MEXICAN WOLF RECOVERY PROGRAM

A Mexican is released back into wild with a new collar during annual helicopter operations. Credit: Mexican Wolf Interagency Field Team

PROGRESS REPORT # 26

PREPARED BY: U.S. FISH AND WILDLIFE SERVICE

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

Mexican Wolf Recovery Program

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Reporting period: January 1-December 31, 2023

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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, 2023.

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

Mexican Wolf Saving Animals From Extinction The Mexican Wolf Saving Animals From Extinction (SAFE) program (formally known as the Species Survival Plan-SSP) is a binational captive breeding program between the United States and Mexico for the Mexican wolf. The SAFE 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 the *SAFE program, recovery of the Mexican wolf would not have been possible.*

A veterinarian at Brookfield Zoo Chicago, examines a 9-day-old Mexican wolf pup. Photo credit: Brookfield Zoo Chicago

In 2023, the SAFE program's binational meeting to plan and coordinate wolf breeding, transfers, and related activities among facilities was held with the Red Wolf SAFE program annual meeting in Chico Hot Springs, MT. 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 2023, the SAFE program's population included 356 Mexican wolves managed in approximately 60 facilities in the United States and Mexico. The SAFE program'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 program 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 fostering as the primary release method 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 (including pups for fostering) 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.

Release candidates 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. Release candidates are given annual examinations to

vaccinate for canine diseases (e.g., parvo, adeno2, parainfluenza, distemper, 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. National Wildlife Refuge staff assist Mexican Wolf Recovery Program staff in the maintenance and administration of the wolf pens.

A Mexican wolf runs inside an enclosure at the Sevilleta Wolf Management Facility. Credit: U.S. Fish and Wildlife Service

Through the course of the year fourteen wolves were housed at Sevilleta. In January, one wolf was transferred from the MWEPA to Sevilleta and paired with a captive mate to assist with genetic management of the wild population. This wolf was translocated back into the MWEPA in June. In November and December, three wolves were transferred from the MWEPA to Sevilleta to assist with genetic management of the wild population and were housed as breeding pairs for potential future translocation. Four wolves were transferred to other SAFE facilities, and one wolf was transferred into Sevilleta from another SAFE facility to support SAFE's mission of maintaining wolves in captivity to support recovery efforts. No births or deaths occurred at Sevilleta in 2023.

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 fifteen wolves were housed at the Ladder Ranch. One wolf was transferred from the MWEPA to the Ladder Ranch to assist with genetic management of the wild population. This wolf was housed temporarily and was translocated back into the MWEPA in 2023. Four wolves were transferred in from other SAFE facilities, and two wolves were transferred out of the Ladder Ranch to other SAFE facilities to support the SAFE's mission of maintaining wolves in captivity to support recovery efforts. Three births and four deaths occurred at the Ladder Ranch in 2023.

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 2023, we implemented a number of recovery actions associated with the objectives in the RIS; including: 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 captive breeding/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). For the five-year evaluation (based on data through 2022), the Recovery Plan provides the following demographic and genetic benchmarks:

- Interim abundance targets of approximately 145 wolves in the United States and 100 wolves in Mexico; and
- Interim release and translocation targets of a sufficient number of wolves to result in approximately 9 released wolves surviving to breeding age in the United States, and 25 released and translocated wolves surviving to breeding age in Mexico.

We continue working on the five-year evaluation and expect to finalize our efforts by the end of 2024. As of this annual report, the minimum population in the United States is 257 Mexican wolves and 15 released wolves have survived to breeding age to count toward the genetic recovery criteria. As of this annual report, an official estimate of the Mexican wolf population in Mexican has not been received. The estimated population for 2022 in Mexico was 20 Mexican wolves and nine released or translocated wolves 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; U.S. 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 has 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.

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, U.S. Fish and Wildlife Service, Amy Lueders Intervenors: New Mexico Department of Game and Fish (Defendant)

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 10/14/21 remanding the 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 11/18/22. 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 12/13/23 the Ninth Circuit held that the lawsuit was moot because it was superseded by the 2022 plan. Plaintiffs filed a motion to vacate the original Ninth Circuit ruling and also filed a petition for hearing in December 2023.

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 2019 to address the provisions of the revised 2015 10(j) Rule and 2017 Mexican Wolf Recovery Plan, First Revision. 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 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 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 2023 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: www.azgfd.com/wildlife-conservation/conservation-and-endangered-species- programs/mexican-wolf-management/.

5. COOPERATIVE AGREEMENTS

In 2023, the Service funded cooperative or grant agreements with AZGFD, The Cincinnati Zoo, Turner Endangered Species Fund (TESF), University of Idaho, University of New Mexico, and WMAT. These agreements convey funding for the monitoring and management of captive and wild Mexican wolves (AZGFD, Cincinnati Zoo, TESF, and WMAT), administration and facilitation of recovery planning and implementation efforts (Mexican Wolf Fund—when funded), and genetic analysis and preservation of biomaterials (University of Idaho and University of New Mexico). The Service also provides funding to AZGFD and NMDGF for Mexican wolf recovery through Section 6 of the Act, which requires 25 percent matching funds from each state.

Cooperator	**U.S. Fish and Wildlife Service Mexican Wolf Program Funds Provided in 2023**
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 visit https://www.fws.gov/program/conserving-mexican- wolf/library.

6. LIVESTOCK CONFLICT COMPENSATION PROGRAMS

There are currently two 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/index.

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. 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 administers the funds received by AZGFD; the Mexican Wolf/Livestock Council (MWLC) assisted in administering funds received by NMDA in the early part of 2023, and the County Livestock Loss Authority (CLLA) administered the funds received by NMDA during the remainder of 2023. For more information on the Arizona Livestock Loss Board please visit https://live- azlivestocklossboard.pantheonsite.io/. For more information on the County Livestock Loss Authority please visit https://cllanm.org/.

The following tables reflect annual WLDG amounts and disbursement of funds for associated activities. 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) $55,057.50 (CLLA)	$142,446.711

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	N/A	$77,500
2023	$142,450	N/A	$142,450

7. LITERATURE CITED

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

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PART B: REINTRODUCTION

MEXICAN WOLF EXPERIMENTAL POPULATION AREA INTERAGENCY FIELD TEAM ANNUAL REPORT

Reporting period: January 1– December 31, 2023

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 257 Mexican wolves and 26 breeding pairs were documented in the Mexican Wolf Experimental Population Area (MWEPA) at the end of 2023.

- Pup survival was documented to be 61 percent in 2023 (compared to 68 percent in 2022), with 86 pups surviving until the end of the year. The pup survival rate in 2023 was higher than the previous ten-year (2013-2022) average of 58 percent.

- Sixteen genetically diverse wolf pups were fostered from captive facilities across the United States into six wild wolf dens in Arizona and New Mexico. By the end of 2023, twelve fostered wolves (from all years) were radio-collared and known to be alive. From 2016 to the end of 2023, ten fostered wolves had been documented producing pups and a minimum of twenty different litters had been produced by foster wolves.

- An adult survival rate of 0.79 combined with the number of pups that survived to December 31, resulted in a population growth of 6 percent in 2023. Furthermore, the number of breeding pairs documented in 2023 decreased from 2022. Thus, the population fell short of the management objective for 2023 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 the majority of the population losses in 2023 being due to mortalities.

A Mexican wolf from the Canovas Creek pack seen on a trail camera. Credit: Mexican Wolf Interagency Field Team.

- In 2023, the overall (inclusive of all age classes) survival rate (0.76) was very similar to the previous 10-year (2013-2022) period (0.76).

- At the end of 2023, fifteen released wolves counted toward the genetic criterion (AM1471, AF1578, F1692, AM1693, M1710, F1712, F1865, F1866, M1888, F1889, F1890, M1953, F2503, M2545, M2597). Nine of these 15 fostered wolves produced pups in 2023 (AM1471, AF1578, AF1712, AF1865, AF1866, AF1889, AF1890, AF2503, AM2597).

- The 2023 rate of cattle confirmed to have been killed by Mexican wolves was approximately 44.36 depredations/100 wolves was notably lower than the previous 10-year (2013-2022) recovery program mean of 61.50 confirmed killed cattle per 100 wolves. Therefore, meeting the program goal of maintaining the depredation rate at or below the previous 10-year recovery program mean. In addition, the 2023 depredation rate was 15 percent lower than in 2022.

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 2023, the wild population minimum count increased to 257 wolves; this report summarizes the results of Mexican Wolf IFT activities during 2023. The objective of this report is to document progress towards recovery goals set out in the 2022 Mexican Wolf Recovery Plan, Second Revision (Recovery Plan) for the United States population.

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 success. 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 under-represented genes from captivity into the wild population. Thus, the survival of animals released from captivity into the population will be monitored.

Evaluations will be conducted five and ten years from the publishing of the 2017 Recovery Plan, First Revision to determine the progress of the Mexican wolf population toward recovery goals. The five- and ten-year evaluations will assess the status of the United States and Mexico populations toward recovery. The interim abundance target at the end of 2022 is 145 wolves in the United States and 100 wolves in Mexico. The interim release and translocation target at the end of 2022 is nine released wolves surviving to breeding age in the United States and 25 released or translocated wolves surviving to breeding age in Mexico. 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. These evaluations will determine if the recovery strategy is proving effective and feasible or needs to be revised.

