, mortalities, releases/translocations, dispersal, depredations, etc.) in the MWEPA. The 2024 report is included as PART B of this document. Mexican Wolf Recovery Program Quarterly Updates are available at www.fws.gov/program/conserving-mexican-wolf/library or you may sign up to receive them electronically by visiting www.azgfd.com/ and clicking on the subscribe button at the bottom of the page. Additional information about the management of Mexican wolves can be found on the Service's web page at: www.fws.gov/program/conserving-mexican-wolf or AZGFD's web page at: http://www.azgfd.com/wildlife-conservation/conservation-and-endangered-species-programs/mexican-wolf-management

5. COOPERATIVE AGREEMENTS

In 2024, the Service's Mexican Wolf Recovery Program funded cooperative or grant agreements with AZGFD, The Cincinnati Zoo, Turner Endangered Species Fund (TESF), University of Idaho, University of New Mexico, and WMAT (Table 3). These agreements convey funding for the monitoring and management of captive and wild Mexican wolves (AZGFD, Cincinnati Zoo, TESF, and WMAT), and genetic analysis and preservation of biomaterials (University of Idaho and University of New Mexico).

Table 3: Service funded cooperative grants and agreements.

Cooperator	**U.S. Fish and Wildlife Service Mexican Wolf Program Funds Provided in 2024**
AZGFD	$ 240,000
Cincinnati Zoo	$ 40,000
TESF	$ 40,000
University of Idaho	$ 50,000
University of New Mexico	$ 15,000
WMAT	$ 250,000

In addition to the above agreements, the Service also provided funding for several miscellaneous contracts for veterinary, helicopter, and other services. For more information on Program costs to date including Service and Partner contributions to Mexican Wolf Recovery visit www.fws.gov/program/conserving-mexican-wolf/library.

6. LIVESTOCK CONFLICT COMPENSATION PROGRAMS

There are currently two federal programs from which livestock producers can seek compensation for confirmed livestock losses due to predation by Mexican wolves, 1) the Livestock Indemnity Program authorized by the 2018 Farm Bill and administered by the U.S. Department of Agriculture's Farm Service Agency, and 2) the Wolf Livestock Loss Demonstration Grants authorized by the Omnibus Public Lands Management Act of 2009 (P.L. 111-11) and awarded by the Service through a competitive process to qualifying States and Tribes.

Livestock Indemnity Program

The Livestock Indemnity Program (LIP) compensates livestock producers for losses in excess of normal mortality that are due to adverse weather or attacks by animals reintroduced to the wild by the Federal Government. LIP compensation payments are equal to 75 percent of the (national) average fair market value of the livestock. For more information see www.fsa.usda.gov/programs-and-services/disaster-assistance-program/livestock-indemnity.

Wolf-Livestock Loss Demonstration Project Grants

The Service provides approximately $1,000,000 annually through a competitive process to eligible states and tribes to (1) assist livestock producers in undertaking proactive, non-lethal activities to reduce the risk of livestock loss due to predation by wolves, and (2) compensation to livestock producers for livestock losses due to wolf predation. Subtitle C of the Omnibus Public Lands Management Act of 2009 (P.L. 111-11) states that funding made available should be allocated equally between the two grant purposes (compensation and prevention), and that the Federal share of the cost does not exceed 50 percent (requires a 50 percent non-Federal match).

The Wolf-Livestock Loss Demonstration Project Grants (WLDG) are applied for by AZGFD and New Mexico Department of Agriculture (NMDA) in Arizona and New Mexico, respectively. The Arizona Livestock Loss Board (ALLB) administers the funds received by AZGFD; the County Livestock Loss Authority (CLLA) administers the funds received by NMDA (Tables 4, 5). In addition to WLDG expenditures, the ALLB expended $1,379.40 in non-federal funding during 2024 to provide compensation to producers for probable wolf depredations, and the CLLA expended $45,522.24 in non-federal funding during 2024 to provide compensation to producers for probable wolf depredations. For more information on the ALLB please visit https://live-azlivestocklossboard.pantheonsite.io. For more information on the CLLA please visit https://cllanm.org.

Table 4: Annual WLDG disbursement of funds for direct compensation for livestock lost associated with the Mexican wolf Program. Note that these expenditures required at least a 1:1 non-Federal match.

Year	Direct Compensation for Livestock Lost - Arizona	Direct Compensation for Livestock Lost – New Mexico	Total
2011	$5,400	$12,781	$18,181
2012	$7,550	$15,050	$22,600
2013	$14,581	$13,013	$27,594
2014	$21,100	$42,624	$63,724
2015	$33,070	$77,133.90	$110,203.90
2016	$15,785	$58,041.18	$73,826.18
2017	$29,880	$29,942.50	$59,822.5
2018	$17,850	$92,573.38	$110,423.38
2019	$99,312.37	$185,797.46	$285,109.83
2020	$68,306.10	$105,892.00	$174,198.10
2021	$98,016.32	$80,931.00	$178,947.32
2022	$140,014.20	$62,302	$202,316.20
2023	$83,555.73	$3,833.48 (MWLC) $75,006.74 (CLLA)	$162,395.95
2024	$39,163	$132,208	$171,371

Table 5: Annual WLDG disbursement of funds for wolf/livestock conflict prevention associated with the Mexican wolf Program. Note that these expenditures required at least a 1:1 non-Federal match.

Year	Wolf/Livestock Conflict Prevention—Arizona	Wolf/Livestock Conflict Prevention—New Mexico	Total
2011	N/A	N/A	N/A
2012	N/A	N/A	N/A
2013	$38,000	$47,500	$85,500
2014	$38,000	$47,500	$85,500
2015	$51,000	$32,300	$83,300
2016	$48,000	$57,000	$105,000
2017	$60,000	$57,000	$117,000
2018	$81,000	$57,000	$138,000
2019	$156,043.80	$57,000	$213,043.80
2020	$90,000.20	$57,000	$147,000.20
2021	$94,500	$64,877	$159,377
2022	$77,500	$87,750	$165,250
2023	$142,450	$72,000	$214,450
2024	$102,538	N/A	$102,538

7. LITERATURE CITED

Miller, P.S. 2017. Population viability analysis for the Mexican wolf (*Canis lupus baileyi*). Integrating wild and captive populations in a metapopulation risk assessment model for recovery planning. U.S. Fish and Wildlife Service. Albuquerque, New Mexico, USA.

U.S. Fish and Wildlife Service. 1982, Mexican Wolf Recovery Plan 1982, U.S. Fish and Wildlife Service, Albuquerque, New Mexico.

U.S. Fish and Wildlife Service. 1998, Final Rule. Establishment of a Nonessential Experimental Population of the Mexican Gray Wolf in Arizona and New Mexico, 63 Federal Register 1752- 1772.

U.S. Fish and Wildlife Service, 2013, Proposed Rule. Removing the Gray Wolf (Canis lupus) From the List of Endangered and Threatened Wildlife and Maintaining Protections for the Mexican Wolf (Canis lupus baileyi) by Listing It as Endangered, 78 Federal Register 35664-35719.

U.S. Fish and Wildlife Service, 2014. Final Environmental Impact Statement for the Proposed Revision to the Regulations for the Nonessential Experimental Population of the Mexican Wolf. 79 Federal Register 70154-70155.

U.S. Fish and Wildlife Service, 2015. Revision to the Regulations for the Nonessential Experimental Population of the Mexican Wolf. 80 Federal Register 2512-2567.

U.S. Fish and Wildlife Service, 2015. Endangered Status for the Mexican Wolf. 80 Federal Register 2488-2512.

U.S. Fish and Wildlife Service, 2017. Mexican Wolf Recovery Plan, First Revision, U.S. Fish and Wildlife Service, Albuquerque, New Mexico.

U.S. Fish and Wildlife Service, 2022. Mexican Wolf Recovery Plan, Second Revision, U.S. Fish and Wildlife Service, Albuquerque, New Mexico.

PART B: REINTRODUCTION

MEXICAN WOLF EXPERIMENTAL POPULATION AREA INTERAGENCY FIELD TEAM ANNUAL REPORT

Reporting period: January 1—December 31, 2024

Prepared by:

Arizona Game and Fish Department, New Mexico Department of Game and Fish, USDA-APHIS Wildlife Services, U.S. Fish and Wildlife Service, U.S. Forest Service, and White Mountain Apache Tribe.

Participating Agencies:

Arizona Game and Fish Department (AZGFD)

New Mexico Department of Game and Fish (NMDGF)

USDA-APHIS Wildlife Services (USDA-WS)

U.S. Fish and Wildlife Service (Service)

U.S. Forest Service (USFS)

White Mountain Apache Tribe (WMAT)

1. KEY DEVELOPMENTS

- A minimum of 286 Mexican wolves and 26 breeding pairs were documented in the Mexican Wolf Experimental Population Area (MWEPA) at the end of 2024.
- Pup survival was documented to be 48 percent in 2024 (compared to 61 percent in 2023), with 79 pups surviving until the end of the year. The pup survival rate in 2024 was lower than the previous ten-year (2014—2023) average of 58 percent.
- Twenty-seven genetically diverse wolf pups were fostered from captive facilities across the United States into eight wild wolf dens in Arizona and New Mexico. By the end of 2024, eleven fostered wolves (from all years) were radio-collared and known to be alive. From 2016 to the end of 2024, thirteen fostered wolves had been documented producing pups and a minimum of thirty different litters had been produced by foster wolves.
- An adult survival rate of 0.77 combined with the number of pups that survived to December 31, contributed to a population growth of 11 percent in 2024. The number of breeding pairs documented in 2024 remained the same from 2023. Thus, the population met the management objective for 2024 of a 10 percent increase in the minimum population count and/or the addition of at least two breeding pairs. The number of management removals has remained low in the recent past with most of the population losses in 2024 being due to mortalities.
- In 2024, the overall (inclusive of all age classes) survival rate (0.77) was very similar to the previous 10-year (2014—2023) period (0.76).
- At the end of 2024, 20 released wolves counted toward the genetic criterion (AM1471, AF1578, F1692, AM1693, M1710, AF1712, AF1865, AF1866, M1888, AF1889, AF1890, M1953, AF2503, AM2545, AM2597, AM2709, M2710, M2719, AM2722, F2736). Ten of these 20 fostered wolves produced pups in 2024 (AM1471, AF1578, AF1865, AF1866, AF1889, AF1890, AF2503, AM2545, AM2709, AM2722).
- The 2024 rate of cattle confirmed to have been killed by Mexican wolves was approximately 35.66 depredations per 100 wolves and was notably lower than the previous 10-year (2014—2023) recovery program mean of 60.38 confirmed killed cattle per 100 wolves. Therefore, meeting the program goal of maintaining the cattle depredation rate at or below the previous 10-year recovery program mean. In addition, the 2024 cattle depredation rate was 20 percent lower than in 2023.

2. INTRODUCTION

The reintroduction, monitoring, and management of Mexican wolves in the MWEPA is part of a larger recovery program intended to reestablish the Mexican wolf (*Canis lupus baileyi*) within its historical range in the United States and Mexico. The first releases of Mexican wolves occurred in March 1998 on the Alpine and Clifton ranger districts of the Apache-Sitgreaves National Forest, Arizona. In 2024, the United States wild population minimum count increased to 286 wolves. This report summarizes the results of Mexican Wolf IFT activities during 2024 for monitoring, management, and furthering recovery of the United States population of Mexican wolves and serves as the annual report for all field activities authorized under USFWS Research and Recovery Permit ESPER0048320.

More information on population metrics can be found at: www.fws.gov/program/conserving-mexican-wolf/library.

a. *Background*

The Recovery Plan establishes several important metrics to gauge relative progress towards recovery. First, the recovery criteria call for an average of at least 320 wolves over eight years in the United States population. Thus, a growing population is an important measure of recovery. The population viability model Miller (2017) used to help determine recovery criteria show scenarios with mean adult mortality rates less than 25 percent, combined with mean sub-adult mortality rates less than 33 percent and mean pup mortality (for radio-marked pups greater than four months old) less than 13 percent resulted in an increasing population that will meet the population abundance recovery criteria, under certain management regimes. In particular, Miller (2017) found that growth rates and recovery were sensitive to small changes in adult mortality.

Thus, adult mortality will be an important metric for evaluation of the program. The recovery criteria also call for 22 wolves released from captivity to survive for one (sub-adults and adults) to two (pups) years following release. This recovery criterion allows for the incorporation of genes from captivity into the wild population. Thus, adult mortality, population growth, and the survival of animals released from captivity into the population are important metrics for monitoring progress toward recovery.

Due to the intensive logistical, economic, and socio-political nature of the Mexican wolf recovery effort, the Service committed to conducting evaluations five and ten years from the publishing of the 2017 Mexican Wolf Recovery Plan, First Revision to determine the progress of the Mexican wolf populations toward recovery goals. The five-year evaluation was completed in December 2024 and found over the course of the 5-year evaluation period, the Mexican wolf population in the United States surpassed interim abundance and release targets as well as 2017 model predictions for gene diversity and population growth. In contrast the population in Mexico performed better than predicted for retention but did not reach interim abundance targets nor interim release and translocation targets

(www.fws.gov/media/5-year-evaluation-mexican-wolf-recovery-strategy for the full report). For the ten-year evaluation, the interim abundance target in 2027 is 210 wolves in the United States and 167 wolves in Mexico. The interim release target in 2027 is 16 wolves released from captivity surviving to breeding age in the United States and 37 released or translocated wolves surviving to breeding age in Mexico. This evaluation will determine if the recovery strategy is effective and feasible or needs to be revised.

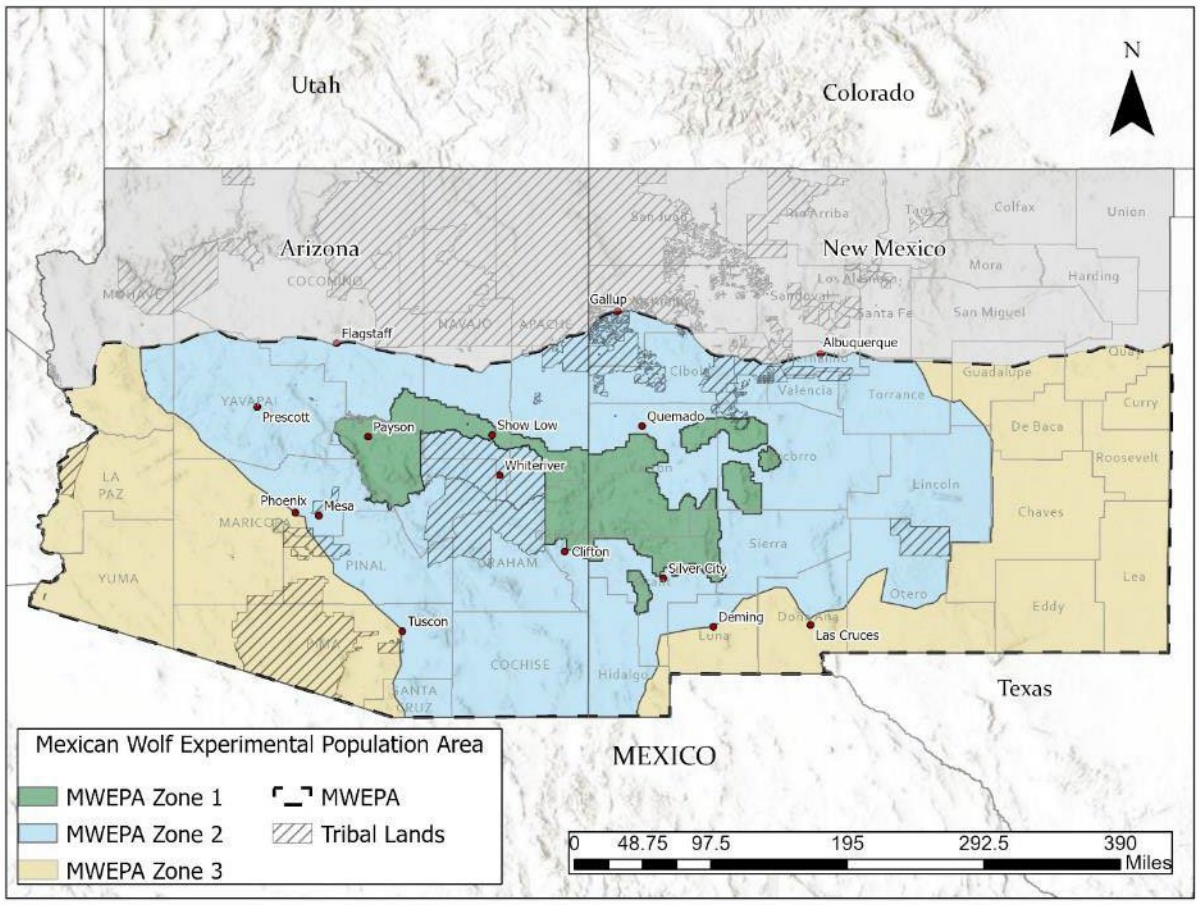

Figure 1: The Mexican Wolf Experimental Population Area (MWEPA) and Zones 1-3 in Arizona and New Mexico as described in the Final Rule.