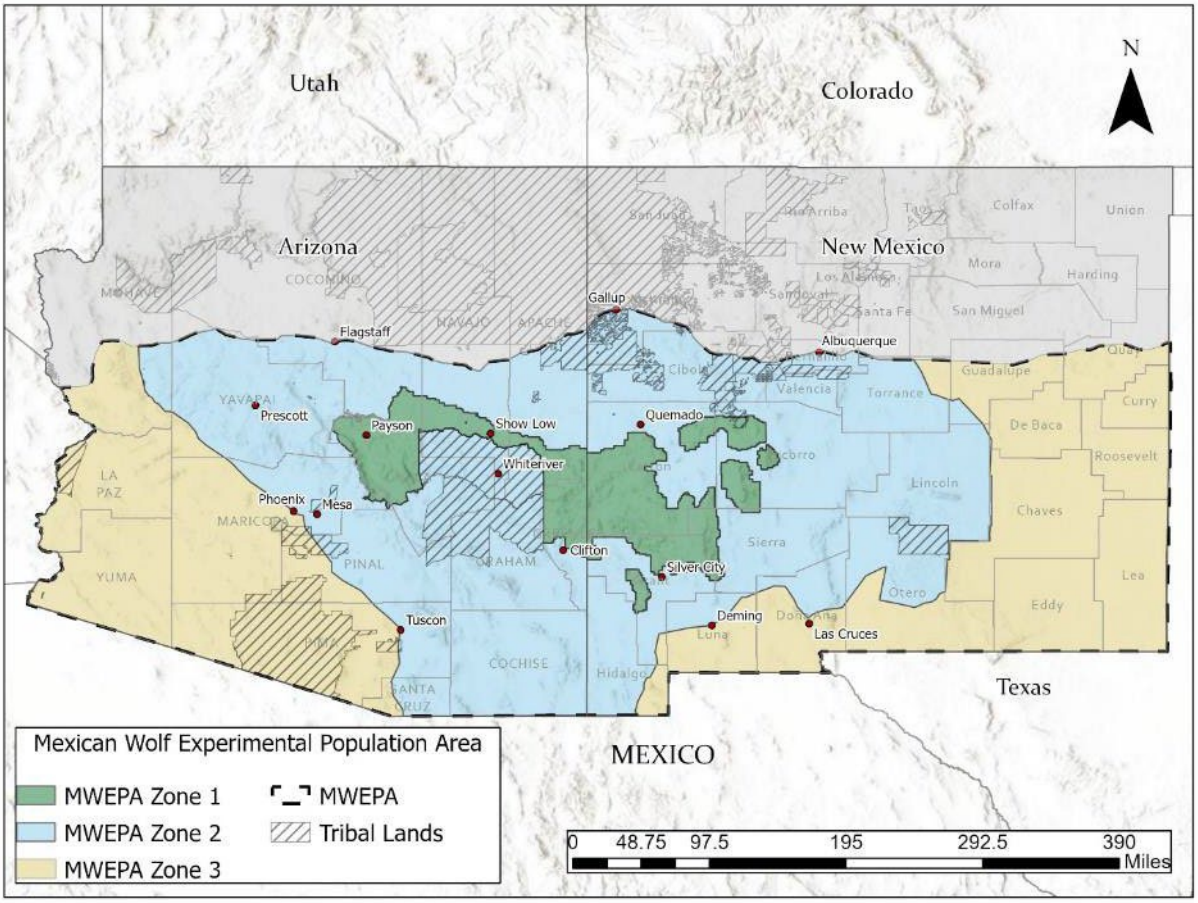

Figure 1: The Mexican Wolf Experimental Population Area (MWEPA) and Zones 1-3 in Arizona and New Mexico as described in the Final Rule.

Management of wolves in the MWEPA is conducted in accordance with an experimental population Final Rule (Service 2022; 2022 10(j) Rule). 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 mi2 of area that wolves may occupy. See the Final Rule (Service 2022; 2022 10(j) Rule) 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.

Two Mexican wolves from the Willow Creek pack seen on a trail camera. Credit: Mexican Wolf Interagency Field Team.

3. POPULATION STATUS

b. *Definitions*

Wolf pack: two or more wolves that maintain an established territory. In the event that 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.

c. *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 2023 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 supplementary 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 2024, aircraft were used to document wolves for the 2023 year-end 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 2023 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 2023 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.

d. Minimum Population Count

At the end of 2023, the minimum population count was 257 wolves, which was a 6 percent increase from the previous year's population (n=242; Figure 2). Pups comprised 33 percent of the population in 2023. Twenty-six packs were considered breeding pairs in 2023, compared to thirty-two in 2022.

At the end of 2023, the functioning collared population consisted of 113 radio-collared wolves among 60 packs, and eight single wolves, which was an overall increase from 2023 (Table 5). A total of 144 uncollared or failed collared wolves were documented at the end of 2023 (*note: all the uncollared wolves captured during the January and February 2024 helicopter operation were included as uncollared animals associated with known packs above;* Table 5).

Twelve uncollared wolves were documented in 2023 (Figure 3) 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.

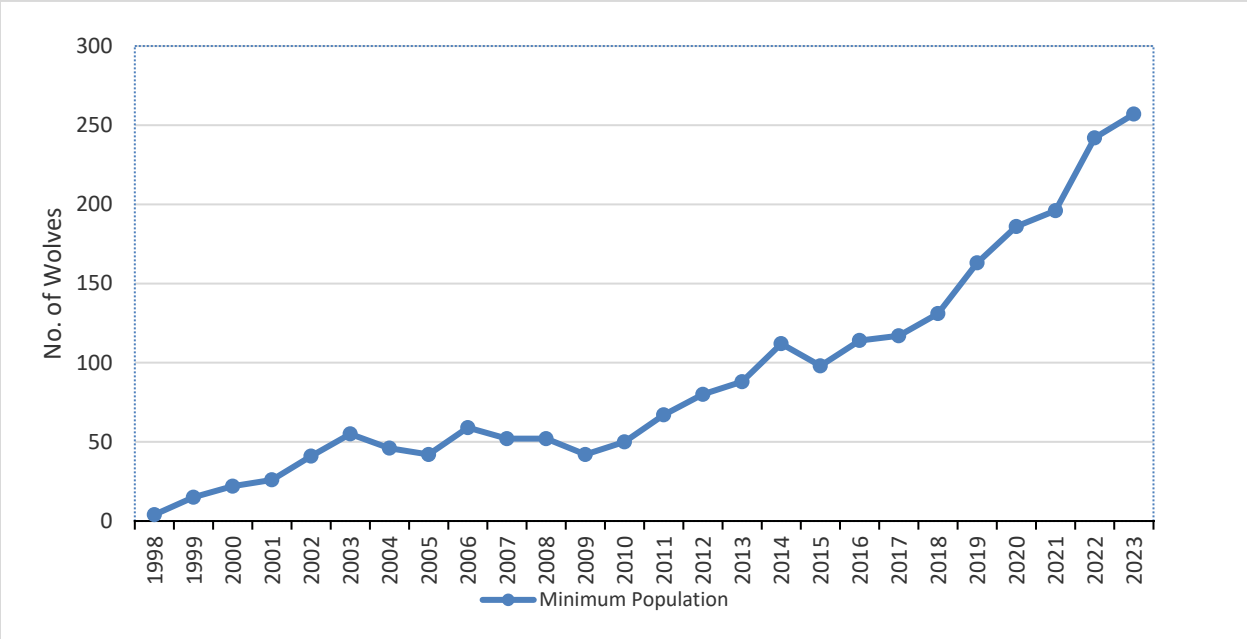

Figure 2: Mexican wolf minimum population counts from 1998 through 2023 in Arizona and New Mexico.

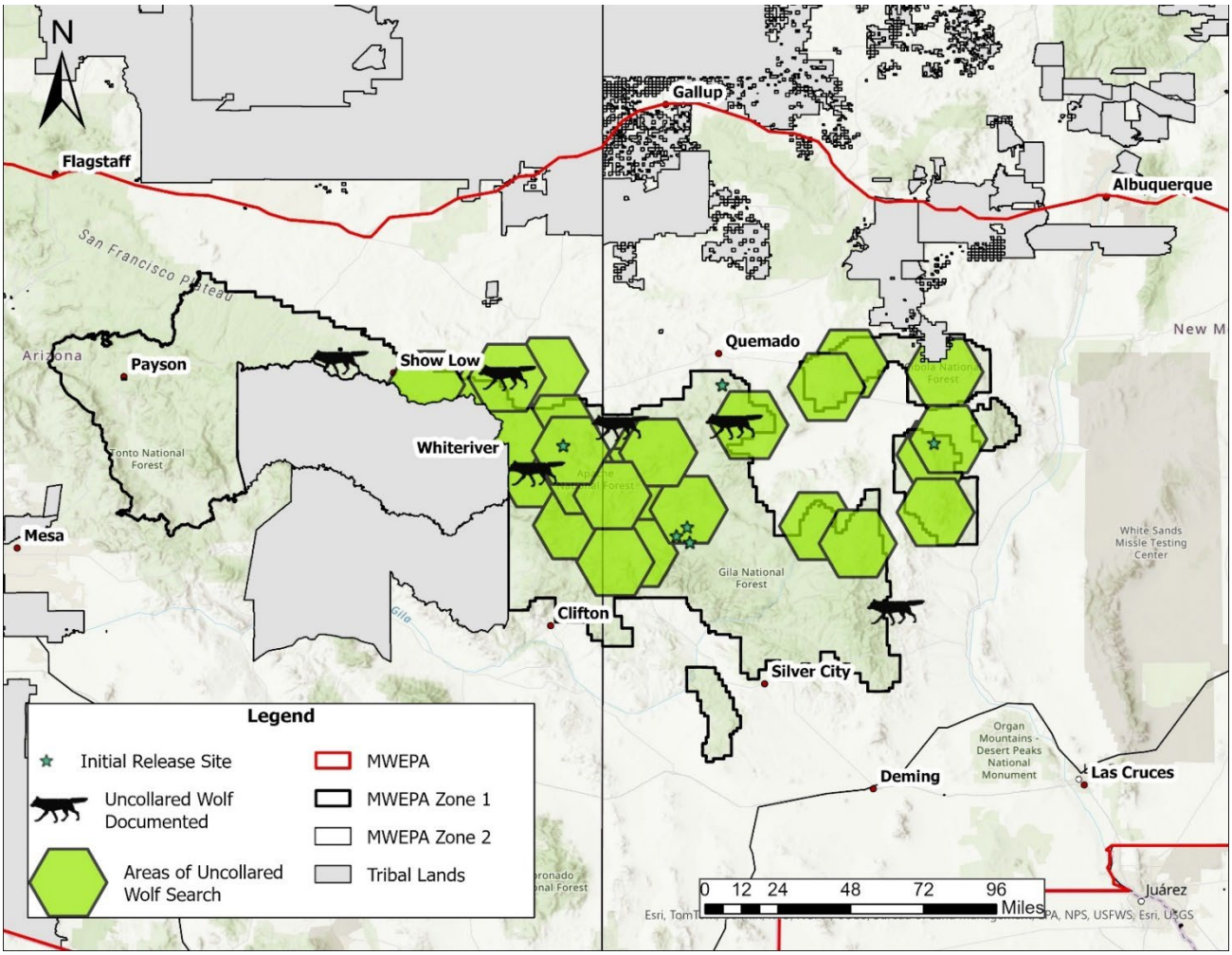

Figure 3: Areas searched for uncollared wolf sign within the Mexican Wolf Experimental Population Area. Areas where the uncollared wolves documented contributed to the year's total population count are indicated as uncollared wolves documented. Six initial release sites (dens for fostering efforts) were used during 2023 in Arizona and New Mexico.

e. *Reproduction*

In 2023, 37 packs exhibited denning behavior, which included 14 packs in Arizona and 23 packs in New Mexico. Of the 37 denning packs, 26 had at least one pup at the end of the year and were thus considered breeding pairs. In addition, the IFT fostered a total of 16 captive-born pups into dens of six wild packs in Arizona and New Mexico. The IFT documented 141 pups (including the 16 fostered pups) with a minimum of 86 surviving in the wild until year-end in Arizona (n = 38) and New Mexico (n = 48), which showed that 61 percent of the pups documented in early counts survived until the end of the year (Figure 4, Table 5)