Management of wolves in the MWEPA is conducted in accordance with the Regulations for the Nonessential Experimental Population of the Mexican wolf (hereafter referred to as the "10(j) rule" Service 2022). This rule designates the reintroduced population as experimental and nonessential and establishes the MWEPA within historical range south of Interstate 40 to the United States-Mexico border in Arizona and New Mexico, inclusive of three management areas (Zone 1, 2, and 3; Figure 1). Mexican wolves can occupy any portion of the MWEPA (Zones 1-3), can be released into Zone 1 (or in accordance with tribal or private land agreements in Zone 2), and/or translocated into Zones 1 and 2 (note: fostering—when conducted as an initial release—may be conducted in Zone 1 and on Federal lands in Zone

2). Zone 1 includes all the Apache-Sitgreaves and Gila national forests; the Payson, Pleasant Valley, and Tonto Basin ranger districts of the Tonto National Forest; and the Magdalena ranger district of the Cibola National Forest. In 2000, the WMAT agreed to allow free-ranging Mexican wolves to inhabit the Fort Apache Indian Reservation (FAIR). The FAIR is in east-central Arizona and provides 2,440 mi^2 of area that wolves may occupy. See the 10(j) rule (Service 2022) for more information.

Wolf age and sex abbreviations used in this document:

A = alpha/breeder (wolf that has successfully bred and produced/sired at least one pup) M = adult male (24 months or older)

F = adult female (24 months or older)

m = subadult male (younger than 24 months)

f = subadult female (younger than 24 months)

mp = male pup (born in the most recent spring)

fp = female pup (born in the most recent spring)

Specific information regarding wolves on the FAIR and the San Carlos Apache Reservation (SCAR) is not included in this report in accordance with tribal agreements. However, wolves occurring on the FAIR and SCAR are included in total counts for depredations and population metrics.

3. POPULATION STATUS

a. *Definitions*

Wolf pack: two or more wolves that maintain an established territory. If one of the wolves dies, the remaining wolf, regardless of pack size, usually retains the pack name.

Breeding pair: a pack that consists of an adult male and female and at least one pup of the year surviving through the end of the reporting period (January 1—December 31).

New pair: a male and female wolf, traveling together for at least two months.

b. *Monitoring Techniques*

The year-end minimum population count (population or population count) is derived from information gathered through a variety of methods deployed annually from November 1 through the year-end helicopter operation. The IFT has continued to employ comprehensive efforts initiated in 2006 to make the 2024 year-end population count accurate, consistent, and repeatable.

Management actions implemented to document Mexican wolves included: surveys and trapping for uncollared wolves, greater coordination and investigation of wolf sightings provided through the public and other agency sources, deployment of remote trail cameras, cameras at supplemental and diversionary food caches, and howling surveys in areas of suspected uncollared wolves.

Wolf sign (e.g., tracks, scats) was documented by driving roads and hiking canyons, trails, or other areas closed to motor vehicles. Confirmation of uncollared wolves was achieved via visual observation, remote cameras, howling, scats, and tracks. Ground survey efforts for

suspected packs having no collared members were documented using global positioning system (GPS) and geographical information systems (GIS) software and hardware. GPS locations were recorded and downloaded into GIS software for analysis and mapping.

In January and February 2025, aircraft were used to document wolves for the 2024 population count and to capture wolves to affix radio collars. Including January and February count data in the December 31 population count (and in this 2024 annual report) is appropriate and consistent with previous years' annual counts because wolves alive in these months were also alive in the preceding December (i.e., whelping only occurs in spring, and any wolf added to the population via initial release or translocation after December 31 and before the end of the survey are not counted in the year-end population count). During the year-end count, fixed-wing aircraft were used to locate wolves and assess the potential for darting wolves from the helicopter. A helicopter was used to obtain a visual count of uncollared wolves associated with collared wolves in all areas and to capture priority animals (e.g., uncollared wolves, injured wolves, or wolves with failed or old collars) where the terrain and land ownership allowed.

As part of the 2024 year-end population count, the IFT coordinated with members of the public and agencies to identify possible wolf sightings. Wolf sightings were investigated to confirm wolf presence and to determine if observations could be used to inform the annual population count by identifying previously unknown animals or better informing counts of known packs.

Documentation of wolves or wolf sign was also used to guide efforts to capture uncollared wolves, with the objective to place at least one collar (preferable two) in each identified pack. Confirmed reports from the public allowed the IFT to count uncollared wolves not associated with collared wolves.

c. *Minimum Population Count*

At the end of 2024, the minimum population count was 286 wolves, which was an 11 percent increase from the previous year's population (n=257; Figure 2). Pups comprised 28 percent of the population in 2024. Twenty-six packs were considered breeding pairs in 2024, compared to twenty-six in 2023.

At the end of 2024, the functioning collared population consisted of 113 radio-collared wolves among 60 known packs, and seven single wolves, which was very similar to 2023 (Table 5). A total of 173 uncollared or failed collared wolves were documented at the end of 2024 (*note: all the uncollared wolves captured during the January and February 2025 helicopter operation were included as uncollared animals associated with known packs above;* Table 5).

Thirty-five uncollared wolves were documented in 2024 (Figure 3, Table 5) that were not associated with known packs. Searches for uncollared wolves occurred throughout the calendar year; however, only uncollared wolves documented between November and the end of the annual helicopter count and capture operations are included in the population count for the

year.

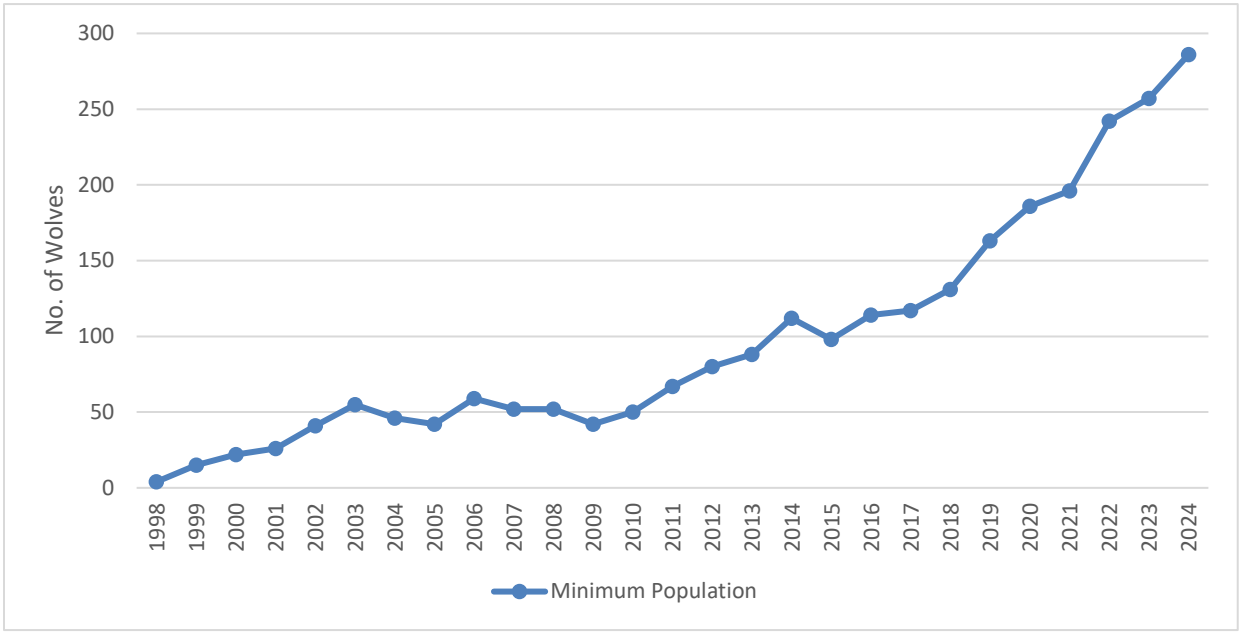

Figure 2: Mexican wolf minimum population counts from 1998 through 2024 in Arizona and New Mexico.

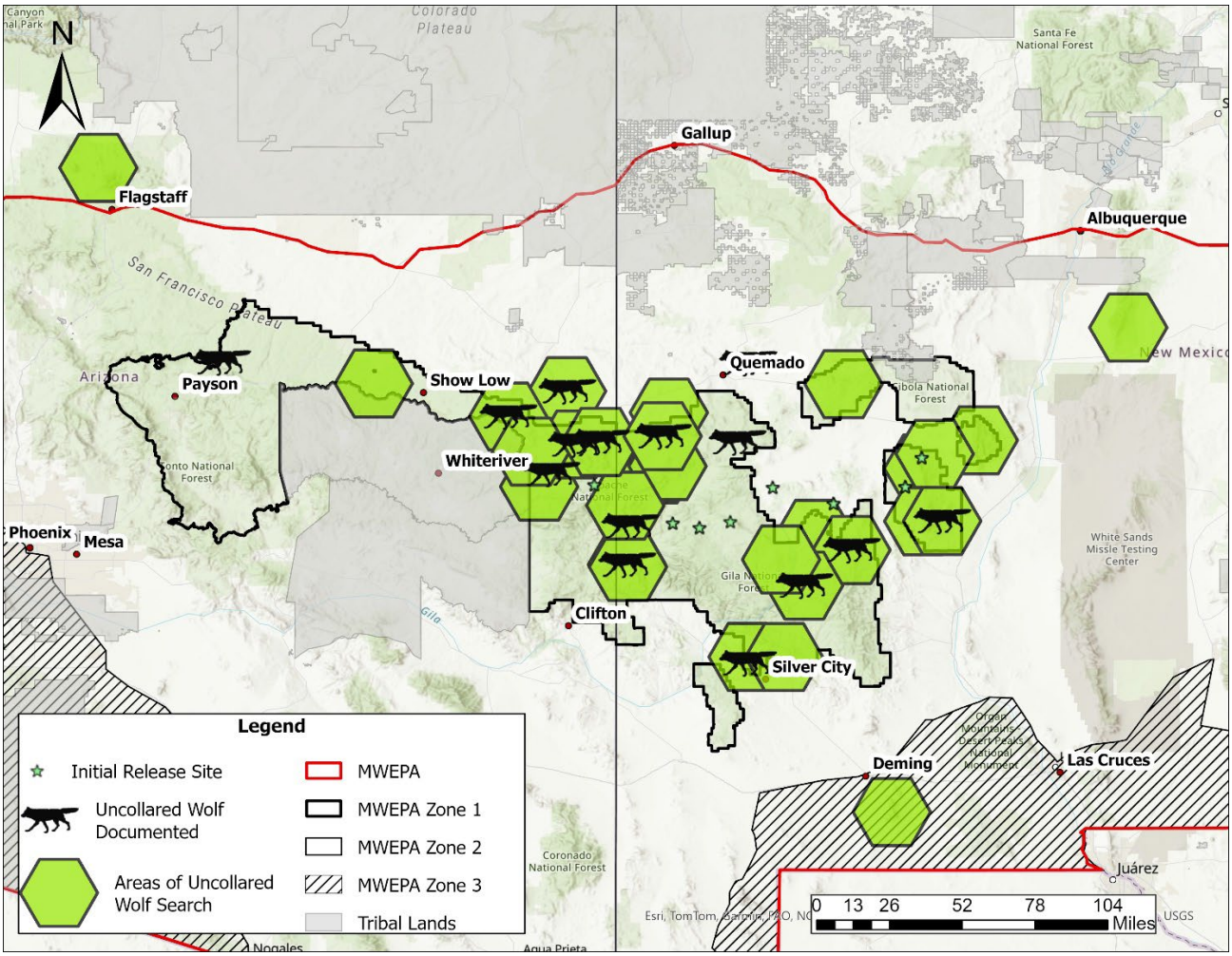

Figure 3: Areas searched for uncollared wolf sign within the Mexican Wolf Experimental Population Area. Areas where the uncollared wolves documented contributed to the year's total population count are indicated as uncollared wolves documented. Eight initial release sites (dens for fostering efforts) were used during 2024 in Arizona and New Mexico.

d. Reproduction

In 2024, 44 packs exhibited denning behavior, which included 15 packs in Arizona and 29 packs in New Mexico. Of the 44 denning packs, 26 had at least one pup and two adults at the end of the year and were thus considered breeding pairs. In addition, the IFT fostered a total of 27 captive-born pups into dens of eight wild packs in Arizona and New Mexico. The IFT documented 164 pups (including the 27 fostered pups) with a minimum of 79 surviving in the wild until year-end in Arizona (n = 28) and New Mexico (n = 51), which showed that 48 percent of the pups documented in early counts survived until the end of the year (Figure 4, Table 5)

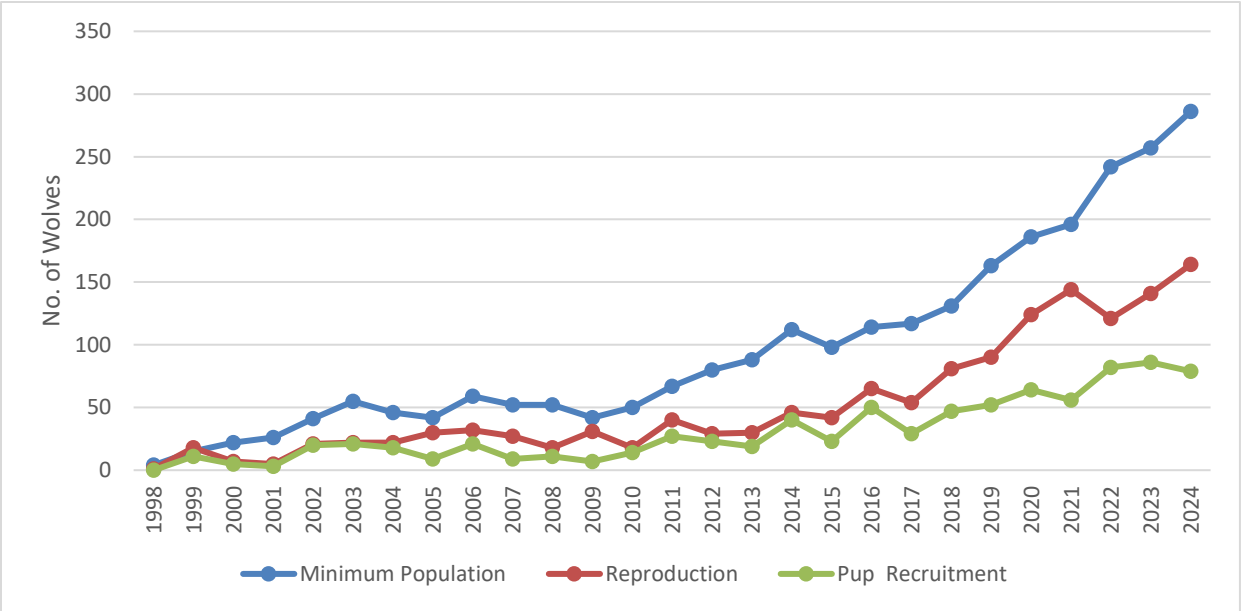

Figure 4: Mexican wolf minimum population estimate, reproduction (maximum number of pups documented), and recruitment (number of pups surviving at year's end) documented in Arizona and New Mexico, 1998—2024.

e. *Captures*

In 2024, 46 wolves were captured a total of 48 times. Twenty-seven wolves were captured by the IFT, collared for the first time, processed, and released on site for routine population monitoring purposes. Sixteen wolves were captured, re-collared, processed, and released on site, or simply released on site with the current collar. One wolf was captured by the IFT for the first time, collared and translocated inside the MWEPA (Table 1). One wolf was captured by the IFT and died during processing (See Tables 2, 3). Three wolves were captured by private trappers. Two of these wolves received veterinary care and were released back into their home range, one of these wolves received veterinary care and was translocated back into the MWEPA outside of their original home range (See Table 1).