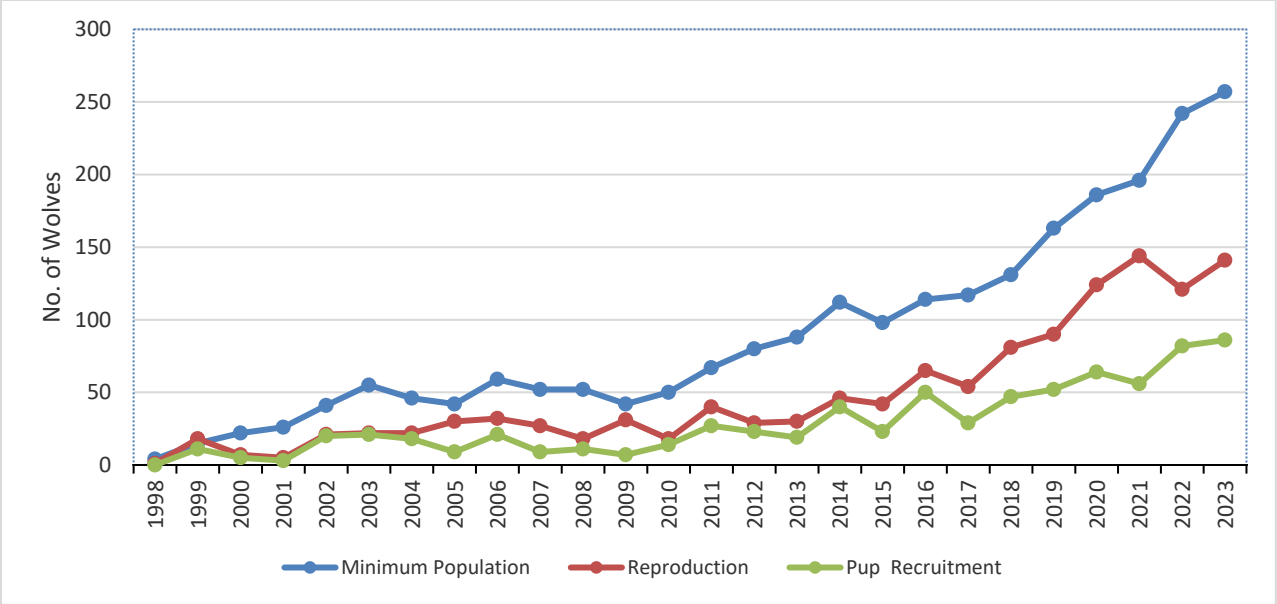

Figure 4: Mexican wolf minimum population estimate, reproduction (maximum number of pups documented), and recruitment (number of pups surviving at year's end) documented in Arizona and New Mexico, 1998- 2023.

f. Captures

In 2023, 58 wolves were captured a total of 64 times. Thirty-five wolves were captured, collared for the first time, processed, and released on site for routine population monitoring purposes. Fourteen wolves were captured, re-collared, processed, and released on site, or simply released on site with the current collar. Three wolves were translocated, and five wolves were removed to captivity (two wolves were translocated back into the MWEPA see Table 1, and three wolves were retained in captivity). One wolf was captured by the IFT for veterinary care and was humanely euthanized at the veterinary hospital. Six wolves were captured by private trappers. Four of these wolves were released on site by the IFT. Two of these wolves were released on site by the private trapper.

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, 138 wolves were equipped with Global Positioning Collars (GPS) collars to provide more detailed location information and management capability.

g. 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 2022 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 2022 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 2023, sixteen wolves were initially released (all 16 were fostered pups; Table 1, Figure 3, Figure 5) into six packs (Dark Canyon, Hail Canyon, Iron Creek, Leon, Point of Rocks, Sierra Blanca).

These captive-born pups came from four SAFE facilities including: Living Desert Zoo and Gardens State Park (Carlsbad, NM), Brookfield Zoo Chicago, Endangered Wolf Center, and the Wolf Conservation Center. These foster events occurred in April and May 2023. Additionally, eight wolves were translocated in 2023 (Table 1). Translocations can occur throughout the year. We supplementally fed packs where foster events occurred. Supplemental food assists the pack with the nutritional demand of additional pups. Of the 24 wolves that were initially released or translocated in 2023, two were radio collared by the IFT, and known to be alive during the end of year count (F2593, mp2821), two were documented as mortalities (M2701, mp2790), one was removed for going north of the 10(j) boundary (F2754), and 19 were uncollared and considered fate unknown (fp2780, mp2781, mp2782, mp2783, fp2784, mp2785, mp2791, mp2797, fp2798, mp2810, fp2811, mp2812, mp2822, mp2823, fp2824, fp2825, mp2837, mp2838, fp2839) as the IFT had not been able to capture and collar the pups, nor were they documented as a mortality. 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, 2023.

Wolf pack	Wolf ID	Release site	Release date	Released or translocated
Single	M2701	Gila Flat, NM	1/30/2023	Translocated (adult)
Sierra Blanca	fp2780	Sierra Blanca Den	5/6/2023	Released (fostered)
Sierra Blanca	mp2781	Sierra Blanca Den	5/6/2023	Released (fostered)
Sierra Blanca	mp2782	Sierra Blanca Den	5/6/2023	Released (fostered)
Sierra Blanca	mp2797	Pitchfork Canyon Den	5/6/2023	Translocated (fostered)
Sierra Blanca	fp2798	Pitchfork Canyon Den	5/6/2023	Translocated (fostered)
Leon	mp2783	Leon Den	5/6/2023	Released (fostered)
Leon	fp2784	Leon Den	5/6/2023	Released (fostered)
Leon	mp2785	Leon Den	5/6/2023	Released (fostered)
Leon	mp2810	Whiskey Creek Den	5/6/2023	Translocated (fostered)
Leon	fp2811	Whiskey Creek Den	5/6/2023	Translocated (fostered)
Leon	mp2812	Whiskey Creek Den	5/6/2023	Translocated (fostered)
Point of Rocks	mp2790	Point of Rocks Den	5/7/2023	Released (fostered)
Point of Rocks	mp2791	Point of Rocks Den	5/7/2023	Released (fostered)
Dark Canyon	mp2822	Dark Canyon Den	5/10/2023	Released (fostered)
Dark Canyon	mp2823	Dark Canyon Den	5/10/2023	Released (fostered)
Dark Canyon	fp2824	Dark Canyon Den	5/10/2023	Released (fostered)
Hail Canyon	mp2821	Hail Canyon Den	5/11/2023	Released (fostered)
Hail Canyon	fp2825	Hail Canyon Den	5/11/2023	Released (fostered)
Iron Creek	mp2837	Iron Creek Den	5/13/2023	Released (fostered)
Iron Creek	mp2838	Iron Creek Den	5/13/2023	Released (fostered)
Iron Creek	fp2839	Iron Creek Den	5/13/2023	Released (fostered)
Single	F2754	Double Cienega, AZ	6/7/2023	Translocated (adult)
Single	F2593	Saddle Mountain, AZ	6/9/2023	Translocated (adult)

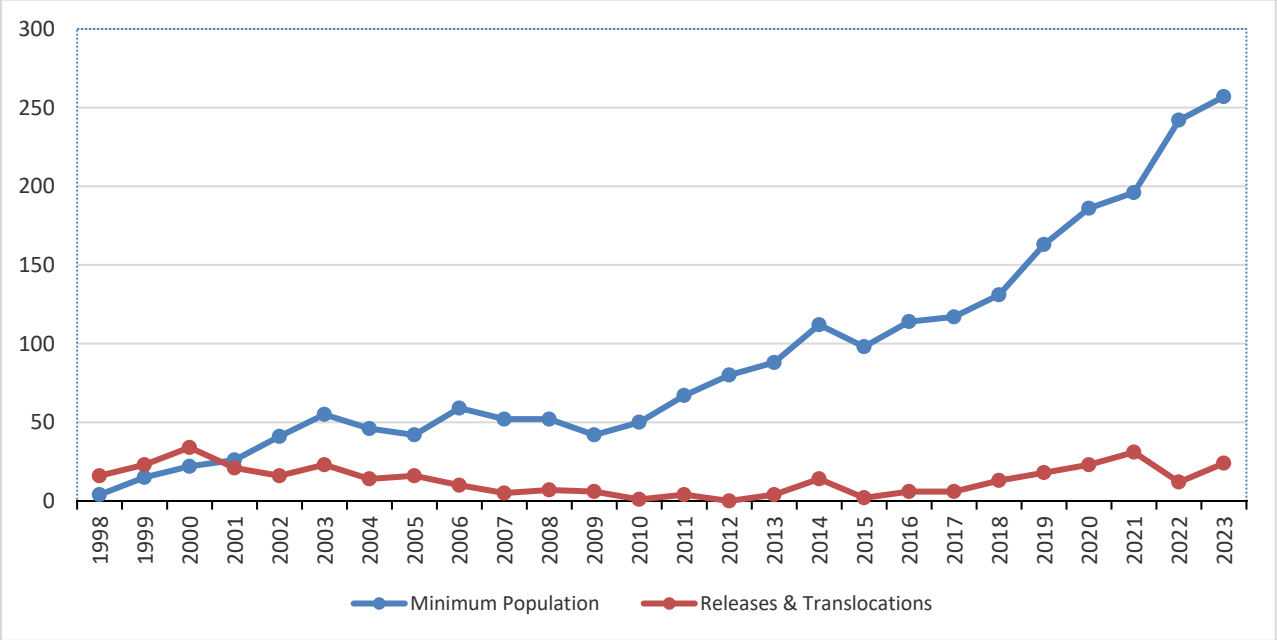

Figure 5: Mexican wolf minimum population estimates and associated releases and translocations including: initial releases (wolves released with no wild experience), translocations (wolves re-released from captivity back into the wild, and wolves in the wild that were captured, moved, and re-released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

h. 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 2023. 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 55 packs or pairs exhibiting territorial behavior in 2023 using kernel density estimation (Seaman et al. 1999). These home ranges were between 43 square miles (Sierra Blanca pack) and 2,169 square miles (Manada del Arroyo pack), with an average home range size of 275 square miles (Figure 6). For additional information regarding home range details in Arizona and New Mexico please see Appendix A.

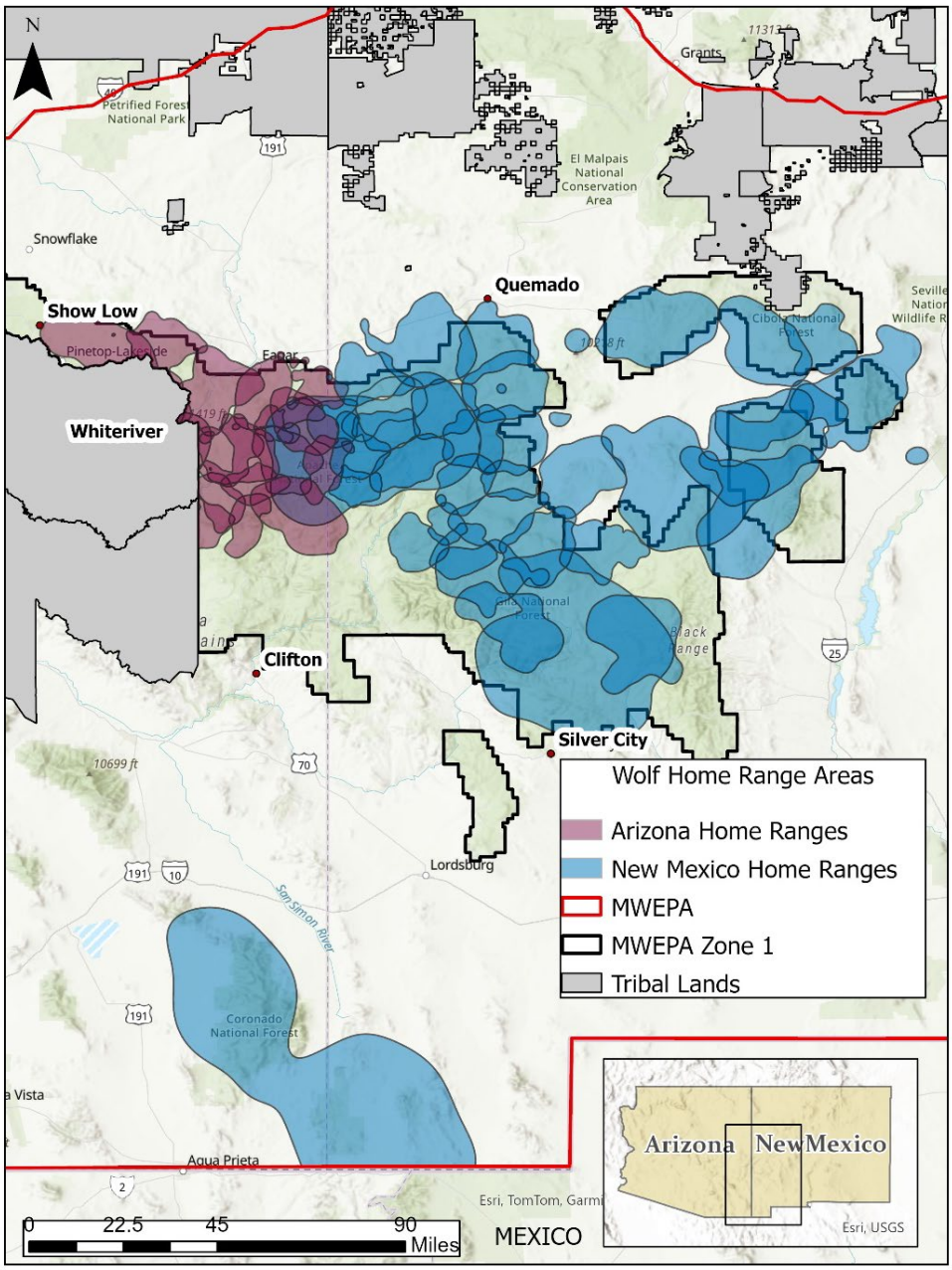

Figure 6: Mexican wolf home ranges (95 percent fixed kernel utilization distribution) for 2023 in Arizona and New Mexico excluding tribal lands. Darker areas indicate overlap between home ranges.

Martinez-Meyer et al. (2021) estimated 12,741 square miles of high-quality habitat occurred in the MWEPA. In 2023, fifty-five packs utilized a total home range area of 10,837 square miles (outer boundary of non-overlapping home ranges). The home range area encompassed approximately 7,005 square miles of high-quality habitat, indicating there is still sufficient available high-quality habitat in the MWEPA for the population to continue growing.

i. Dispersals

In 2023, the IFT documented 12 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 = 6); 2) dispersed into an existing pack (n = 2); 3) were single wolves at the end of the year (n = 3); or 4) were removed (n = 1).

j. 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 2022 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 31,585 square miles of the MWEPA during 2023 (Figure 7). In comparison, Mexican wolves occupied 29,663 square miles during 2022. The Mexican wolf occupied range increased by 6.5 percent from 2022. For additional information on areas utilized by Mexican wolves in 2023, please see Appendix B.

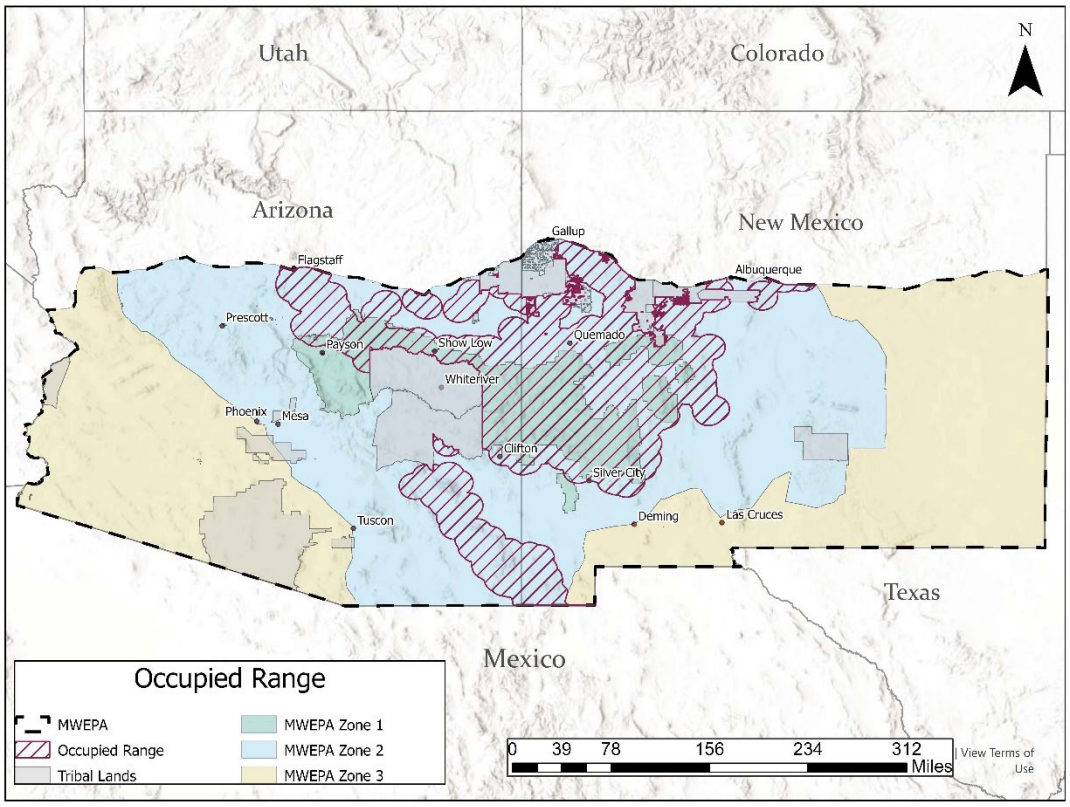

Figure 7: Mexican wolf occupied range in Arizona and New Mexico during 2023.

k. 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 (Table 2). The IFT has documented 284 wolf mortalities since 1998, 31 of which occurred in 2023 (Tables 2 and 3, Figure 8). The annual mortality total for 2023 was substantially higher than 2022 (12 mortalities) and slightly higher than 2021 (25 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. Eleven of the 31 (35 percent) documented wolf mortalities were considered illegal. Four of the 31 (13 percent) documented wolf mortalities were caused by a vehicle collision. Nine of the 31 (29 percent) documented wolf mortalities died from natural causes (e.g., starvation, exposure, interspecific competition, intraspecific competition). Four of the 31 (13 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 three of the 31 (10 percent) documented wolf mortalities. In total, 15 (48 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, 1998-2023.

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**
Total	**149**	**39**	**47**	**20**	**29**	**0**	**284**

[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 (M2556, fp2872) and three wolves last located in New Mexico (F1405, F1692, F2750) were designated fate unknown (e.g., not observed via sightings, remote cameras, or radio telemetry for >3 months during portions of 2023).

Table 3: Mexican wolf mortalities documented in Arizona and New Mexico during January 1-December 31, 2023.

Wolf ID	**Pack**	**Age (years)**	**Estimated Date of Mortality**	**Cause of death**
AF1294	Elk Horn	11	1/9/2023	Vehicle collision
f2691	Slade	1	1/17/2023	Natural
AF1728	Seco Creek	4	2/5/2023	Other
m2689	Seco Creek	1	2/11/2023	Illegal
F2771	Uncollared wolf	2	2/25/2023	Vehicle collision
F1333	Single	9	3/1/2023	Natural
AM1953	Blue Canyon	3	3/1/2023	Unknown
AM1582	Manada del Arroyo	5	3/23/2023	Illegal
f2779	Uncollared wolf	1	4/20/2023	Other
f2768	Panther Creek	1	4/24/2023	Natural
AF2569	Canovas Creek	4	5/24/2023	Other
f2757	Juniper Bench	1	6/24/2023	Illegal
F2603	Single	2	7/3/2023	Vehicle collision
AF1712	Aldo	5	7/21/2023	Natural
mp2790	Point of Rocks	<1	7/30/2023	Natural
AM2597	Noble Mountain	2	8/28/2023	Illegal
m2866	Uncollared wolf	1	9/1/2023	Illegal
m2739	Dark Canyon	1	9/3/2023	Unknown
AM1790	Owl Canyon	5	9/12/2023	Natural
fp2832	Dark Canyon	<1	9/19/2023	Unknown
AM1240	Iron Creek	12	9/25/2023	Natural
M2701	Single	4	9/29/2023	Other
f2871	Uncollared wolf	1	10/10/2023	Illegal

Wolf ID	Pack	Age (years)	Estimated Date of Mortality	Cause of death
AF1683	Panther Creek	6	10/14/2023	Natural
AF1916	Centerfire	4	11/10/2023	Illegal
AF1788	Squirrel Springs	8	11/13/2023	Natural
AM2590	Potato Canyon	2	11/21/2023	Vehicle
F2536	Single	3	12/5/2023	Illegal
AM1831	Buzzard Peak	5	12/7/2023	Illegal
M2862	Canovas Creek	2	12/16/2023	Illegal
F2860	Sunflower Mesa	2	12/25/2023	Illegal

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). Thirty-two wolves equipped with functioning radio collars were considered removed ($n = 7$), dead ($n = 23$), or missing ($n = 2$). Uncollared wolves and individuals with failed collars documented dead ($n = 7$) or removed ($n = 6$) 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), 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 (one wolf with functioning radio collar died as a result of handling in 2023) 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 0.76 with a cumulative mortality rate of 0.24. The cumulative mortality rate was composed of human caused mortality rate (0.10; *n* = 14), natural mortality rate (0.06; *n* = 8), unknown/awaiting necropsy mortality rate (0.01; *n* = 1), boundary removal rate (0.03; *n* = 4), missing likely dead wolves' rate (0.015; *n* = 2), livestock depredation removal rate (0.01; *n* = 1), nuisance removal rate (0.00; *n* = 0), and other removal rate (0.015; *n* = 2). Much of the mortality was concentrated on sub-adults (radio days = 10,114, failures = 12, survival rate = 0.65), relative to the pup (radio days = 1,879, failures = 0, survival rate = 1.00) and adult (radio days = 30,719, failures = 20, survival rate = 0.79) components of the population.