All wolves equipped with functioning radio collars were monitored opportunistically by standard radio telemetry from the ground and air (White and Garrot 1990). During all or portions of the year, 142 wolves were equipped with Global Positioning Collars (GPS) collars to provide more detailed location information and management capability.

f. *Releases and Translocations*

Foster: the transfer of offspring from their biological parent(s) and placement with surrogate parent(s). If the offspring were in captivity at the time of the transfer, this is also considered an *Initial Release* (see definition below). If the offspring were in the wild at the time of their transfer this is also considered a *Translocation* (see definition below).

Initial Release: the release of Mexican wolves to the wild within Zone 1 (Figure 1), or in

accordance with tribal or private land agreements in Zone 2 (Figure 1), that have never been in the wild, or releasing pups that have never been in the wild and are less than five months old within Zones 1 or 2. The initial release of pups less than five months old into Zone 2 allows for the fostering of pups from the captive population into the wild, as well as enables translocation-eligible adults to be re-released in Zone 2 with pups born in captivity (see 10(j) rule at www.fws.gov/program/conserving-mexican-wolf/library).

Translocations: the release of Mexican wolves into the wild that have previously been in the wild. In the MWEPA translocations will occur only in Zones 1 and 2 (Figure 1; see 10(j) rule at www.fws.gov/program/conserving-mexican-wolf/library.

Supplemental Food Cache: road-killed native prey carcasses or carnivore logs provided to wolves to assist a pack or remnant of a pack when extenuating circumstances reduce their own ability to do so [e.g., one animal raising young, or just after initial releases and translocations (including fostering)].

In 2024, twenty-seven wolves were initially released (all 27 were fostered pups released in April and May; Table 1, Figure 3, Figure 5) into eight packs (Chimney Canyon, Cottonwood Canyon, Hail Canyon, Lonesome Well, Milligan Gulch, Pitchfork Canyon, Point of Rocks, Prime Canyon).

These captive-born pups came from five SAFE facilities including: Living Desert Zoo and Gardens State Park, Brookfield Zoo Chicago, Endangered Wolf Center, the Wolf Conservation Center, and Sevilleta Wolf Management Facility. We supplementally fed packs where foster events occurred to assist the pack with the nutritional demand of additional pups.

Additionally, twelve wolves were translocated in 2024 (Table 1). Translocations can occur throughout the year. Of the 39 wolves that were initially released or translocated in 2024, six were radio collared, and known to be alive during the end of year count, one was lethally removed for nuisance behavior, and 32 were uncollared and considered fate unknown as the IFT had not been able to capture and collar the pups, nor were they documented as a mortality (See Table 1). The IFT will continue efforts to document surviving fostered pups in the following years.

Table 1: Mexican wolves initially released from captivity or translocated in the wild in Arizona and New Mexico during January 1 – December 31, 2024.

Wolf pack	Wolf ID	Release site	Release date	Event Type	End of Year Status
Frieborn	fp2891	Frieborn Den	4/14/2024	Translocated (fostered)	Fate Unknown
Frieborn	mp2892	Frieborn Den	4/14/2024	Translocated (fostered)	Fate Unknown
Frieborn	mp2893	Frieborn Den	4/14/2024	Translocated (fostered)	Fate Unknown
Frieborn	fp2894	Frieborn Den	4/14/2024	Translocated (fostered)	Fate Unknown
Frieborn	mp2895	Frieborn Den	4/14/2024	Translocated (fostered)	Fate Unknown
Frieborn	mp2896	Frieborn Den	4/14/2024	Translocated (fostered)	Fate Unknown
Frieborn	fp2897	Frieborn Den	4/14/2024	Translocated (fostered)	Fate Unknown
Pitchfork	mp2900	Pitchfork Den	4/25/2024	Released (fostered)	Fate Unknown
Pitchfork	fp2902	Pitchfork Den	4/25/2024	Released (fostered)	Fate Unknown
Prime Canyon	mp2899	Prime Canyon Den	4/25/2024	Released (fostered)	Fate Unknown
Prime Canyon	fp2901	Prime Canyon Den	4/25/2024	Released (fostered)	Fate Unknown
Prime Canyon	mp2903	Prime Canyon Den	4/25/2024	Released (fostered)	Fate Unknown
Manada del Arroyo	AF1828	Peloncillo Mountains, AZ	4/29/2024	Translocated	Alive, Radio Collared
Manada del Arroyo	M2774	Peloncillo Mountains, AZ	4/29/2024	Translocated	Alive, Radio Collared
Milligan Gulch	mp2909	Milligan Gulch Den	5/5/2024	Released (fostered)	Fate Unknown
Milligan Gulch	fp2910	Milligan Gulch Den	5/5/2024	Released (fostered)	Fate Unknown
Milligan Gulch	fp2911	Milligan Gulch Den	5/5/2024	Released (fostered)	Fate Unknown
Milligan Gulch	fp2912	Milligan Gulch Den	5/5/2024	Released (fostered)	Fate Unknown
Milligan Gulch	fp2913	Milligan Gulch Den	5/5/2024	Released (fostered)	Fate Unknown
Hail Canyon	mp2922	Hail Canyon Den	5/7/2024	Released (fostered)	Alive, Radio Collared
Hail Canyon	fp2924	Hail Canyon Den	5/7/2024	Released (fostered)	Fate Unknown
Hail Canyon	mp2926	Hail Canyon Den	5/7/2024	Released (fostered)	Fate Unknown
Point of Rocks	mp2923	Point of Rocks Den	5/8/2024	Released (fostered)	Fate Unknown
Point of Rocks	mp2925	Point of Rocks Den	5/8/2024	Released (fostered)	Fate Unknown
Point of Rocks	mp2927	Point of Rocks Den	5/8/2024	Released (fostered)	Fate Unknown

Wolf pack	Wolf ID	Release site	Release date	Event Type	End of Year Status
Point of Rocks	mp2928	Point of Rocks Den	5/8/2024	Released (fostered)	Fate Unknown
Chimney Canyon	mp2944	Chimney Canyon Den	5/16/2024	Released (fostered)	Fate Unknown
Chimney Canyon	mp2945	Chimney Canyon Den	5/16/2024	Released (fostered)	Alive, Radio Collared
Chimney Canyon	fp2948	Chimney Canyon Den	5/16/2024	Released (fostered)	Fate Unknown
Cottonwood Canyon	mp2943	Cottonwood Canyon Den	5/16/2024	Released (fostered)	Fate Unknown
Cottonwood Canyon	mp2946	Cottonwood Canyon Den	5/16/2024	Released (fostered)	Fate Unknown
Cottonwood Canyon	mp2947	Cottonwood Canyon Den	5/16/2024	Released (fostered)	Fate Unknown
Lonesome Well	mp2962	Lonesome Well Den	5/17/2024	Released (fostered)	Fate Unknown
Lonesome Well	fp2967	Lonesome Well Den	5/17/2024	Released (fostered)	Fate Unknown
Lonesome Well	fp2968	Lonesome Well Den	5/17/2024	Released (fostered)	Fate Unknown
Lonesome Well	fp2969	Lonesome Well Den	5/17/2024	Released (fostered)	Fate Unknown
Single	m2978	Gila Flat, NM	6/17/2024	Translocated	Alive, Radio Collared
Single	F2534	Rose Peak, AZ	10/23/2024	Translocated	Lethal Removal
Hail Canyon	mp2933	Gila Flat, NM	12/27/2024	Translocated	Alive, Radio Collared

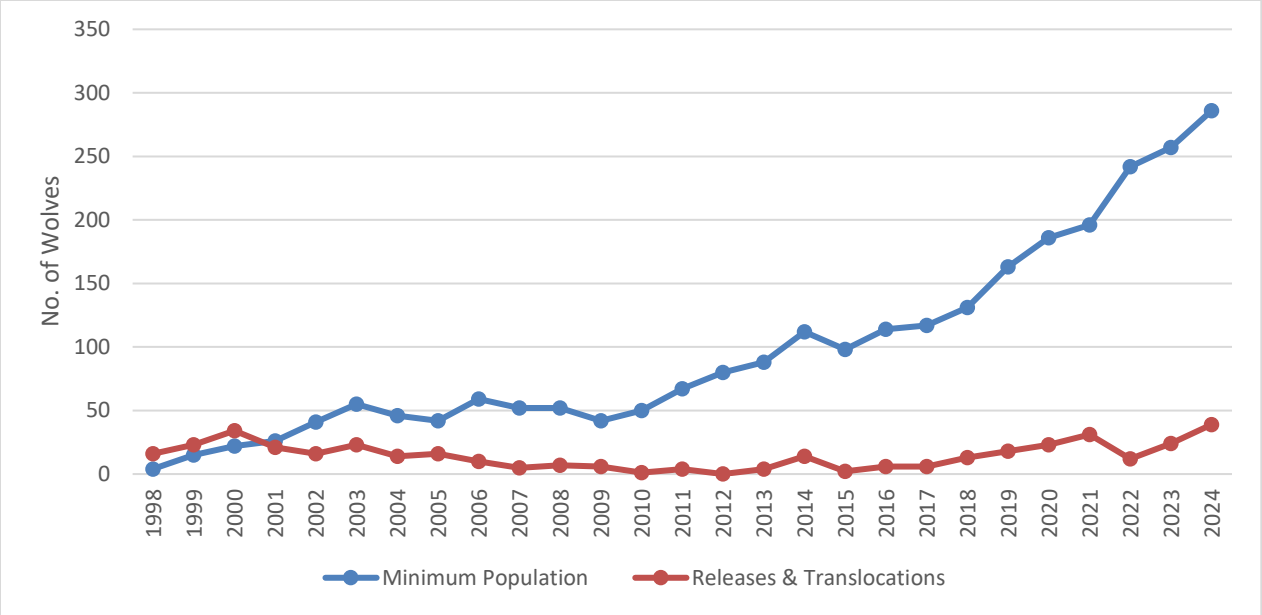

Figure 5: Mexican wolf minimum population estimates and associated releases and translocations including: initial releases (wolves released with no wild experience), and translocations (wolves re-released from captivity back into the wild, and wolves in the wild that were captured, moved, and re-released in a different location for management purposes such as but not limited to boundary issues and conflicts with livestock in Arizona and New Mexico 1998—2024).

g. Home Ranges and Movements

Home ranges were calculated using ≥20 individual locations on a pack, pair, or single wolf exhibiting territorial behavior over a period of greater than six months. Due to the large volume of deployed GPS collars, individual wolves were selected to represent a pack's home range territory (Kittle et al. 2015). When possible, breeders were selected to represent the territorial behavior of the pack with preference given to the breeding female. To maximize sample independence, only two locations per animal per day were used in the analysis. After any major pack disturbance that affected territorial behavior (i.e., death of a breeder that resulted in dispersal of the other breeder), GPS locations were right-censored to avoid extra territorial movement. Home ranges were not calculated for wolves that displayed dispersal behavior or exhibited other non-territorial behavior during 2024. Individual point selection was accomplished with program R (R Core Team 2015). Home range polygons were generated using the 95 percent adaptive kernel method (Seaman and Powell 1996) with R and the adehabitatHR package in conjunction with ArcPro (Calenge 2019, ESRI 2018).

Home ranges were calculated for 58 packs or pairs exhibiting territorial behavior in 2024 using kernel density estimation (Seaman et al. 1999). These home ranges were between 26 square miles (Warm Springs pack) and 1,001 square miles (Tres Lagunas pack), with an average home range size of 252 square miles (Figure 6). For additional information regarding home range details in Arizona and New Mexico please see Appendix A.

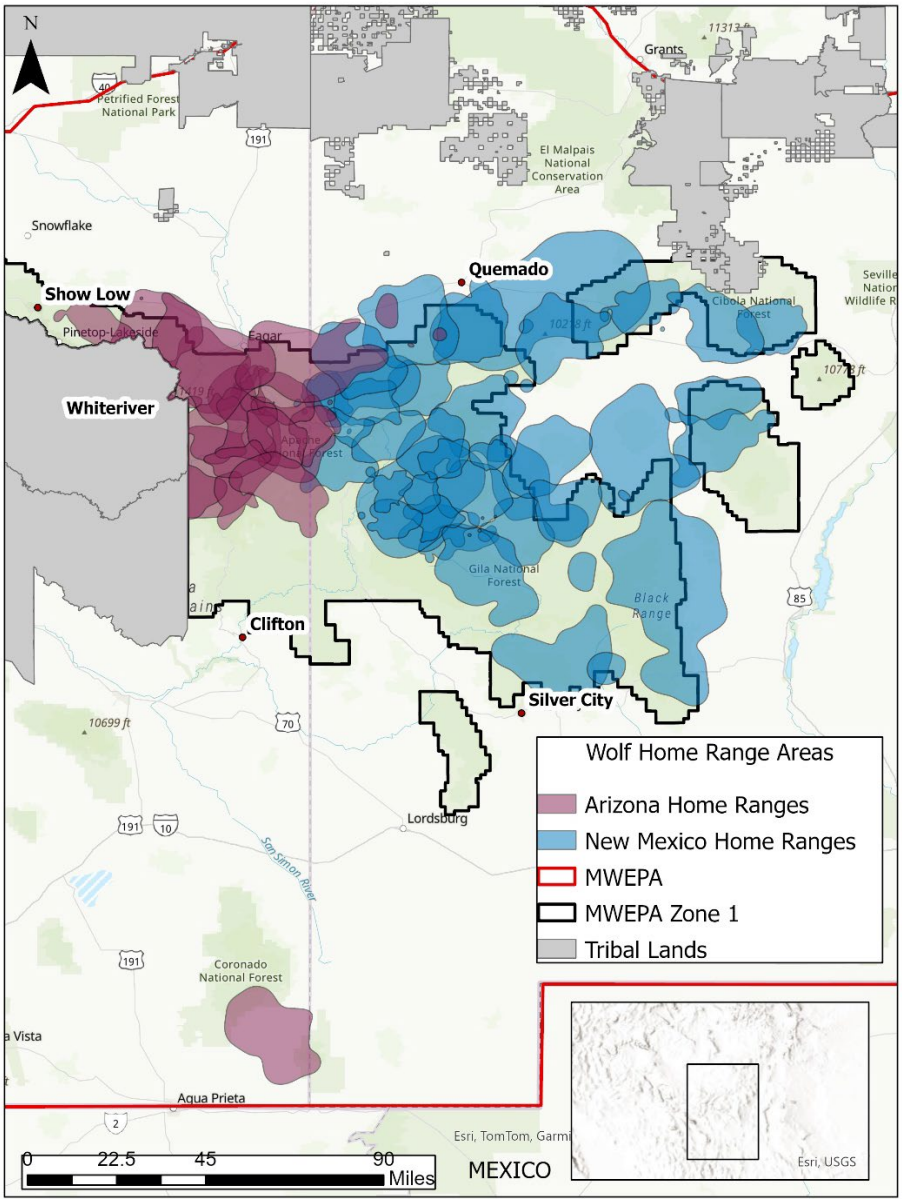

Figure 6: Mexican wolf home ranges (95 percent fixed kernel utilization distribution) for 2024 in Arizona and New Mexico excluding tribal lands. Darker areas indicate overlap between home ranges.