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 0.24 in 2023. Following Fuller et al. (2003), our cumulative mortality rate would predict an increasing population which was the case in 2023. Further, Miller (2017) found that population growth was particularly sensitive to adult mortality rates, which were lower in our population (0.21) than the sub-adults (0.35) in 2023. 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 2023 being due to mortalities. Indeed, the cumulative mortality rate from 2016-2023 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 time period (Figure 9).

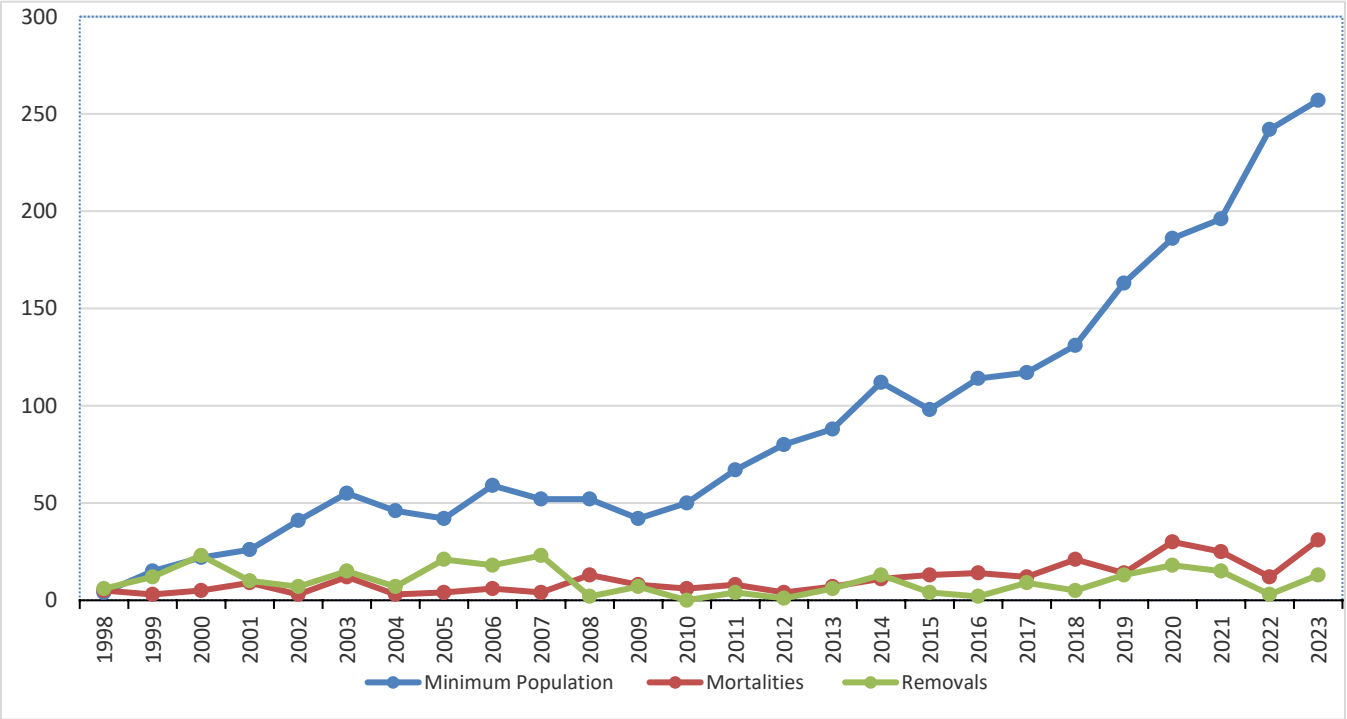

Figure 8: Mexican wolf minimum population estimates and associated removals and mortalities in Arizona and New Mexico during 1998-2023.

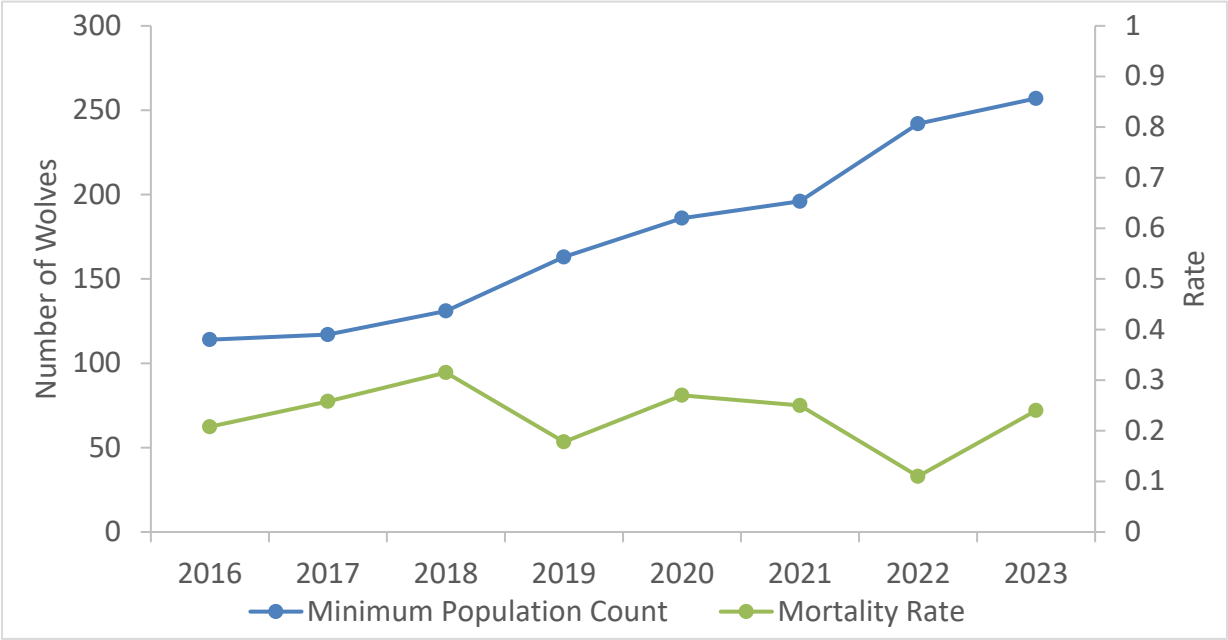

Figure 9: Mexican wolf minimum population estimates and associated mortality rates in Arizona and New Mexico 2016-2023.

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).

I. Depredations

In 2023, investigators confirmed that wolves were responsible for the death of 114 cattle, two sheep, and one dog, and injuries to 14 cattle. Additionally, 12 cattle were identified as probable wolf-caused deaths, and one was identified as a probable wolf-caused injury (Table 4). In 2023, the total number of confirmed depredations decreased by 15 percent from 2022 (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 2023.

	Confirmed Wolf		**Probable Wolf**	
	Killed or died from injuries	**Injured**	**Killed or died from injuries**	**Injured**
Arizona	36	6	0	1
New Mexico	81	8	12	0
Total	**117**	**14**	**12**	**1**

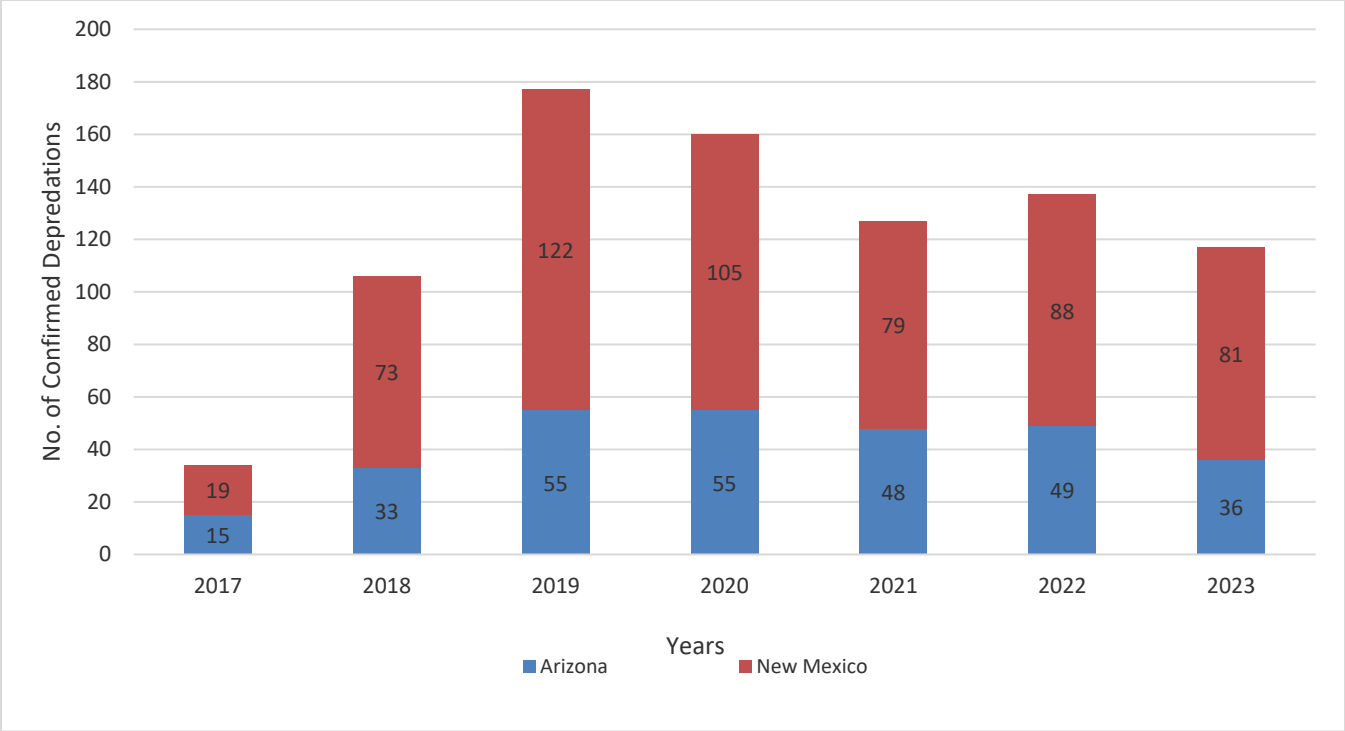

Figure 10: Total number of confirmed depredations (animal killed or died from injuries) in Arizona and New Mexico during 2017-2023.