Martinez-Meyer et al. (2021) estimated 12,521 square miles of high-quality habitat occurred in the MWEPA. In 2024, fifty-eight packs utilized a total home range area of 9,776 square miles (outer boundary of non-overlapping home ranges). The home range area encompassed approximately 4,721 square miles of high-quality habitat, indicating there is still sufficient available high-quality habitat in the MWEPA for the population to continue growing.

h. Dispersals

In 2024, the IFT documented 14 collared wolves that dispersed from their natal packs (i.e., the pack the wolf was raised by). These dispersing wolves were classified into one of four categories:

1) dispersed to form a new pack (n = 7); 2) dispersed into an existing pack (n = 4); 3) were single wolves at the end of the year (n = 3); or 4) were removed (n = 0).

i. Occupied Range

Occupied wolf range was calculated based on the following criteria: (1) a ten-mile radius around all aerial locations or GPS locations of radio monitored wolves over the past year; (2) a ten-mile radius around all uncollared wolf locations and wolf sign over the past year; and (3) in accordance with the 10(j) rule, occupied range is calculated within the 10(j) boundary of the MWEPA and does not include tribal lands or areas in management Zone 3.

Under this definition, Mexican wolves occupied 20,270 square miles of the MWEPA during 2024 (Figure 7). In comparison, Mexican wolves occupied 31,585 square miles of the MWEPA during 2023. The Mexican wolf occupied range decreased by 36 percent from 2023. For additional information on areas utilized by Mexican wolves in 2024, please see Appendix B.

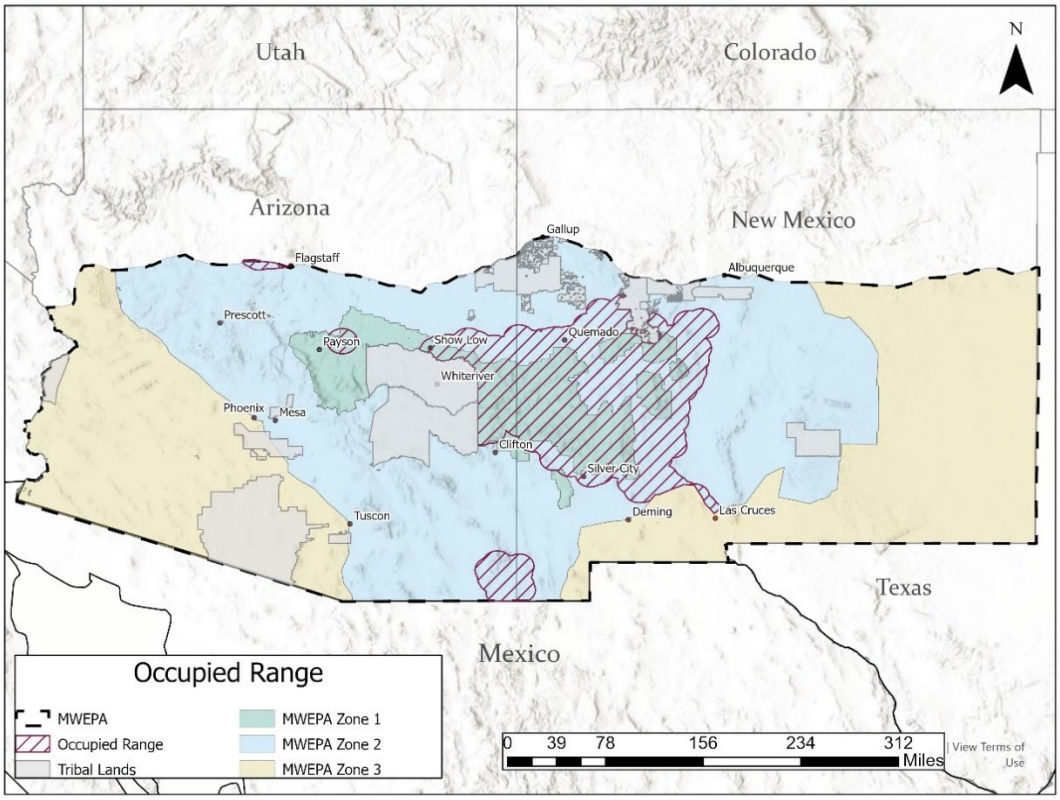

Figure 7: Mexican wolf occupied range in Arizona and New Mexico during 2024.

j. Mortality and Removals

Wolf mortalities were detected via ground telemetry, GPS locations, and public reports. Mortality signals from radio collars were investigated within approximately 24 hours of detection to determine the status of the wolf. Carcasses were investigated by law enforcement personnel from the lead agencies and necropsies were conducted to determine cause of death (Tables 2, 3). The IFT has documented 314 wolf mortalities since 1998, 30 of which occurred in 2024 (Tables 2, 3 and Figure 8). The annual mortality total for 2024 was very similar to 2023 (31 mortalities) and substantially higher than 2022 (12 mortalities). Causes of death were classified into six categories including: 1) illegal mortality; 2) vehicle collision; 3) natural; 4) other; 5) unknown; and 6) pending necropsy. Twelve of the 30 (40 percent) documented wolf mortalities were considered illegal. Five of the 30 (16.5 percent) documented wolf mortalities were caused by a vehicle collision. Five of the 30 (16.5 percent) documented wolf mortalities died from natural causes (e.g., starvation, exposure, interspecific competition, intraspecific competition). Two of the 30 (7 percent) documented wolf mortalities died from other causes (e.g., capture-related mortalities, legal shootings and legal trap related mortalities by the public). Cause of death could not be determined for six of the 30 (20 percent) documented wolf mortalities. In total, 17 (56.5 percent) of the documented mortalities were considered human-caused (includes illegal mortality and vehicle collision). All causes of death should be considered minimum estimates of mortality, as uncollared wolves (of any age, including those with failed collars) may die without those mortalities being documented.

Table 2: Wild Mexican wolf mortalities documented in Arizona and New Mexico, 1998—2024.

Year	Illegal mortality[a]	Vehicle collision	Natural[b]	Other[c]	Unknown	Awaiting necropsy	Annual total
1998	4	0	0	1	0	0	5
1999	0	1	2	0	0	0	3
2000	2	2	1	0	0	0	5
2001	4	1	2	1	1	0	9
2002	3	0	0	0	0	0	3
2003	7	4	0	0	1	0	12
2004	1	1	1	0	0	0	3
2005	3	0	0	0	1	0	4
2006	1	1	1	1	2	0	6
2007	2	0	1	0	1	0	4
2008	7	2	2	0	2	0	13
2009	4	0	4	0	0	0	8
2010	5	0	1	0	0	0	6
2011	3	2	3	0	0	0	8
2012	4	0	0	0	0	0	4
2013	5	0	0	2	0	0	7
2014	7	1	3	0	0	0	11
2015	8	0	3	0	2	0	13
2016	7	2	1	2	2	0	14
2017	6	1	4	0	1	0	12
2018	13	2	3	0	3	0	21
2019	9	1	1	2	2	0	15
2020	14	6	0	4	6	0	30
2021	12	5	4	3	1	0	25
2022	7	3	1	0	1	0	12
2023	11	4	9	4	3	0	31
2024	12	5	5	2	6	0	30
Total	**161**	**44**	**52**	**22**	**35**	**0**	**314**

[a] *Illegal mortality causes of death may include but are not limited to known or suspected illegal shooting with a firearm or arrow, and illegal trap related mortalities by the public following necropsy.*

[b] *Natural causes of death may include, but are not limited to predation, starvation, interspecific strife, lightening, and disease.*

[c] *Other causes of death include capture-related mortalities. legal shootings and legal trap related mortalities by the public.*

Wolves not located or otherwise documented alive for three or more months are considered missing or "fate unknown." These wolves may have died, dispersed, or have a malfunctioned radio collar. Two wolves last located in Arizona (F1679, f2864) and eight wolves last located in New Mexico (F1278, M1345, F1346, F1439, M1455, M1949, F2503, M2703) were designated fate unknown (e.g., not observed via sightings, remote cameras, or radio telemetry for >3 months during portions of 2024).

Table 3: Mexican wolf mortalities documented in Arizona and New Mexico during January 1—December 31, 2024.

Wolf ID	Pack	Age (years)	Estimated Date of Mortality	Cause of Death
mp2785	Uncollared wolf (Leon)	<1	1/19/2024	Vehicle Collision
mp2880	Uncollared wolf	<1	3/5/2024	Other
f2890	Uncollared wolf	1	3/18/2024	Illegal
AM1571	Sierra Blanca	8	4/7/2024	Natural
m2882	Uncollared wolf	1	4/8/2024	Illegal
AF1889	Pancho Spring	4	4/12/2024	Vehicle Collision
AF2753	Beaver Point	4	4/30/2024	Illegal
F2741	Single	2	5/3/2024	Unknown
m2888	Rose	1	5/4/2024	Natural
AF2887	Baldy	5	5/7/2024	Unknown
AF1936	Agua Frio	5	5/9/2024	Illegal
m2863	Rocky Prairie	1	5/15/2024	Unknown
m2870	Pancho Spring	1	5/27/2024	Vehicle collision
M2762	New Pack NM	2	5/29/2024	Other
AF1399	San Mateo	9	6/27/2024	Illegal
F2885	Lost Spring	3	6/29/2024	Unknown
AM1338	Tu dil hil	11	7/3/2024	Natural
AM2722	Elderberry	2	7/6/2024	Illegal
f2976	Saffel	1	7/12/2024	Natural

Wolf ID	Pack	Age (years)	Estimated Date of Mortality	Cause of Death
AF1726	Buzzard Peak	6	8/1/2024	Illegal
AM2545	Warm Springs	4	8/3/2024	Illegal
AF2523	Chimney Canyon	4	8/8/2024	Illegal
AF1918	Noble Mountain	5	8/16/2024	Unknown
AF2593	Sawtooth	3	8/31/2024	Illegal
fp2989	Juniper Bench	<1	10/6/2024	Vehicle collision
AF2756	Iron Creek	3	10/23/2024	Unknown
AM1856	Colibri	5	10/31/2024	Illegal
F2979	New Pack AZ	2	11/6/2024	Illegal
AF1705	Cimmaron Mesa	7	11/28/2024	Natural
mp2951	Uncollared wolf (Chimney Canyon)	<1	11/30/2024	Vehicle collision

For wolves equipped with radio collars, mortality, missing, and removal rates were calculated using methods presented in Heisey and Fuller (1985). Missing animals were censored at the date of the last signal/location of a functioning collar and classified as likely alive or dead based on the totality of the information associated with the failure (e.g., do we have subsequent photos of the animal, did the collar malfunction suddenly or fail in a predictable manner, etc.).

Management removals can have an effect equivalent to mortalities on the population of Mexican wolves (Paquet et al. 2001). Thus, yearly cause-specific removal rates were calculated for wolves equipped with radio collars. Wolves are removed from the population for four primary causes: 1) livestock depredations; 2) nuisance to humans; 3) wolves that are outside the boundary (e.g., outside the recovery area) or requested removal from tribal lands (these wolves are generally translocated within the US or Mexico); and 4) other (e.g., paired with other wolves, veterinary treatment, movement of a wolf to a more appropriate area without any of the other causes occurring first). Each time a wolf was moved, it was considered a removal, regardless of the animal's status later in the year (e.g., if the wolf was translocated or held in captivity). Twenty-nine wolves equipped with functioning radio collars were considered removed (n = 1), dead (n = 25), or missing (n = 3). Uncollared wolves and individuals with failed collars documented dead (n = 5) or removed (n = 9) were not included in the survival analysis.

A cumulative mortality rate of wolves was calculated by combining mortality, missing (only those wolves that went missing under questionable scenarios (i.e. are likely dead)), and removal rates to represent the overall yearly rate of wolves affected (i.e., dead, missing, or

managed) in a given year. Uncollared or failed-collared wolves that were found dead or removed were not included in the survival analyses because these wolves were not consistently monitored throughout the year (e.g., animals may die without being found and the individuals that are found are random occurrences that do not reflect overall population dynamics). In addition, wolves that died as a result of handling (no wolves with a functioning radio collar died as a result of handling in 2024) were right-censored at the time of their death (e.g., radio days were counted until their death, but the death was not counted in survival estimates) in accordance with standard survival analyses methodology (Heisey and Fuller 1985, Smith et al. 2010).

The overall survival rate was 0.77 with a cumulative mortality rate of 0.23. The cumulative mortality rate was composed of human caused mortality rate (0.12; $n = 14$), natural mortality rate (0.04; $n = 5$), unknown/awaiting necropsy mortality rate (0.05; $n = 6$), boundary removal rate (0.00; $n = 0$), missing likely dead wolves' rate (0.03; $n = 3$), livestock depredation removal rate (0.00; $n = 0$), nuisance removal rate (0.01; $n = 1$), and other removal rate (0.00; $n = 0$). Mortality rates were evenly distributed across age classes with pup (radio days = 1,658, failures = 1, survival rate = 0.80) sub-adult (radio days = 8,273, failures = 6, survival rate = 0.77), and adult (radio days = 31,216, failures = 22, survival rate = 0.77) being roughly equivalent.

Based on meta-analysis of gray wolf literature, Fuller et al. (2003) identified a 0.34 mortality rate as the inflection point for wolf populations. Theoretically, wolf populations below a 0.34 mortality rate would increase naturally, and wolf populations above a 0.34 mortality rate would decrease. The Mexican wolf population had a cumulative mortality rate of 0.23 in 2024.

Following Fuller et al. (2003), our cumulative mortality rate would predict an increasing population which was the case in 2024. Further, Miller (2017) found that population growth was particularly sensitive to adult mortality rates, which were similar to other components of the population in 2024. The low cumulative mortality rate is in part because the number of management removals has remained low in the recent past with the majority of the population losses in 2024 being due to mortalities. The cumulative mortality rate from 2016—2024 has remained relatively stable at a level below the inflection point (0.34) with a high of 0.31 (2018) and a low of 0.11 (2022) and the population has consistently grown through this period (Figure 9).

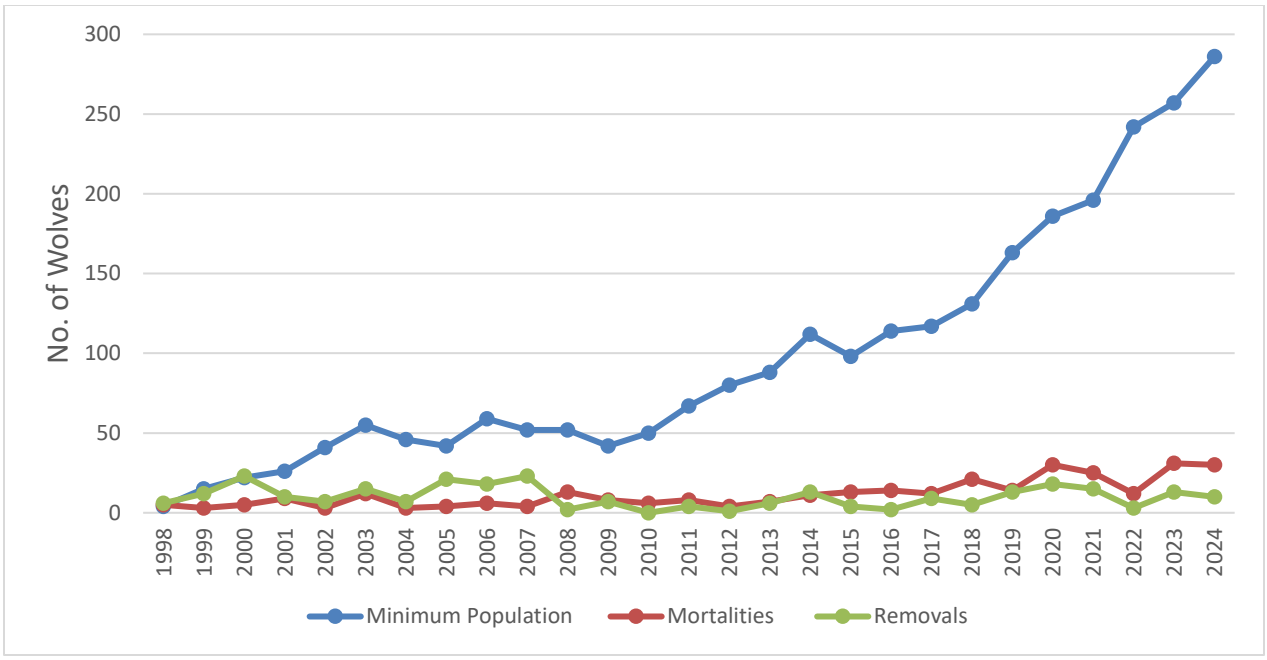

Figure 8: Mexican wolf minimum population estimates and associated removals and mortalities in Arizona and New Mexico during 1998—2024.

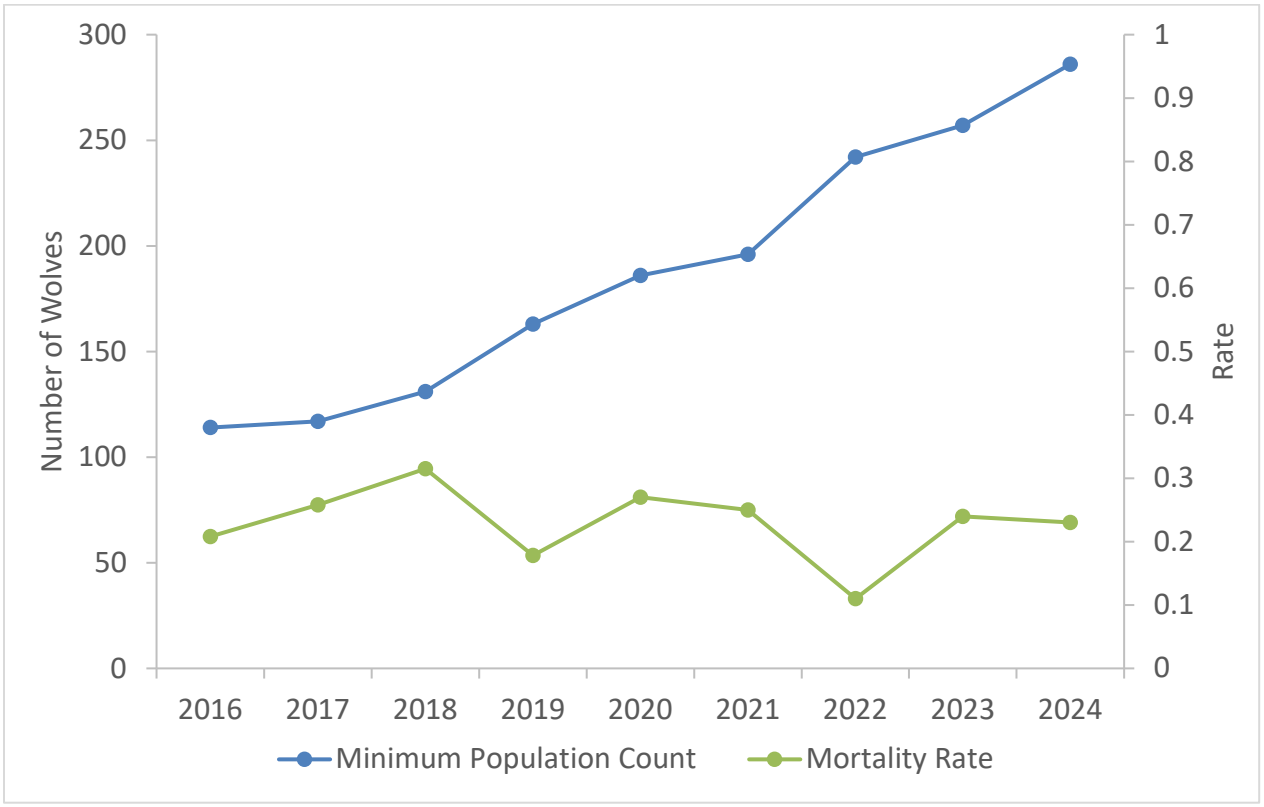

Figure 9: Mexican wolf minimum population estimates and associated mortality rates in Arizona and New Mexico 2016—2024.

4. CONFLICT MANAGEMENT

Reports of wolf-caused livestock depredations are investigated and classified by USDA-WS as confirmed wolf, probable wolf, or determined as not having wolf involvement. A depredation is defined as a confirmed killing or wounding of lawfully present domestic animals by one or more Mexican wolves. A depredation incident is defined as the aggregate number of livestock killed or mortally wounded by an individual wolf or by a single pack of wolves at a single location within a one-day (24 hr.) period, beginning with the first confirmed kill, as documented in an initial IFT incident investigation. Investigations of injured animals that survive that are confirmed or probable are not considered depredation incidents. Investigations where an animal was killed, and the investigator determines the death was probably caused by wolves (but not confirmed) are also not considered depredation incidents.

USDA-WS investigated suspected wolf depredations on livestock, including dead and injured livestock within 24 hours of receiving a report unless rare circumstances prevented arrival within 24 hours. Not all dead livestock were found or found and reported in time to document cause of death. Accordingly, depredation numbers in this report represent the minimum number of livestock determined by USDA-WS to have wolf involvement (confirmed or probably killed or injured by wolves).

a. *Depredations*

In 2024, investigators confirmed that wolves were responsible for the death of 102 cattle, and two horses, and injuries to 19 cattle, one horse, and one dog. Additionally, 33 cattle and one dog were identified as probable wolf-caused deaths, and four cattle were identified as probable wolf-caused injuries (Table 4). In 2024, the total number of confirmed depredations decreased by 11 percent from 2023 (Figure 10). Investigations of dead and injured livestock conducted by USDA-WS that were determined to be from causes other than wolves (i.e., vehicle strike, illness, coyote depredation, bear depredation, or unknown cause) are not listed.

Table 4: USDA-WS confirmed and probable wolf depredations by state in 2024.

	Confirmed Wolf Killed or died from injuries	**Confirmed Wolf Injured**	**Probable Wolf Killed or died from injuries**	**Probable Wolf Injured**
Arizona	24	4	3	0
New Mexico	80	17	31	4
Total	**104**	**21**	**34**	**4**

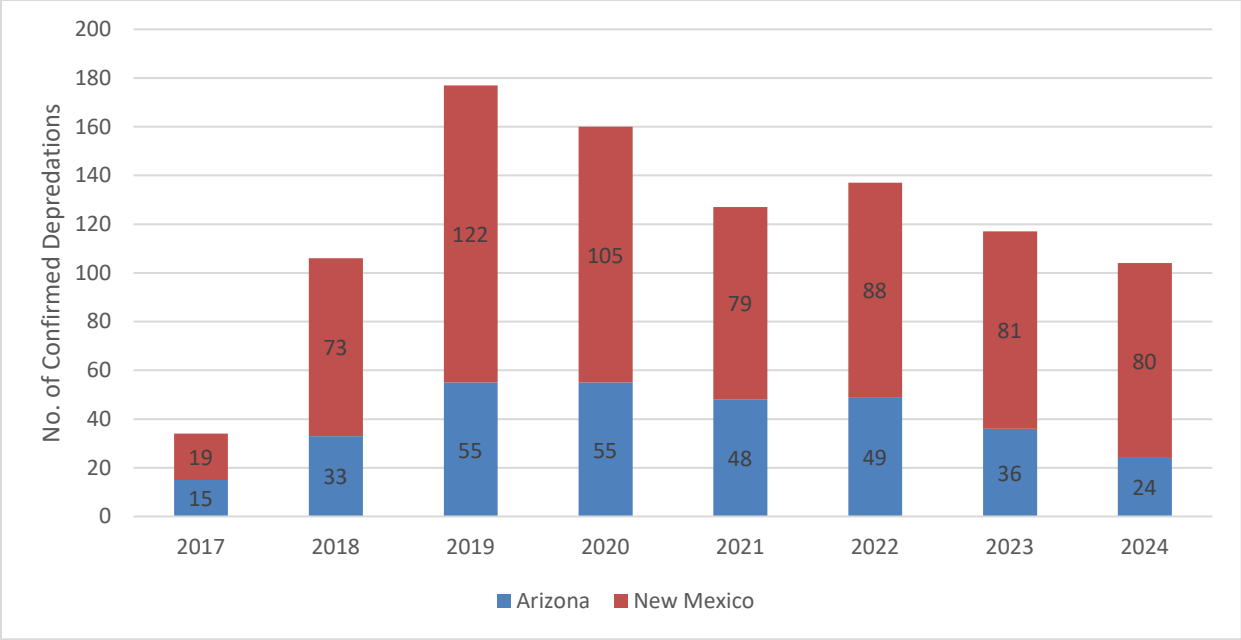

Figure 10: Total number of confirmed depredations (animal killed or died from injuries) in Arizona and New Mexico during 2017—2024.

From 2014 to 2023 (10-year average), the mean number of cattle confirmed killed by wolves per year is 97.4 which extrapolates to 60.38 cattle killed per year per 100 Mexican wolves (Figure 11). The mean of cattle killed per year per 100 wolves is useful for comparison purposes in 2024. The depredation rate for 2024 extrapolates to 35.66 confirmed cattle killed per 100 wolves using the number of confirmed killed cattle compared to the final population count.

Furthermore, the 2024 rate (35.66) is considerably lower than the previous 10-year average (2014 to 2023) mean of 60.38 confirmed killed cattle per100 wolves per year and is also a 20 percent decrease from 2023 (44.36).

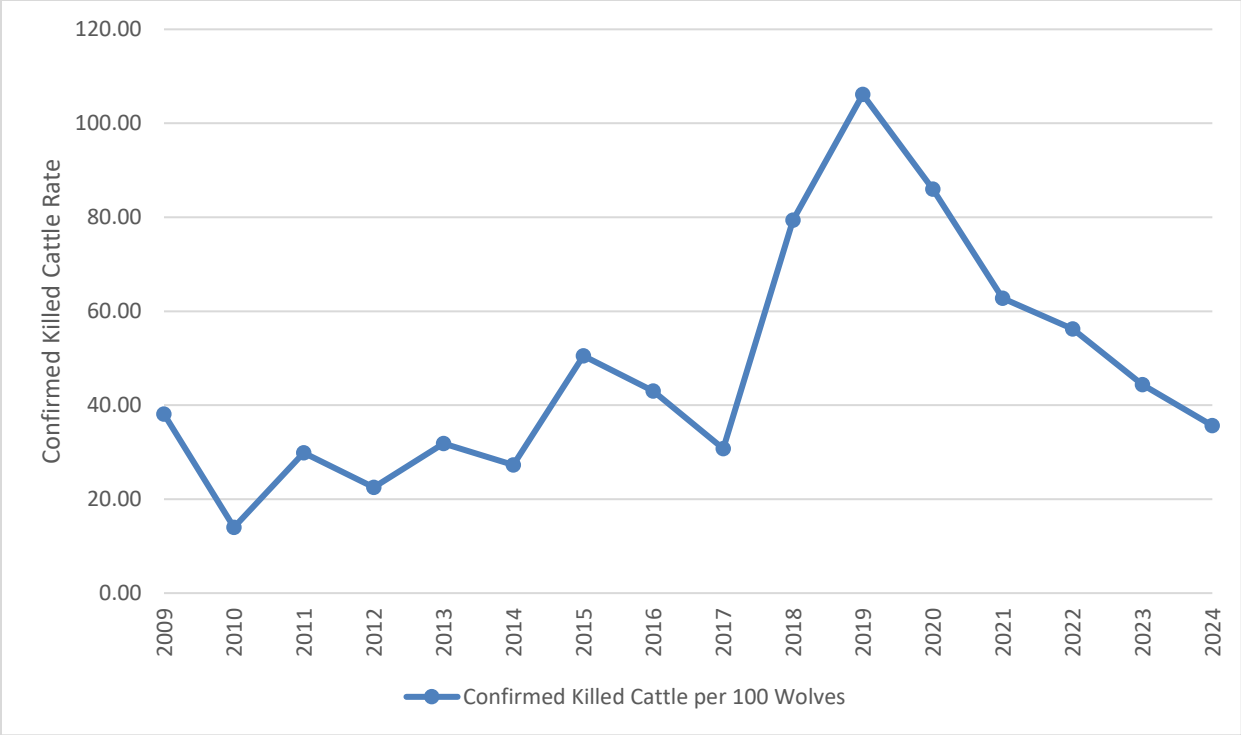

Figure 11: Confirmed killed cattle rate per 100 wolves in Arizona and New Mexico during 2009—2024.

b. Wolf-Human Conflict

Wolf-human conflict incidents are categorized as: imminent threat to humans, potential threat to humans, or nuisance incidents in which a report is taken of unacceptable wolf behavior or a wolf sighting in an unacceptable area, such as near a residence, but not posing an imminent or potential threat to humans. Though wolf attacks on humans are very rare in North America, we recognize there is potential for wolves, as with all large predators, to pose a risk to human safety. For this reason, and to build social tolerance of wolves, every effort is made to investigate such reports in a timely manner, determine if wolf/wolves were involved in the incident and implement management efforts to resolve credible reports of wolf-human conflict. Investigations may determine reports of wolf-human conflict involve animals that are not wolves, such as dogs or coyotes, or may be classified as unknown if it cannot be determined that wolves were present or responsible.

When incidents of wolf-human conflict are reported, IFT members use on-site investigations, interviewing reporting parties, trail cameras, tracking, telemetry, GPS locations, howling, and trapping during investigations to gather evidence of wolf involvement. Hazing is used to move wolves away from residences, recreational areas, or domestic animals in proximity to humans. Carcasses and other attractants are removed from affected areas when appropriate.

In 2024, the IFT received 19 wolf-human conflict reports. Of the 19 reports, the IFT determined 7 reports (Figures 12 and 13) involved or may have involved Mexican wolves, 10

reports involved species other than wolves (domestic dogs, coyotes, etc.) and 2 reports the IFT was unable to determine if wolves were involved or not. Of the reports that involved or may have involved wolves, six were determined to be nuisance incidents not posing an imminent or potential threat to humans, and one was determined to be a potential threat to humans. The incident determined as having potential threat to humans involved an interaction in December where the IFT received a report of two adult wolves that were seen near a residence and cattle water lot. The uncollared wolves were observed in the area over several days. Please see the Mexican Wolf Recovery Program Quarterly Update (Fourth Quarter) for 2024 for additional details of this incident.

Wolf-human conflict reports were documented in the Mexican Wolf Recovery Program Quarterly Updates which can be accessed on the Service's Mexican wolf web site at www.fws.gov/program/conserving-mexican-wolf/library.

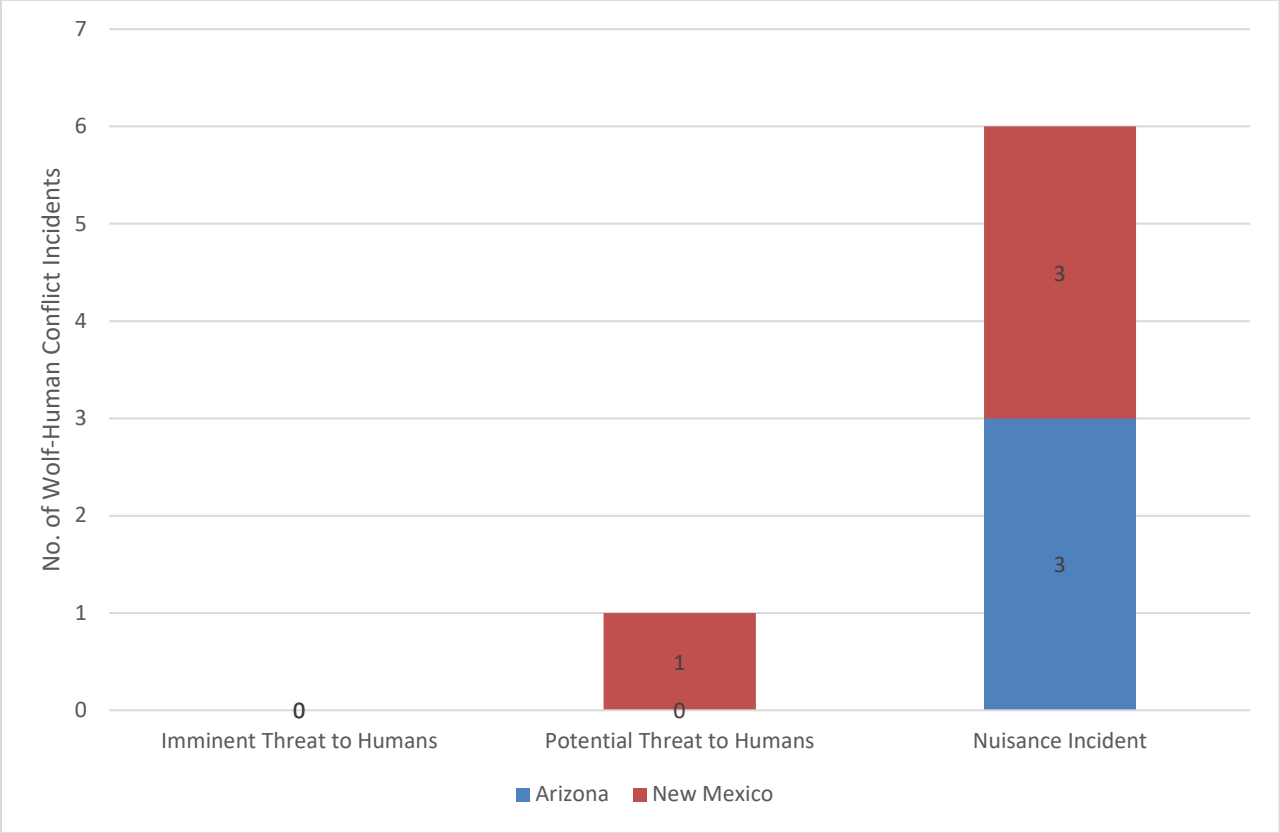

Figure 12: Total number of wolf-human conflict incidents by incident category in Arizona and New Mexico in 2024.