From 2013 to 2022 (10-year average), the mean number of cattle confirmed killed by wolves per year is 88.8 which extrapolates to 61.50 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 2023. The depredation rate for 2023 extrapolates to 44.36 confirmed cattle killed per 100 wolves using the number of confirmed killed cattle compared to the final population count. Furthermore, the 2023 rate is considerably lower than the previous 10-year average (2013 to 2022) mean of 61.50 confirmed killed cattle/100 wolves/year and is also a decrease of 15 percent from 2022.

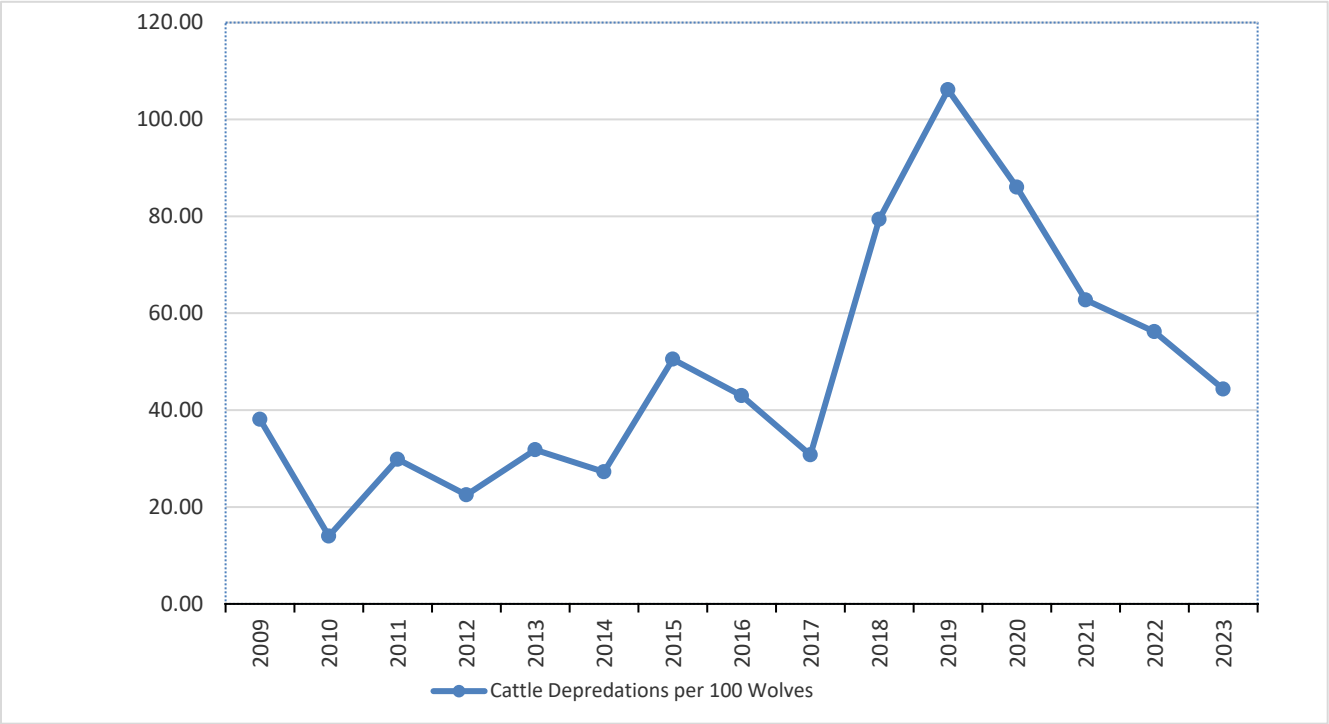

Figure 11: Total number of confirmed depredations (animal killed or died from injuries) in Arizona and New Mexico during 2017-2023.

m. 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 what wolf/wolves were involved in the incident and implement management efforts to resolve credible reports of wolf-human conflict. Some reports of wolf-human conflict are determined to involve animals that are not wolves, such as dogs or coyotes. Other reports are classified as unknown if it cannot be determined that wolves were present or responsible.

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

In 2023, the IFT received 35 wolf-human conflict reports. Of the 35 reports, the IFT determined 12 reports (Figures 12 and 13) involved or may have involved Mexican wolves, 19 reports involved species other than wolves (domestic dogs, coyotes, etc.) and 4 reports the IFT was unable to determine if wolves were involved or not. Of the reports that involved or may have involved wolves, nine were

determined to be nuisance incidents not posing an imminent or potential threat to humans, and three were determined to be a potential threat to humans. The first incident determined as having potential threat to humans involved an interaction in March where the IFT received a report of a wolf that approached a group of people with dogs in the Gila National Forest. Please see the Mexican Wolf Recovery Program Quarterly Update (First Quarter) for 2023 for additional details of this incident. The second incident determined as having potential threat to humans involved an interaction in August where an archery hunter reported two wolf pups approached a food cache within 20 yards of the hunter. Initially, the wolf pups were unaware of the human presence near the food cache, and the hunter stood up and yelled at the wolf pups. The pups froze but did not run away. Concerned that they didn't leave the area, the hunter held his bow over his head to look bigger and one wolf pup ran off. The hunter then threw a large branch near the remaining wolf and the second wolf pup ran off. The third incident determined as having potential threat to humans involved an interaction in December where the IFT received a report of two dogs that were attacked (one killed and one injured) on the porch of a ranch house. USDA-WS investigated and confirmed wolf involvement. Please see the Mexican Wolf Recovery Program Quarterly Update (Fourth Quarter) for 2023 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.

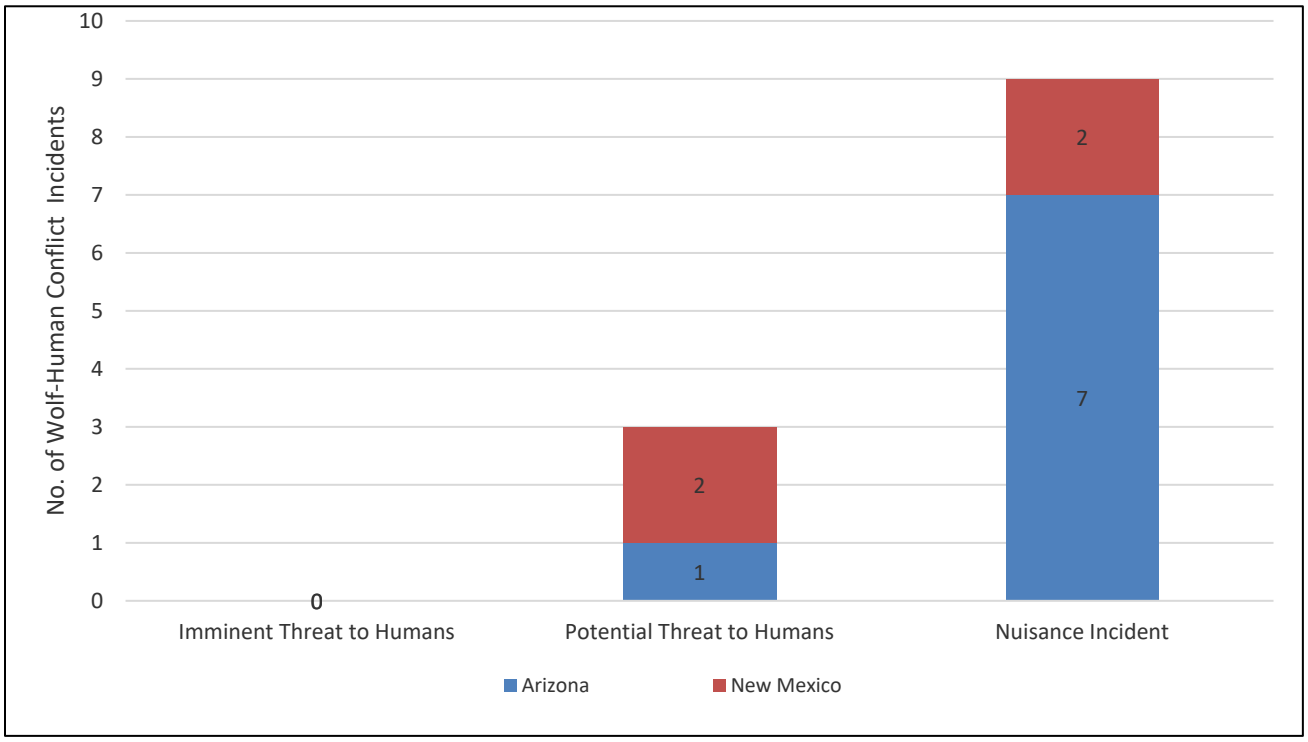

Figure 12: Total number of wolf-human conflict incidents by incident category in Arizona and New Mexico in 2023.