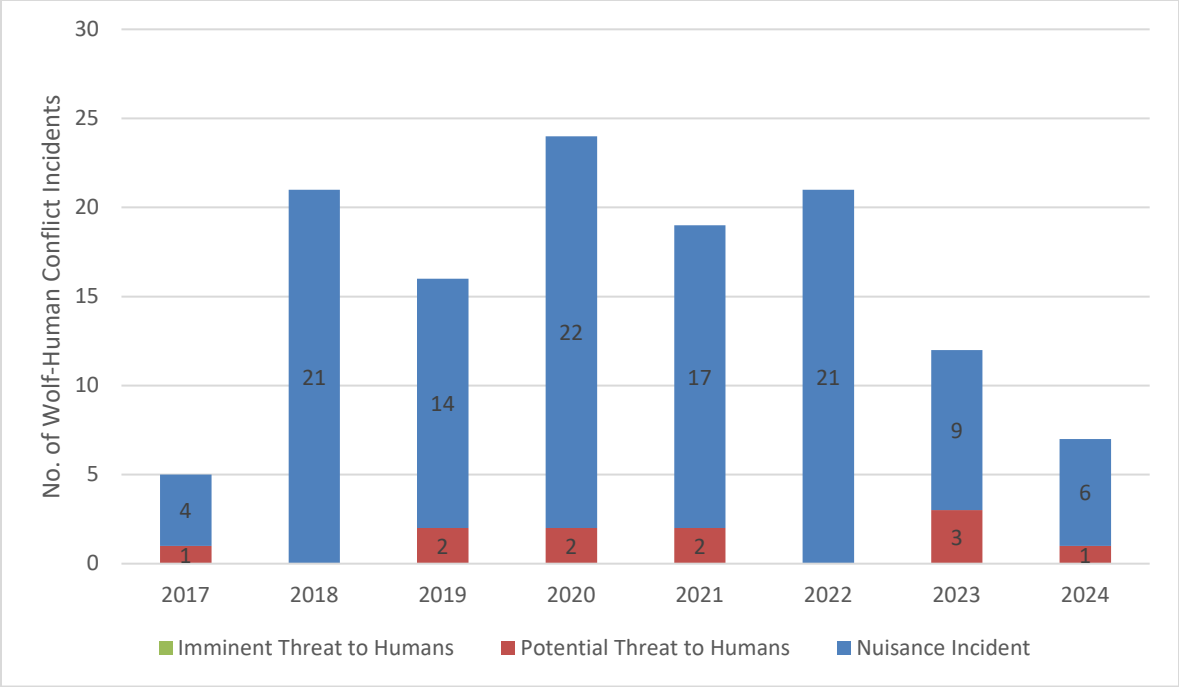

Figure 13: Number of confirmed wolf-human incidents by category in Arizona and New Mexico during 2017—2024.

c. *Proactive Management*

Various proactive management activities are utilized to reduce wolf-livestock conflicts. Details on implementation of these management approaches and tools in 2024 are below:

a. Altering livestock grazing rotations: moving livestock between different pastures within grazing allotments to avoid areas of high wolf use or depredations. Project personnel met with USFS district dangers, biologists, and range staff to discuss livestock management options during the wolf denning season and to address potential conflicts between livestock and wolves. During 2024, alteration of livestock grazing rotation schedules was implemented once to minimize wolf-livestock conflict.

b. Carcass Removals: attractants such as livestock carcasses are removed when the presence of those attractants could draw in wolves and lead to increased conflict. Carcass removal (by the IFT or livestock producers) is prioritized in areas with active calving and prior to denning season to reduce the likelihood that wolves will localize and den in an area where cattle are present. Carcass removal is not possible in some areas due to access issues. During 2024, the IFT removed 48 livestock carcasses in Arizona to minimize wolf-livestock conflict. The ALLB provided funding for nine livestock carcass removals ($250.00/carcass) in Arizona in 2024.

c. Diversionary food caches: carnivore logs or road-killed native prey carcasses provided to wolves in areas to reduce potential wolf conflicts with livestock and

potential nuisance incidents. Diversionary food caches were established in areas where depredations had occurred or were likely to occur for nine known packs and one single wolf during 2024. Supplemental food caches were established in association with 12 packs during 2024. These supplemental food caches can also act as diversionary food caches by reducing the potential wolf-livestock conflict.

d. Hay and supplements: feed and mineral supplements purchased for livestock producers who opt to contain livestock (e.g., cows with young calves) in smaller, more protected areas during livestock calving season or wolf denning periods to reduce the potential for conflict between wolves and cattle on grazing allotments or private property. Our partner agencies and NGOs did not purchase hay or supplements to mitigate conflicts between wolves and livestock in 2024.

e. Hazing: human presence, rubber bullets, pyrotechnics or other combinations of light and sound used to scare wolves from an area. Wolves were hazed on foot or by vehicle in cases where wolves localized near areas of human activity, displayed nuisance behavior, were present in areas with recent depredations on livestock, or areas with potential for wolf-livestock conflict, or if found feeding on, chasing, or killing livestock. When necessary, wolves were hazed to encourage an aversive response to humans and to discourage nuisance and depredation behavior. In 2024, the IFT conducted hazing activities for 315 personnel days (e.g., multiple personnel hazing on the same day would count as two or more personnel days). These activities resulted in successful hazing on 266 occasions.

f. Livestock producer contacts: the IFT regularly contacts livestock producers via phone calls, text messages, emails, and site visits. Team members directly notify affected producers of substantial wolf management actions, including translocations, foster operations, removals, and annual count/capture operations. The team notifies livestock producers and landowners when a wolf dens on or adjacent to active allotments or private property. Similarly, the IFT coordinates with affected producers when implementing conflict-management activities and increases communications with producers experiencing conflict. In addition to direct communication with affected stakeholders, the Service maintains a public internet-based location map providing buffered locations that is updated every two weeks. This map allows livestock producers, landowners, and land managers to independently stay informed on wolf locations and movements.

g. Radio telemetry equipment: radio-collar monitoring equipment issued to livestock producers to facilitate their own proactive management activities and aid in the detection and prevention of conflict between wolves and cattle. The IFT issued/maintained radio telemetry equipment for livestock producers or residents in areas where wolf-livestock conflicts or nuisance incidents had occurred or were likely to occur. The IFT trained livestock producers to use the telemetry equipment to

monitor wolves in the vicinity of cattle or residences and instructed them on hazing techniques. The IFT issued or updated 34 receivers during 2024.

h. Radio Activated Guard (RAG) boxes: consists of radio-collar monitoring equipment that activates strobe lights and loudspeakers that makes various loud noises (sirens, gunshots, helicopters) when a collared wolf is detected in the area. The IFT uses RAG boxes to encourage an aversive response to humans and to discourage nuisance and depredation behavior. The IFT deployed two RAG boxes during 2024.

i. Range Riders: persons who assist livestock producers in monitoring wolf activity in relation to livestock, provide human presence, and conduct hazing to deter wolves away from livestock. During 2024, our partner agencies and NGOs contracted 10 ranges riders, 8 in Arizona, and two in New Mexico to assist stakeholders in monitoring wolves in proximity to livestock. Additionally, the AZGFD employed two permanent range riders in Arizona which were utilized in depredation hotspot areas to mitigate and reduce wolf-livestock conflict. USDA-WS/NMDGF hired two full time range riders in New Mexico in 2024.

j. Removal of wolves: removal of a wolf or wolves associated with confirmed depredation incidents and/or conflict with humans. Wolves can be removed from an area using non-lethal (e.g., trapping, helicopter capture) and lethal methods. Live removals may include translocation to another area or removal to captivity. In 2024, one wolf (F2534) was removed from the wild because of conflict with humans (nuisance behavior), and two wolves (mp2933, m2978) were translocated to reduce wolf- livestock conflict.

k. Trapping: Foot-hold traps can be used as a method to haze wolves out of an area. Trapping and collaring previously uncollared wolves also allows the IFT to better manage conflict situations; collared wolves can be located and hazed, while uncollared wolves prove more difficult. In 2024, the IFT set 60 foot-hold traps for management purposes and/or in areas with potential uncollared wolves.

l. Turbo Fladry: electric fence with colored flagging installed around livestock pastures and private property to discourage wolf presence inside the perimeter of the fencing. When necessary, the IFT uses electrical charged turbo fladry to encourage an aversive response to humans and to discourage nuisance and depredation behavior. The IFT did not install turbo fladry in 2024.

m. Fox Lights: lights attached to turbo fladry fencing which provide computerized varying flashes of light to discourage wolf presence. The IFT did not install fox lights on turbo fladry fencing in 2024.

d. Public Outreach

We are committed to engaging in effective communication, identifying various outreach

mechanisms, and standardizing certain outreach activities. The goal is to ensure timely, accurate, and effective two-way communication between and among cooperating agencies, stakeholders, and the public.

Outreach activities were conducted by IFT personnel on a regular basis as a means of disseminating information to concerned citizens, government and non-government organizations, and other interested stakeholders. Outreach was facilitated through quarterly updates, internet-based Mexican wolf location maps, phone calls to permittees, informational handouts, presentations, meetings, field trips and workshops, informational display booths, web page updates including press releases and public notices, responding to requests for information, recording public wolf reports, and conversing with the public over the phone and through email.

During 2024, quarterly updates were posted in various businesses and public buildings (e.g., libraries, post offices). These quarterly updates were also posted on the Service's Mexican wolf website at www.fws.gov/program/conserving-mexican-wolf/library. Interested individuals can sign up to receive the quarterly update electronically at http://azgfd.gov/signup.

A map consisting of the most recent general wolf locations was also available online via a web-mapping application and updated every two weeks to inform cooperators and the public of areas occupied by wolves.

The IFT contacted campers, hunters, and other members of the public engaged in recreational activity in wolf occupied areas and provided them with information about the Mexican Wolf Recovery Program.

These interactions focused on advising the public of the potential for encountering wolves, providing general recommendations for recreating in wolf-occupied areas, and explaining legal provisions of the 10(j) rule. These contacts were used to collect information on wolf sightings, tracks, and other wolf sign from the public.

Presentations and status reports were provided to federal and state agencies, conservation groups, rural communities, schools, wildlife workshops, and various other public, private, and tribal institutions. In addition, biweekly contacts to provide wolf locations were made to cooperating agencies and stakeholders. Outreach presentations can be scheduled by contacting the IFT at 1-888-459-WOLF (9653).

Informational signs and posters were maintained that provided information on how to minimize conflicts with wolves using available USFS kiosks and various road pullouts within the MWEPA in 2024. AZGFD distributed informational flyers at sporting goods dealers, public offices, and businesses in occupied range to aid hunters in recognizing the differences between wolves and coyotes. Wolf vs. coyote identification flyers were also mailed to deer and elk hunt permit holders in Arizona and provided to Arizona Game and Fish Wildlife Managers in Region 1 for distribution to hunters during fall and winter hunt patrols.

Informational flyers were also provided to recreationists throughout the year with heavy focus on holiday weeks when there was an influx of recreationists. Furthermore, wolf vs. coyote identification information can be found in the AZGFD and NMDGF hunting regulations. The IFT also maintained reward posters at USFS kiosks and local businesses, to provide notice of monetary rewards (provided by the Service, AZGFD, and NMDGF) for information leading to the apprehension of individuals responsible for illegally killing Mexican wolves.

Table 5: Status of Mexican wolf packs in Arizona and New Mexico, as of December 31, 2024.

*Packs denoted with * indicate a pack that meets the definition of a breeding pair per Final Rule.*

Wolf Pack	**Wolf ID**	**Reproduction** (maximum # of pups documented	**Pups alive** (end of year)	**Number collared**	**Number uncollared** (includes wolves with non-functioning collar)	**Minimum pack size** (end of year)	**Pack Notes**
Agua Frio	AM1875, AF1936	0	0	1	1	2	AF1936 died in May after pack denned; pup count was not obtained
Aldo	AM2561	0	0	1	1	2	
Baldy (FAIR)	AM1347, AF2887	N/A	N/A	N/A	N/A	N/A	AM1347 considered uncollared/non-functional collar, AF2887 died in May wolf numbers not displayed at request of the tribe
Bear Canyon*	AM2563, AF1823	3	3	1	6	7	AF1823 considered uncollared/non-functional collar
Beaver Point	AM1949, AF2753, f2884	0	0	1	1	2	AM1949 designated fate unknown, AF2753 died in April after pack denned, pup count was not obtained.
Burnt Peaks	M2557	0	0	1	0	1	
Buzzard Peak*	AM2567, AF1726	2	2	1	3	4	AF1726 died in August
Canovas Creek	AM1584	0	0	0	3	3	AM1584 considered uncollared/non-functional collar
Castle Rock	M1921, F2632	0	0	2	0	2	

Wolf Pack	**Wolf ID**	**Reproduction** (maximum # of pups documented	**Pups alive** (end of year)	**Number collared**	**Number uncollared** (includes wolves with non-functioning collar)	**Minimum pack size** (end of year)	**Pack Notes**
Centerfire	AM2697	3	0	1	2	3	
Chimney Canyon*	AM2636, AF2523, mp2945, fp2950, mp2951, mp2952, fp2953	8	6	5	3	8	AF2523 died in August mp2951 died in November, reproduction includes foster(s) released into den
Cimmaron Mesa	AM2702, AF1705	0	0	1	1	2	AF1705 died in November pack denned; pup count was not obtained
Colibri	AM1856	0	0	0	0	0	AM1856 died in October pack no longer exists
Cottonwood Canyon	AM1859, AF2503	10	0	1	1	2	AF2503 designated fate unknown, reproduction includes foster(s) released into den
Dark Canyon*	AM1354, AF1456	4	1	1	4	5	AF1456 considered uncollared/non-functional collar
Dillon Mountain*	AF1865	2	2	1	7	8	
Eagle Creek	M1477, F1548	0	0	2	0	2	
Elderberry	AM2722, AF2977, M2766	0	0	2	0	2	AM2722 died in July, pack denned, pup count was not obtained
Elk Horn*	AM1838, AF1866, f2865	4	3	3	5	8	
El Torro*	AF2861	5	5	1	6	7	
Fantasia	AM2873, AF2759	2	0	2	0	2	
Firebox	AM1881	0	0	1	1	2	

Wolf Pack	**Wolf ID**	**Reproduction** (maximum # of pups documented	**Pups alive** (end of year)	**Number collared**	**Number uncollared** (includes wolves with non-functioning collar)	**Minimum pack size** (end of year)	**Pack Notes**
Frieborn	AM2765, AF1443	8	0	2	1	3	Reproduction includes foster(s) translocated into den from Pancho Spring
Gallinas Canyon*	AM2700, AF2588	6	2	2	2	4	
Hail Canyon*	AM2764, AF2690, m2821, mp2922, fp2929, mp2933	8	4	6	1	7	Reproduction includes foster(s) released into den
Holdup Mountain	M2847, F2743	0	0	2	0	2	
Hoodoo*	AM1789, AF2752, M1893	3	2	2	3	5	AM1789 considered uncollared/non-functional collar
Iron Creek	AM2549, AF1278, AF2756	0	0	1	0	1	AF1278 designated fate unknown, AF2756 died in October, pack denned, pup count was not obtained
Juniper Bench*	AF1920, 2859, fp2989, m2995	3	2	2	6	8	AF1920 considered uncollared/non-functional collar, fp2989 died in October
La Ventana	M2834	0	0	1	1	2	
Leon*	AM1824, AF1578, f2806	1	1	3	2	5	
Leopold	AM1855, AF1346, m2883	0	0	2	0	2	AF1346 designated fate unknown
Lonesome Well*	AM2755, AF2694	10	4	2	4	6	Reproduction includes foster(s) released into den
Lost Spring	F2885	0	0	0	0	0	F2885 died in June, pack no longer exists

Wolf Pack	**Wolf ID**	**Reproduction** (maximum # of pups documented	**Pups alive** (end of year)	**Number collared**	**Number uncollared** (includes wolves with non-functioning collar)	**Minimum pack size** (end of year)	**Pack Notes**
Luna*	AF1487	3	3	1	4	5	
Manada del Arroyo	AM2774, AF1828	0	0	2	0	2	
Mangas	AF1439, F2775	0	0	1	1	2	AF1439 designated fate unknown
Milligan Gulch*	AM2687, F2688	9	1	2	1	3	Reproduction includes foster(s) released into den
Neko Canyon*	AF2742	1	1	1	2	3	
New Pack, AZ	AF1686	0	0	1	1	2	Pack denned; pup count was not obtained
New Pair, AZ	F2979	0	0	0	0	0	F2979 died in November pair no longer exists
New Pair, NM	M2773, F2713	0	0	2	0	2	
Noble Mountain*	AM2886, AF1918	5	1	1	2	3	AF1918 died in August
Pancho Spring	AM2770, AF1889, m2870	0	0	1	2	3	AF1889 died in April, m2870 died in May, pack denned, litter translocated to Frieborn due to death of AF1889 shortly after whelping
Panther Creek	AM1382	0	0	0	0	0	AM1382 dispersed into Tu dil hil, pack no longer exists
Pitchfork Canyon	AM2566, AF1853	6	0	2	0	2	Reproduction includes foster(s) released into den
Point of Rocks*	AM1717, AF2515 mp2936	11	5	3	4	7	Reproduction includes foster(s) released into den
Prime Canyon*	AM1471, F2849, f2992	5	2	3	4	7	Reproduction includes foster(s) released into den

Wolf Pack	**Wolf ID**	**Reproduction** (maximum # of pups documented	**Pups alive** (end of year)	**Number collared**	**Number uncollared** (includes wolves with non-functioning collar)	**Minimum pack size** (end of year)	**Pack Notes**
Pumpkin Spring	M2848	0	0	1	1	2	
Pyramids	M2889	0	0	1	2	3	
Rocky Prairie*	AM1383, AF1489, F2769, m2863, f2864	2	2	2	7	9	AF1489 considered uncollared/non-functional collar, m2863 died in May f2864 designated fate unknown
Rose*	AM1704, m2888	3	3	1	6	7	m2888 died in May
Saddle Mountain	F2540	0	0	1	1	2	
Saffel*	AM1854, AF1939, M1852, f2976, mp2990, mp2991	6	4	4	8	12	f2976 died in July, mp2990's radio collar slipped off, documented alive in number uncollared
San Mateo	AM1345, AF1399	0	0	0	0	0	AF1399 died in June, AM1345 documented alive in August, designated fate unknown in November, pack no longer exists
Sawtooth	AM2704, AF2593; mp2994	5	3	2	3	5	AF2593 died in August
SBP	AM2703,AF1553, M2719	0	0	2	0	2	AM2703 designated fate unknown, pack denned, pup count was not obtained
Shakespeare Canyon	M2762	0	0	0	0	0	M2762 died in May, pack no longer exists
Sierra Blanca	AM1571, AF1550, m2988	3	3	2	3	5	AM1571 died in April
Six-Shooter Saddle	AM2867	7	0	1	0	1	

Wolf Pack	**Wolf ID**	**Reproduction** (maximum # of pups documented	**Pups alive** (end of year)	**Number collared**	**Number uncollared** (includes wolves with non-functioning collar)	**Minimum pack size** (end of year)	**Pack Notes**
Snake Creek*	AM2709	1	1	1	2	3	
Snow Lake	M2772, F2746	0	0	2	0	2	
Tres Lagunas	AF2763	0	0	1	1	2	Pack denned; pup count was not obtained
Tsay-O-Ah (FAIR)	AM2698, AF1283	N/A	N/A	N/A	N/A	N/A	Wolf numbers not displayed at request of the tribe
Tu dil hil (FAIR)	AM1338, AF1679, F2758, AM1382	N/A	N/A	N/A	N/A	N/A	Wolf numbers not displayed at request of the tribe, AM1338 died in July, AF1679 designated fate unknown
Wagontongue Mountain*	AM1946	5	4	1	7	8	
Warm Springs	AM2545, AF1938 m2796, fp2993	4	3	3	2	5	AM2545 died in August
Whiskey Creek*	AM1842, mp2760	2	2	2	3	5	Reproduction includes foster(s) released into den
Whitewater Canyon	AM1455	0	0	0	0	0	AM1455 designated fate unknown, pack no longer exists
Willow Creek	AM1555, AF1890	0	0	1	1	2	AM1555 considered uncollared/non-functional collar, pack denned, pup count was not obtained
Single, AZ	F2534	0	0	0	0	0	F2534 was lethally removed in December
Single, AZ	M2556	0	0	1	0	1	
Single, AZ	f2868	0	0	1	0	1	
Single, AZ	M1857	0	0	1	0	1	

Wolf Pack	**Wolf ID**	**Reproduction** (maximum # of pups documented	**Pups alive** (end of year)	**Number collared**	**Number uncollared** (includes wolves with non-functioning collar)	**Minimum pack size** (end of year)	**Pack Notes**
Single, AZ	F2767	0	0	1	0	1	
Single, NM	M1888	0	0	1	0	1	
Single, NM	F2741	0	0	0	0	0	F2741 died in May
Single, NM	m2809	0	0	1	0	1	
Single, NM	m2978	0	0	1	0	1	
Uncollared wolves	Alma, NM	0	0	0	2	2	
Uncollared wolf	LS Mesa, NM	0	0	0	1	1	
Uncollared wolves	Black Peak, NM	0	0	0	2	2	
Uncollared wolves	Pueblo, NM	0	0	0	2	2	
Uncollared wolves	Slaughter Mesa, NM	0	0	0	2	2	
Uncollared wolves	Lookout Mountain, NM	0	0	0	2	2	
Uncollared wolves	Diamond Creek, NM	0	0	0	3	3	
Uncollared wolves*	Mariano Mesa, NM	4	4	0	6	6	
Uncollared wolves	Nogal Canyon, NM	0	0	0	2	2	
Uncollared wolves	Turkey Ridge, AZ	0	0	0	2	2	
Uncollared wolves	SIPE, AZ	0	0	0	2	2	
Uncollared wolf	Davis Creek, AZ	0	0	0	1	1	
Uncollared wolf	Conklin Ridge, AZ	0	0	0	1	1	
Uncollared wolf	Wenima, AZ	0	0	0	1	1	
Uncollared wolf	Thompson Park, AZ	0	0	0	1	1	

Wolf Pack	**Wolf ID**	**Reproduction** (maximum # of pups documented	**Pups alive** (end of year)	**Number collared**	**Number uncollared** (includes wolves with non-functioning collar)	**Minimum pack size** (end of year)	**Pack Notes**
Uncollared wolf/wolves	AZ (FAIR)	N/A	N/A	N/A	N/A	N/A	Wolf numbers not displayed at request of the tribe
	Totals	**164**	**79**	**113**	**173**	**286**	

5. LITERATURE CITED

Calenge, Clement. 2019. adehabitatHR, Home Range Estimation. Version 0.4.16 CRAN R Project. https://CRAN.R-project.org/package=adehabitatHR

ESRI (Environmental Systems Research Institute). 2018. ArcGIS ArcPro. Version 2.2.4.

Fuller, T. K., L. D. Mech, and J. F. Cochrane. 2003. Wolf population dynamics. Pages 161-191 *in* L.

D. Mech and L. Boitani, editors. Wolves: behavior, ecology, and conservation. The University of Chicago Press, Chicago, Illinois, USA.

Heisey, D. M., and T. K. Fuller. 1985. Evaluation of survival and cause-specific mortality rates using telemetry data. Journal of Wildlife Management 49:668-674.

Kittle, A. M., Anderson, M. , Avgar, T. , Baker, J. A., Brown, G. S., Hagens, J. , Iwachewski, E. ,

Moffatt, S. ,Mosser, A. , Patterson, B. R., Reid, D. E., Rodgers, A. R., Shuter, J. , Street, G. M., Thompson, I. D., Vander Vennen, L. M. and Fryxell, J. M. 2015, Wolves adapt territory size, not pack size to local habitat quality. J Anim Ecol, 84: 1177-1186. doi:10.1111/1365-2656.12366

Martinez-Meyer, E., A. González-Bernal, J. A. Velasco, T. L. Swetnam, Z. Y. González-Saucedo, J. Servín, C.A. López-González, J. K. Oakleaf, S. Liley, and J. R. Heffelfinger. 2021. Rangewide habitat suitability analysis for the Mexican wolf (Canis lupus baileyi) to identify recovery areas in its historical distribution. Diversity and Distributions 27:642-654.

Mexican Wolf Blue Range Adaptive Management Oversight Committee and Interagency Field Team. 2005. Mexican Wolf Blue Range Reintroduction Project 5-year review. U.S. Fish and Wildlife Service, Albuquerque, New Mexico, USA.

Miller, P.S. 2017. Population viability analysis for the Mexican wolf (Canis lupus baileyi). Integrating wild and captive populations in a metapopulation risk assessment model for recovery planning. U.S. Fish and Wildlife Service. Albuquerque, New Mexico, USA.

Paquet, P. C., J. Vucetich, M. L. Phillips, and L. Vucetich. 2001. Mexican wolf recovery: three-year program review and assessment. Prepared by the Conservation Breeding Specialist Group for the

U.S. Fish and Wildlife Service, Albuquerque, New Mexico, USA.

R Core Team (2015). R: A language and environment for statistical computing. R Foundation for Statistical Computing. Vienna, Austria. https://www.R-project.org/

Seaman, D. E., and R. A. Powell. 1996. An evaluation of the accuracy of kernel density estimators for home range analysis. Ecology 77:2075-2085.

Seaman, D. E., J. J. Millspaugh, B. J. Kernohan, G. C. Brundige, K. J. Raedeke, and R. A. Gitzen. 1999. Effects of sample size on kernel home range estimates. The Journal of Wildlife

Management 63:739-747.

Smith, D. W., Bangs, E. E., Oakleaf, J. K., Mack, C., Fontaine, J., Boyd, D., Jimenez, M., Pletscher, D. H., Niemeyer, C. C., Meier, T. J., Stahler, D. R., Hoylan, J., Asher, V. J., Murray, D.L., 2010. Survival of Colonizing Wolf in the Northern Rocky Mountains of the United States, 1982-2004. Journal of Wildlife Management 74 (4):620-634; DOI:10.2193/2008-584.

U. S. Fish and Wildlife Service. 1996. Final environmental impact statement for the reintroduction of the Mexican wolf within its historic range in the southwestern United States. U.S. Fish and Wildlife Service, Albuquerque, New Mexico, USA.

U.S. Fish and Wildlife Service. 1998. The final Mexican wolf experimental rule. 63 Federal Register. Pp 1763-1772.

U.S. Fish and Wildlife Service. 2015. The final Mexican wolf experimental rule. 80 Federal Register. Pp 2512-2567.

U.S. Fish and Wildlife Service, 2017. Mexican Wolf Recovery Plan, First Revision, U.S. Fish and Wildlife Service, Albuquerque, New Mexico.

U.S. Fish and Wildlife Service, 2022. Mexican Wolf Recovery Plan, Second Revision, U.S. Fish and Wildlife Service, Albuquerque, New Mexico.

U.S. Fish and Wildlife Service. 2022. Revision to the Nonessential Experimental Population of the Mexican Wolf. 87 Federal Register. Pp 39348-39373.

White, G. C., and R. A. Garrott. 1990. Analysis of wildlife radio-tracking data. Academic Press Incorporated, New York, New York, USA.

PERSONNEL

The following is a list of personnel, volunteers, and interns from the Service and our cooperating agencies directly involved in the Mexican Wolf Recovery Program.

Arizona Game and Fish Department

Jim deVos, Mexican Wolf Coordinator

Paul Greer, Field Team Leader (January–July)

Jason Capps, Acting Field Leader (November–December)

Bailey Dilgard, Wolf Biologist, Acting Field Leader (July–October)

Annie Barkan Norland, Wolf Technician

Charles Lonnie Fox, Wolf Technician

David Hanrahan, Range Rider (January–June)

Tristan Young, Range Rider (January–March)

Hunter Bredeson, Range Rider (July–December)

Richard Kauffman, Range Rider (July–December)

New Mexico Department of Game and Fish

Stewart Liley, Chief of Wildlife Management

Don Young, Field Team Leader

Shana Olson, Wolf Biologist

Nicholas Riso, Wolf Biologist

USDA-APHIS Wildlife Services

Dave Bergman, State Director – Arizona

Jon Grant, State Director – New Mexico

Chris Carrillo, District Supervisor – Arizona

Lisa Selner, District Supervisor – New Mexico

Wade Sanders, Non-Lethal Specialist (AZ)

Caleb Garzanelli, Wolf Specialist (AZ)

Tess Fanini, Non-Lethal Specialist (NM)

Scott McDonald, Wildlife Services Agent (NM)

J. Brad Miller, Wildlife Technician/Mexican Wolf Trapper (AZ)

Josh Sanchez, Range Rider (NM)

Lane Wimberly, Range Rider (NM)

U.S. Forest Service

Jay Olson, Forest Service Liaison to the Mexican Wolf Recovery Program

U.S. Fish and Wildlife Service

Brady McGee, Mexican Wolf Recovery Coordinator

Maggie Dwire, Deputy Mexican Wolf Recovery Coordinator

Aislinn Maestas, Public Affairs Specialist

John Oakleaf, Senior Mexican Wolf Scientist

Demetra Panos, Planning and Litigation Coordinator

Lauren Toivonen, Mexican Wolf Field Coordinator

Colby M. Gardner, Biologist

Allison Greenleaf, Senior Biologist

Melissa Kreutzian, Biologist

Cameron "Mac" Purvin, Biologist

Agapito Lopez, Technician

Tessa McDonnell, Technician

Scott Mill, Technician

Kat Schultz, Technician

Chelsey Taylor, Technician

Dewey Wesley, Technician

White Mountain Apache Tribe

Cynthia Dale, Sensitive Species Coordinator

Gage Hollingsworth, Wolf Biologist

Theo Guy, Wolf Technician

Deon Hinton, Wolf Technician

Joseph Perez, Wolf Technician

Project Veterinarians

Ole Alcumbrac, DVM (Contractor)

Elin Crockett, DVM (NMDGF)

Susan Dicks, DVM (USFWS)

Anne Justice-Allen, DVM (AZGFD)

Mexican Wolf Project Volunteers Interns

Cameron Barnes

Dynasia Colman (SCA Career Discovery)

Aidan Caruso

Louis Garcia

Jennifer Gedert

Ryan Hennessey

Rebekah Keating

Elias Leslie (WMAT)