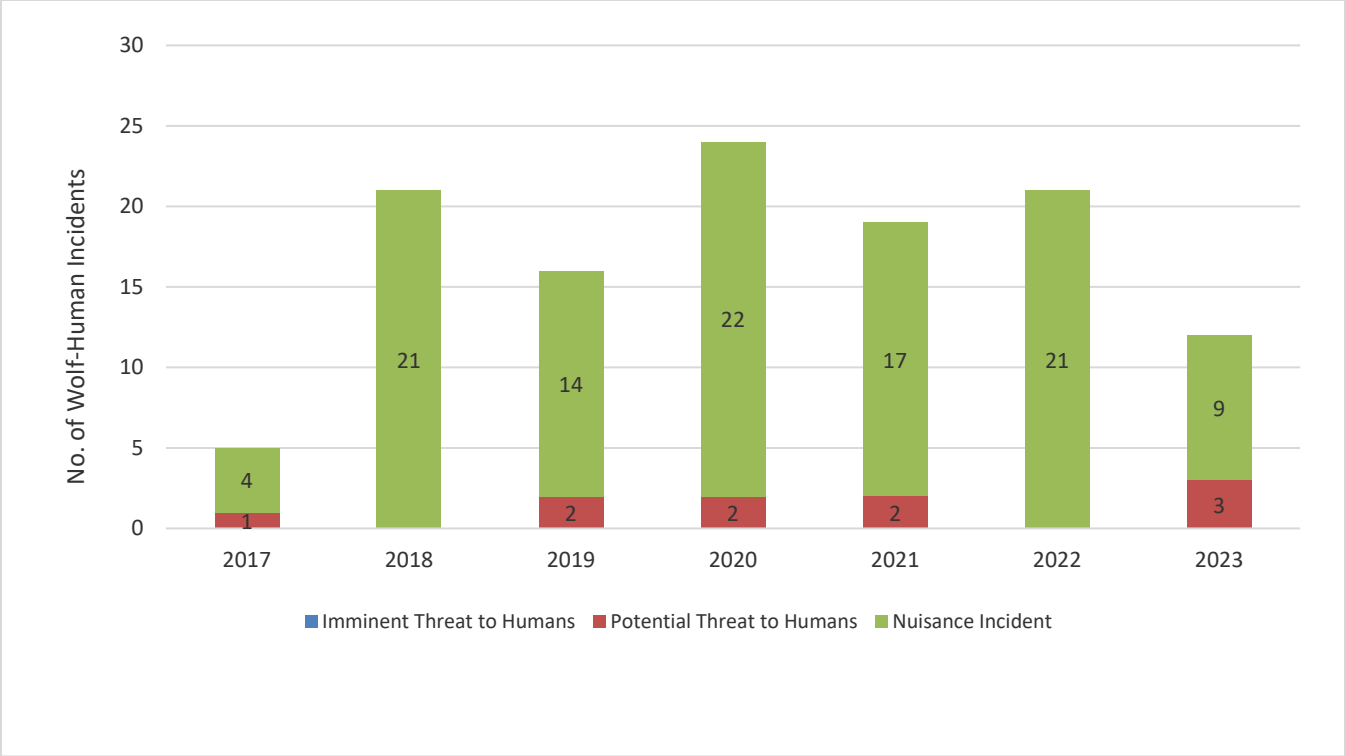

Figure 13: Number of confirmed wolf-human incidents by category in Arizona and New Mexico during 2017-2023.

n. Proactive Management

Various proactive management activities were utilized to reduce wolf-livestock conflicts during 2023. These management approaches and tools may include:

- 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 Rangers, biologists, and range staff to discuss livestock management options during the wolf denning season and to address potential conflicts between livestock and wolves. During 2023, alteration of livestock grazing rotation schedules was implemented once to minimize wolf- livestock conflict.

- 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 2023, the IFT removed 105 livestock carcasses to minimize wolf-livestock conflict.

- 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 10 known packs and one uncollared wolf area during 2023. Supplemental food caches were established in association with eight packs during

2023. These supplemental food caches can also act as diversionary food caches by reducing the potential wolf-livestock conflict.

- 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 provided funding for two projects for hay and other wolf/livestock conflict avoidance measures in Arizona in 2023.

- 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 2023, the IFT conducted hazing activities for 364 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 143 occasions.

- 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.

- 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 47 receivers during 2023.

- 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 one RAG box during 2023.

- 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 2023, our partner agencies and NGOs contracted 17 ranges riders, 12 in Arizona, and five 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 one permanent range rider in New Mexico in 2023.

- 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 2023, one wolf (M1296) was removed from the wild because of wolf-livestock conflict.

- 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 2023, the IFT set 52 foot-hold traps for management purposes and/or in areas with potential uncollared wolves.

- 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 installed six sets of turbo fladry in 2023.

- Fox Lights: lights attached to turbo fladry fencing which provide computerized varying flashes of light to discourage wolf presence. The IFT installed fox lights on 3 sets of turbo fladry fencing in 2023.

o. *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 2023, 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.

A table of Mexican wolf informational materials is displayed at the Albuquerque BioPark as part of a public education event. Credit: USFWS

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 2022 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 2023. Nine hundred and ninety informational flyers were distributed 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 350 deer and elk hunt permit holders in Arizona, and 250 of the same flyers were distributed to hunters by Arizona Game and Fish Wildlife Managers in Region 1 during fall and winter hunt patrols.

Furthermore, wolf vs. coyote identification information can be found in the AZGFD hunting regulations. The IFT also maintained Service reward posters at USFS kiosks and local businesses, to provide notice of a $10,000 reward 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, 2023.

*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 in 2023)	**Pups alive** (at end of year)	**Number collared**	**Number uncollared** (includes wolves with non-functioning collar)	**Minimum pack size** (at end of year)	**Pack Notes**
Agua Frio	AM1875, AF1936	0	0	2	0	2	
Aldo	AM2561, AF1712	2	2	1	2	3	AF1712 died in July
Baldy* (FAIR)	AM1347, F2767	N/A	N/A	N/A	N/A	N/A	Wolf numbers not displayed at request of the tribe
Bear Canyon*	AM2563, AF1823	4	2	1	5	6	AF1823 considered uncollared/non-functional collar
Beaver Point*	AM1949, AF2753	5	2	2	2	4	
Blue Canyon	M1953	0	0	0	0	0	M1953 died in March, pack no longer exists
Burnt Peaks	M2557, F1692	0	0	1	0	1	F1692 designated fate unknown
Buzzard Peak	AM1831, AF1726, f2713, M2567	1	1	3	1	4	AM1831 died in December
Canovas Creek	AM1584, AF2569, m2862	4	3	1	4	5	AF2569 died in May m2862 died in December
Castle Rock	AM1921, F2632	0	0	2	0	2	
Centerfire	AM2697, AF1916	3	1	1	2	3	AF1916 died in November
Chimney Canyon	M2636	0	0	1	1	2	

Wolf Pack	**Wolf ID**	**Reproduction** (maximum # of pups documented in 2023)	**Pups alive** (at end of year)	**Number collared**	**Number uncollared** (includes wolves with non-functioning collar)	**Minimum pack size** (at end of year)	**Pack Notes**
Cimmaron Mesa*	AM2702, AF1705	4	3	2	3	5	
Colibri	AM1856	0	0	1	1	2	
Cottonwood Canyon*	AM1859, AF2503	1	1	2	1	3	
Dark Canyon*	AM1354, AF1456	9	2	1	5	6	AF1456 considered uncollared/non-functional collar. Reproduction includes foster(s) placed into den
Dillon Mountain*	AF1865	3	3	1	4	5	
Eagle Creek	M1477, F1548	0	0	1	1	2	M1477 considered uncollared/non-functional collar
Elk Horn*	AM1838, AF1294, AF1866, fp2865	5	5	3	4	7	AF1294 died in January
El Torro	F2861	0	0	1	1	2	
Fantasia	AM2873, AF2729	2	0	2	0	2	
Firebox	AM1881	0	0	1	1	2	Pack denned, but a pup count was not obtained
Frieborn*	AF1443, AM2765	4	2	2	4	6	
Gallinas Canyon	AM2700, AF2588	0	0	2	0	2	
Hail Canyon*	AM2764, AF2690, mp2821	6	2	3	2	5	Reproduction includes foster(s) placed into den
Hoodoo*	AM1789, AF2752, M1893, fp2868	3	3	4	2	6	

Wolf Pack	**Wolf ID**	**Reproduction** (maximum # of pups documented in 2023)	**Pups alive** (at end of year)	**Number collared**	**Number uncollared** (includes wolves with non-functioning collar)	**Minimum pack size** (at end of year)	**Pack Notes**
Iron Creek	AM1240, AF1278, M2549, f2756	6	1	3	1	4	Reproduction includes foster(s) placed into den AM1240 died in September
Juniper Bench*	AF1920, f2757, mp2859	3	3	2	4	6	F2757 died in June
Lava	AF1405, M2750	0	0	0	0	0	AF1405 designated fate unknown, M2750 designated fate unknown, pack no longer exists
Leon*	AM1824, AF1578, f2763	9	3	3	3	6	Reproduction includes foster(s) placed into den
Leopold*	AM1855, AF1346	1	1	1	2	3	AF1346 considered uncollared/non-functional collar
Lonesome Well	M2755, F2694	0	0	2	0	2	
Lost Spring	m2766	0	0	1	1	2	
Luna	AF1487	0	0	1	1	2	
Manada del Arroyo	AM1582, AF1828	0	0	0	0	0	Pack denned, but a pup count was not obtained AM1582 died in March AF1828 was temporarily removed in November (genetic management)
Mangas	AM1296, AF1439, f2775	4	3	1	5	6	AF1439 considered uncollared/non-functional collar AM1296 was lethally removed in April (livestock)

Wolf Pack	**Wolf ID**	**Reproduction** (maximum # of pups documented in 2023)	**Pups alive** (at end of year)	**Number collared**	**Number uncollared** (includes wolves with non-functioning collar)	**Minimum pack size** (at end of year)	**Pack Notes**
Milligan Gulch*	AM2687, AF2688	3	3	2	3	5	
Snake Creek, AZ	m2709	0	1	1	0	2	
New Pair, NM	M2772, f2746	0	0	2	0	2	
New Pair, NM	f2742	0	0	1	1	2	
New Pair, NM	m2762	0	0	1	1	2	
Noble Mountain	AM2597, AF1918	1	1	1	2	3	AM2597 died in August
Owl Canyon	AM1790	0	0	0	0	0	AM1790 died in September, pack no longer exists
Pancho Spring*	AM2770, AF1889, mp2870	4	3	3	2	5	
Panther Creek	AM1382, AF1683	3	3	0	6	6	AF1683 died in October AM1382 considered uncollared/non-functional collar
Pitchfork Canyon*	AM2566, AF1853	6	3	2	3	5	Reproduction includes foster(s) placed into den
Point of Rocks*	AM1717, AF2515	6	1	2	1	3	Reproduction includes foster(s) placed into den
Prime Canyon*	AM1471, AF1488, m2848, f2849	4	4	2	7	9	AM1471 considered uncollared/non-functional collar AF1488 considered uncollared/slipped collar
Rocky Prairie*	AM1383, AF1489, f2769, mp2863, fp2864	5	5	4	5	9	