Austin Nino

Haylee Pearce

Jessica Ridge

Ari Sullivan

Liz Tsourakis

Isabella Villanueva

Seanna Wittler

APPENDICES

6. APPENDIX A: MEXICAN WOLF PACK HOME RANGE DETAILS

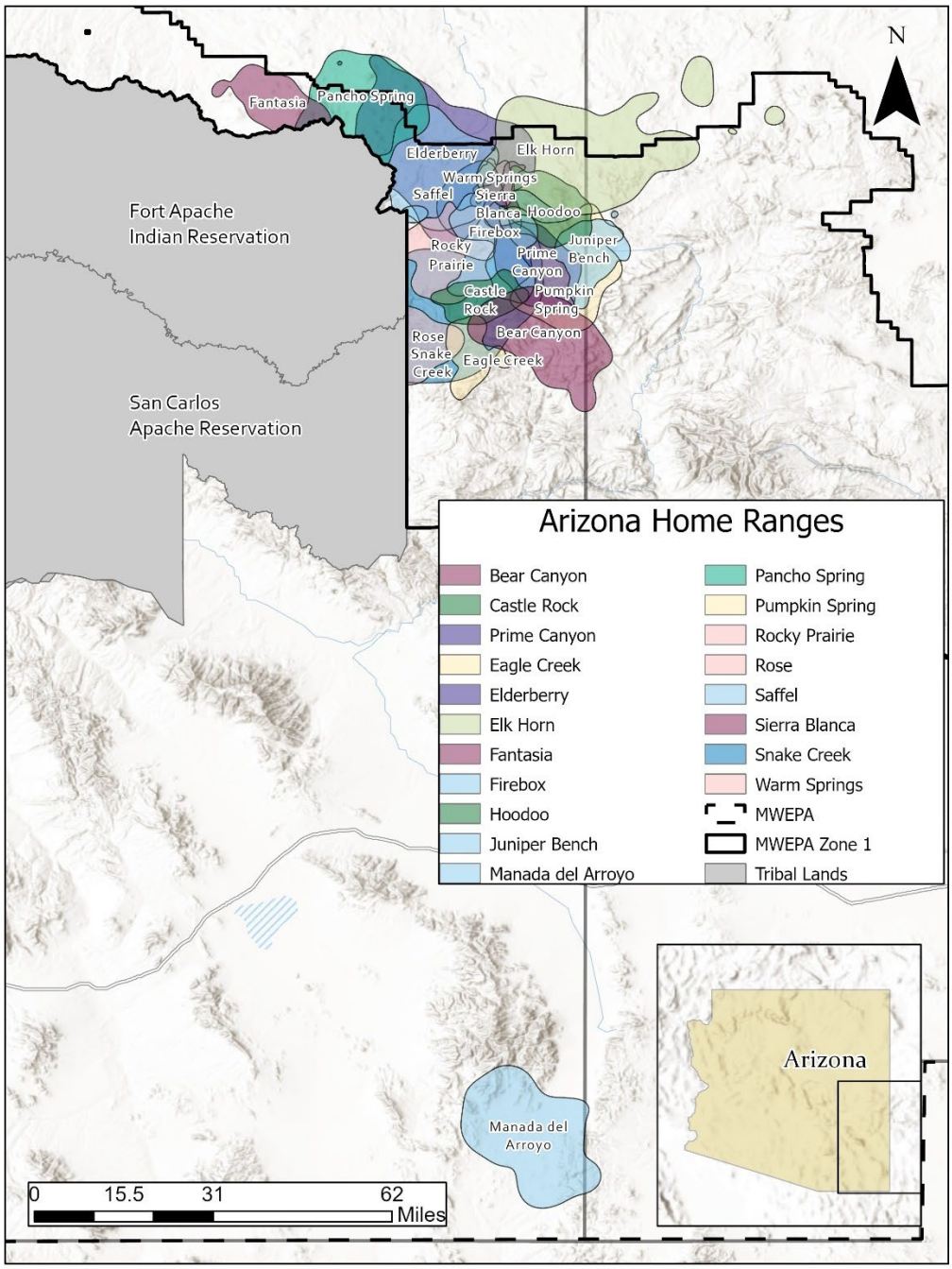

Figure 14: Mexican wolf home ranges in Arizona in 2024.

Table 6: Arizona Wolf Home Range Details

Wolf Pack	**Home Range Size (mi^2)**	**County**
Baldy	N/A	Apache/Navajo
Bear Canyon	240	Greenlee
Castle Rock	83	Greenlee
Eagle Creek	74	Greenlee
Elderberry	485	Apache
Elk Horn	474	Apache/Catron
Fantasia	133	Apache/Navajo
Firebox	183	Apache/Greenlee
Hoodoo	125	Apache
Juniper Bench	101	Apache/Greenlee/Catron
Manada del Arroyo	323	Cochise
Pancho Spring	370	Apache
Prime Canyon	143	Apache/Greenlee
Pumpkin Spring	256	Apache/Greenlee/Catron
Rocky Prairie	174	Apache/Greenlee
Rose	181	Greenlee
Saffel	257	Apache
Sierra Blanca	53	Apache
Snake Creek	956	Apache/Greenlee
Tsay-O-Ah	N/A	Apache/Navajo
Tu dil hil	N/A	Apache
Warm Springs	26	Apache

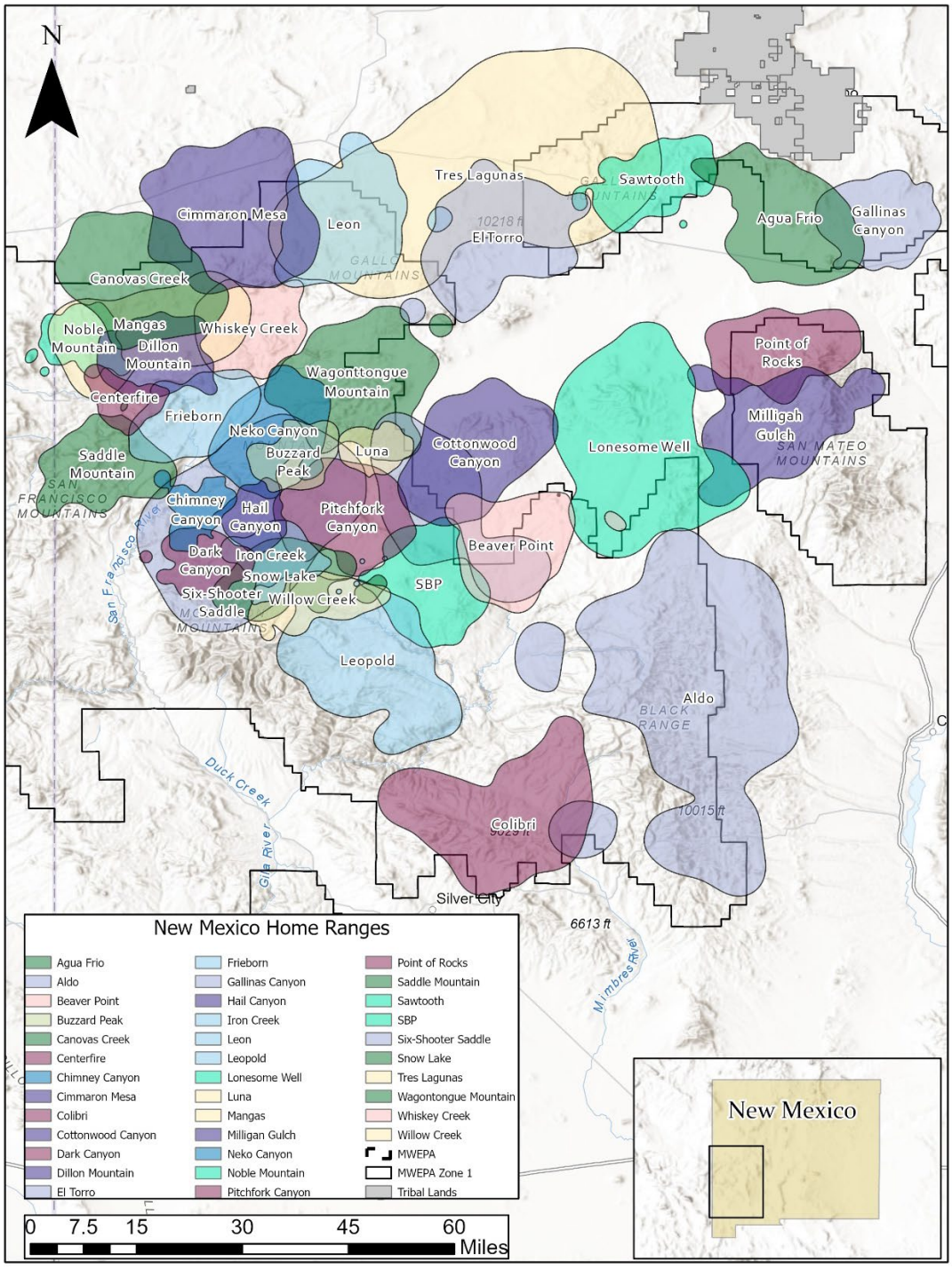

Figure 15: Mexican wolf home ranges in New Mexico in 2024.

Table 7: New Mexico Wolf Home Range Details

Wolf Pack	Home Range Size (mi^2)	County
Agua Frio	248	Socorro
Aldo	924	Catron/Grant/Sierra
Beaver Point	195	Catron
Buzzard Peak	79	Catron
Canovas Creek	268	Catron
Centerfire	55	Catron
Chimney Canyon	59	Catron
Cimmaron Mesa	360	Catron
Colibri	364	Grant
Cottonwood Canyon	251	Catron
Dark Canyon	84	Catron
Dillon Mountain	130	Catron
El Torro	280	Catron
Frieborn	145	Catron
Gallinas Canyon	153	Socorro
Hail Canyon	60	Catron
Iron Creek	85	Catron
Leon	255	Catron
Leopold	346	Catron/Grant
Lonesome Well	486	Catron
Luna	49	Catron
Mangas	265	Catron
Milligan Gulch	257	Socorro
Neko Canyon	174	Catron
Noble Mountain	81	Apache/Catron
Pitchfork Canyon	195	Catron
Point of Rocks	176	Socorro
Saddle Mountain	160	Catron
Sawtooth	138	Catron
SBP	183	Catron
Six-Shooter Saddle	825	Catron
Snow Lake	142	Catron
Tres Lagunas	1001	Catron
Wagontongue Mtn	301	Catron
Whiskey Creek	149	Catron
Willow Creek	100	Catron

7. APPENDIX B: MEXICAN WOLF USE AREA

The Mexican Wolf Use Area depicts both territorial and extra territorial locations of wolves in Arizona and New Mexico. The Territorial Area was calculated based on the following criteria: a ten-mile radius around all aerial locations or GPS locations of radio monitored wolves exhibiting localized behavior for greater than six months during the past year. The Extra Territorial Area was calculated based on the following criteria: (1) a ten-mile radius around all aerial locations or GPS locations of radio monitored wolves exhibiting localized behavior for less than six months during the past year; (2) a ten-mile radius around all aerial locations or GPS locations of radio monitored wolves exhibiting dispersal behavior during the past year; and (3) a ten-mile radius around all uncollared wolf locations and wolf sign documented during the past year. The Mexican Wolf Use Area is different than "Occupied Wolf Range" as defined in the 10(j) rule, which specifically relates to certain take prohibitions and only applies to areas within the MWEPA, excluding Zone 3 and tribal trust lands, in that it includes temporary dispersal movements outside the MWEPA, locations of wolves in Zone 3, and includes tribal trust lands (not depicted on the map). In 2024, the Mexican wolf Use Area was 25,333 mi^2. The Territorial Area was 17,473 mi^2, while the Extra Territorial Area was 7,860 mi^2. The Mexican Wolf Use Area decreased by 42% from 2023. The Territorial Area decreased by 26% from 2023, and the Extra Territorial Area decreased by 61% from 2023.

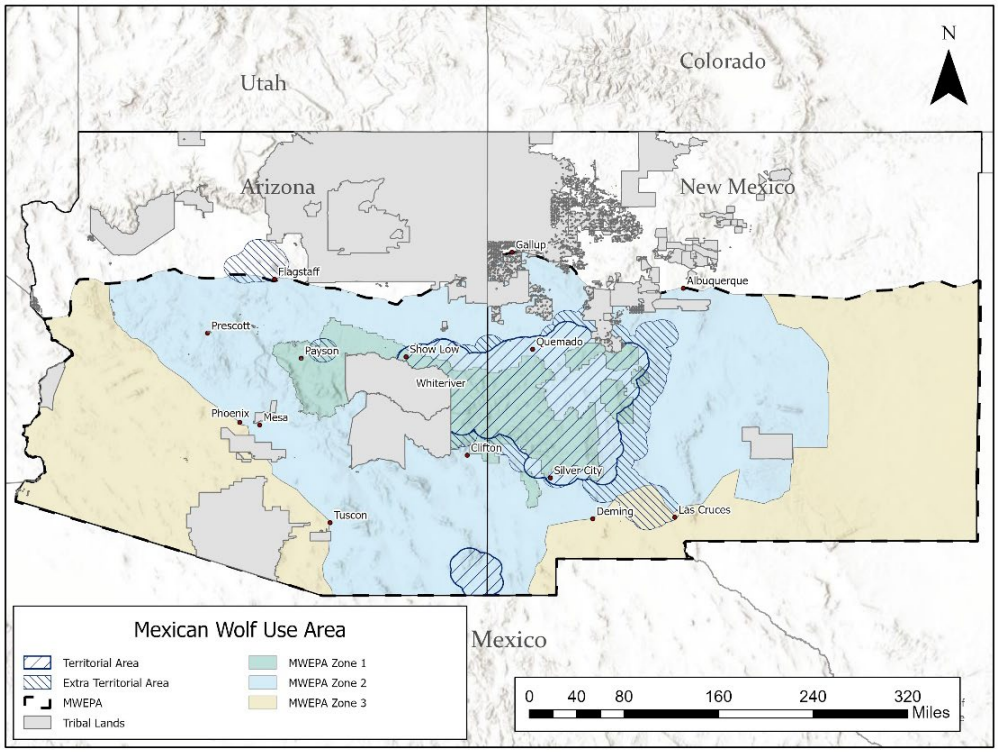

Figure 16. Mexican Wolf Use Area in Arizona and New Mexico in 2024.

8. APPENDIX C: LESS-THAN-LETHAL PROJECTILE USAGE

In 2024, Program personnel utilized less-than-lethal hazing techniques that came in contact with Mexican wolves 20 times.

Table 8: Less-Than-Lethal Projectile Usage

Date	Wolf Pack	Studbook	Method	Follow-up
1/5/2024	Elk Horn	1838	Rubber Bullets	No injury observed, documented in the following month
1/5/2024	Elk Horn	1866	Rubber Bullets	No injury observed, documented in the following month
1/5/2024	Elk Horn	2865	Rubber Bullets	No injury observed, documented in the following month
1/14/2024	Single	2766	Rubber Bullets	No injury observed, documented in the following month
2/20/2024	Saffel	1854	Rubber Bullets	No injury observed, documented in the following month
2/25/2024	Pancho Spring	2870	Rubber Bullets	No injury observed, documented in the following month
2/25/2024	Pancho Spring	2770	Rubber Bullets	No injury observed, documented in the following month
2/25/2024	Pancho Spring	1889	Rubber Bullets	No injury observed, documented in the following month
2/25/2024	Lost Spring	2885	Rubber Bullets	No injury observed, documented in the following month
2/25/2024	Lost Spring	2766	Rubber Bullets	No injury observed, documented in the following month
3/11/2024	Juniper Bench	2859	Rubber Bullets	No injury observed, documented in the following month
3/12/2024	Mangas	Uncollared	Rubber Bullets	No injury observed, not documented in the following month, observed alive at the end of 2024
3/19/2024	Juniper Bench	2859	Rubber Bullets	No injury observed, not documented in the following month, observed alive at the end of 2024
3/19/2024	Dillon Mountain	1865	Rubber Bullets	No injury observed, not documented in the following month, observed alive at the end of 2024
3/28/2024	Single	2722	Rubber Bullets	No injury observed, documented in the following month
4/2/2024	Fantasia	2873	Rubber Bullets	No injury observed, documented in the following month
4/2/2024	Fantasia	2759	Rubber Bullets	No injury observed, documented in the following month
8/7/2024	Pancho Spring	2770	Rubber Bullets	No injury observed, documented in the following month
8/11/2024	Pancho Spring	Uncollared	Rubber Bullets	No injury observed, documented in the following month
12/14/2024	Single	2534	Rubber Bullets	No injury observed, documented in the following month