Wolf Pack	**Wolf ID**	**Reproduction** (maximum # of pups documented in 2023)	**Pups alive** (at end of year)	**Number collared**	**Number uncollared** (includes wolves with non-functioning collar)	**Minimum pack size** (at end of year)	**Pack Notes**
Rose*	AM1704	3	2	1	3	4	
Saddle Mountain	F2540	0	0	1	1	2	
Saffel*	AM1854, AF1939, M1852	4	4	3	6	9	
San Mateo	AM1345, AF1399	0	0	1	1	2	AM1345 considered fate unknown
Sawtooth	AM2704, F2593	0	0	2	0	2	
SBP*	AM2703, AF1553	2	2	2	2	4	
Seco Creek	AF1728, m2689	0	0	0	0	0	AF172 and M2689 died in February, pack no longer exists
Sierra Blanca*	AM1571, AF1550	7	1	2	1	3	Reproduction includes foster(s) placed into den
Slade	f2691	0	0	0	0	0	f2691 died in January, pack no longer exists
Squirrel Springs	AF1788	0	0	0	0	0	AF1788 died in November, pack no longer exists
Sunflower Mesa	F2860	0	0	0	1	1	F2860 died in December, pack no longer exists
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, fp2758	N/A	N/A	N/A	N/A	N/A	Wolf numbers not displayed at request of the tribe
Wagontongue Mountain*	AM1946, m2773	4	4	2	5	7	

Wolf Pack	**Wolf ID**	**Reproduction** (maximum # of pups documented in 2023)	**Pups alive** (at end of year)	**Number collared**	**Number uncollared** (includes wolves with non-functioning collar)	**Minimum pack size** (at end of year)	**Pack Notes**
Warm Springs	M2545, F1938	0	0	2	0	2	
Whiskey Creek*	AM1842, mp2760	7	4	2	5	7	Reproduction includes foster(s) placed into den
Whitewater Canyon	AM1455	0	0	0	3	3	AM1455 considered uncollared/non-functional collar
Willow Creek	AM1555, AF1890, M2867	0	0	2	1	3	AM1555 considered uncollared/non-functional collar
Single, AZ	m2722	0	0	1	0	1	
Single, AZ	AF1333	0	0	0	0	0	F1333 died in March
Single, AZ	F2603	0	0	0	0	0	F2603 died in July
Single, AZ	M2556	0	0	0	0	0	AM2556 considered fate unknown
Single, AZ	F2536	0	0	0	0	0	F2536 died in December
Single, AZ	AF1686	0	0	1	0	1	
Single, AZ	M1857	0	0	1	0	1	
Single, NM	f2743	0	0	1	0	1	
Single, NM	M1888	0	0	1	0	1	
Single, NM	m2847	0	0	1	0	1	
Single, NM	f2741	0	0	1	0	1	
Single, NM	m2719	0	0	1	0	1	
Single, NM	M2761	0	0	0	0	0	M2761 died in October

Wolf Pack	**Wolf ID**	**Reproduction** (maximum # of pups documented in 2023)	**Pups alive** (at end of year)	**Number collared**	**Number uncollared** (includes wolves with non-functioning collar)	**Minimum pack size** (at end of year)	**Pack Notes**
Single, NM	mp2699	0	0	0	0	0	mp2699 died in November
Uncollared wolf	Slaughter Mesa, NM	0	0	0	1	1	
Uncollared wolf	Ladder Ranch, NM	0	0	0	1	1	
Uncollared wolf	Jim Smith Peak, NM	0	0	0	1	1	
Uncollared wolf	Cottonwood Wash, AZ	0	0	0	1	1	
Uncollared wolves	Thompson Creek, AZ	0	0	0	3	3	
Uncollared wolf	Cerro Quemado, AZ	0	0	0	1	1	
Uncollared wolf/wolves	Amos Ranch, AZ (FAIR)	N/A	N/A	N/A	N/A	N/A	Wolf numbers not displayed at request of the tribe
Uncollared wolf/wolves	Christmas Tree, AZ (FAIR)	N/A	N/A	N/A	N/A	N/A	Wolf numbers not displayed at request of the tribe
Uncollared wolf/wolves	SCAR, AZ	N/A	N/A	N/A	N/A	N/A	Wolf numbers not displayed at request of the tribe
	Totals	**141**	**86**	**113**	**144**	**257**	

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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

Bailey Dilgard, Wolf Biologist

Annie Barkan, Wolf Technician

Charles Lonnie Fox, Wolf Technician

David Hanrahan, Range Rider

Tristan Young, Range Rider

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

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Jon Grant, State Director – New Mexico

Chris Carrillo, District Supervisor – Arizona

Lisa Selner, District Supervisor – New Mexico

Caleb Garzanelli, Non-Lethal Specialist (AZ)

Sterling Simpson, Wolf Specialist (AZ)

Scott McDonald, Wildlife Services Agent (NM)

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

Bret Valona, 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, Policy, Planning, and Litigation Coordinator

Lauren Toivonen, Mexican Wolf Field Projects Coordinator

Colby Gardner, Biologist

Allison Greenleaf, Senior Biologist

Melissa Kreutzian, Biologist

Cameron "Mac" Purvin, Biologist

Agapito Lopez, Technician

Kat Schultz, Technician

Dewey Wesley, Technician

Ryan Hennessey, 60-Day Hire

Tessa McDonnell, 60-Day Hire

Meghan Murphy, 60-Day Hire

White Mountain Apache Tribe

Cynthia Dale, Sensitive Species Coordinator

Theo Guy, Wolf Technician

Deon Hinton, Wolf Technician

Manuelita Kessay, Sensitive Species Technician

Joseph Perez, Wolf Technician

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Elin Crockett, DVM (NMDGF)

Susan Dicks, DVM (USFWS)

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Mexican Wolf Project Volunteers and Interns

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Kevin Brown

Savannah Cantrell

Aidan Caruso

Todd Cornwell

Andrew Craton

Grace Dougan

Jennifer Gedert

Makayla Goldon

Sean Gordon

Ryan Hennessey

Rebekah Keating

Chris Martin

Haylee Pearce

Anna Resek

Mary Sadyrova

Corbin Scott

Chelsey Taylor

Liz Tsourakis

Maya Bridges – SCA Career Discovery Intern

APPENDICES

APPENDIX A: MEXICAN WOLF PACK HOME RANGE DETAILS

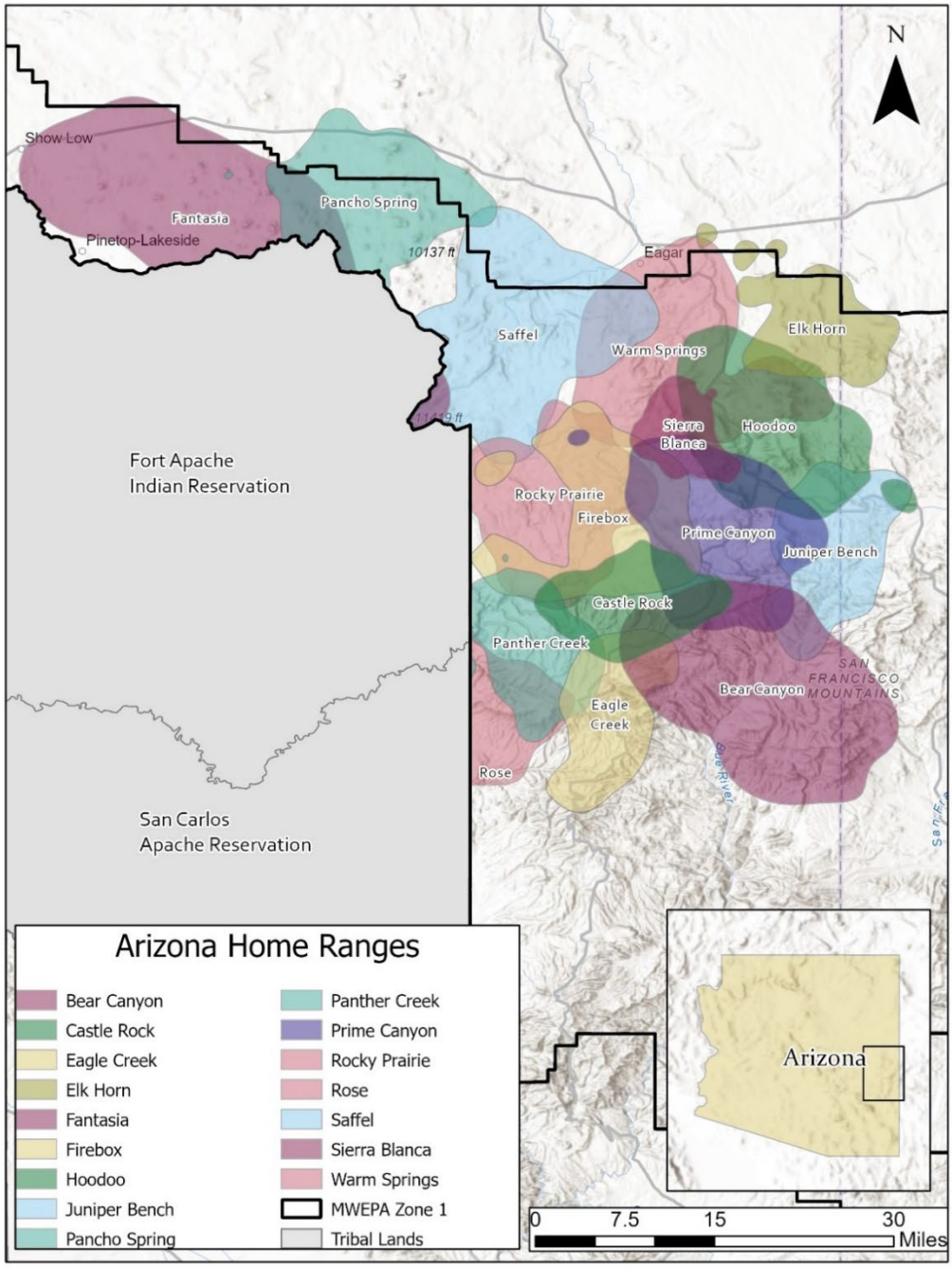

Figure 14: Mexican wolf home ranges in Arizona in 2023.

Table 6. Arizona Wolf Home Range Details

Wolf Pack	**Home Range Size (mi^2)**	**County**
Baldy	N/A	Apache/Navajo
Bear Canyon	243	Greenlee
Castle Rock	86	Apache/Greenlee
Eagle Creek	87	Greenlee
Elk Horn	85	Apache
Fantasia	323	Apache/Navajo
Firebox	154	Apache/Greenlee
Hoodoo	159	Apache
Juniper Bench	108	Apache/Greenlee/Catron
Pancho Spring	152	Apache
Panther Creek	107	Apache/Greenlee
Prime Canyon	165	Apache/Greenlee
Rocky Prairie	151	Apache/Greenlee
Rose	156	Apache/Greenlee
Saffel	223	Apache
Sierra Blanca	43	Apache
Tsay-O-Ah	N/A	Apache/Navajo
Tu dil hil	N/A	Apache
Warm Springs	193	Apache

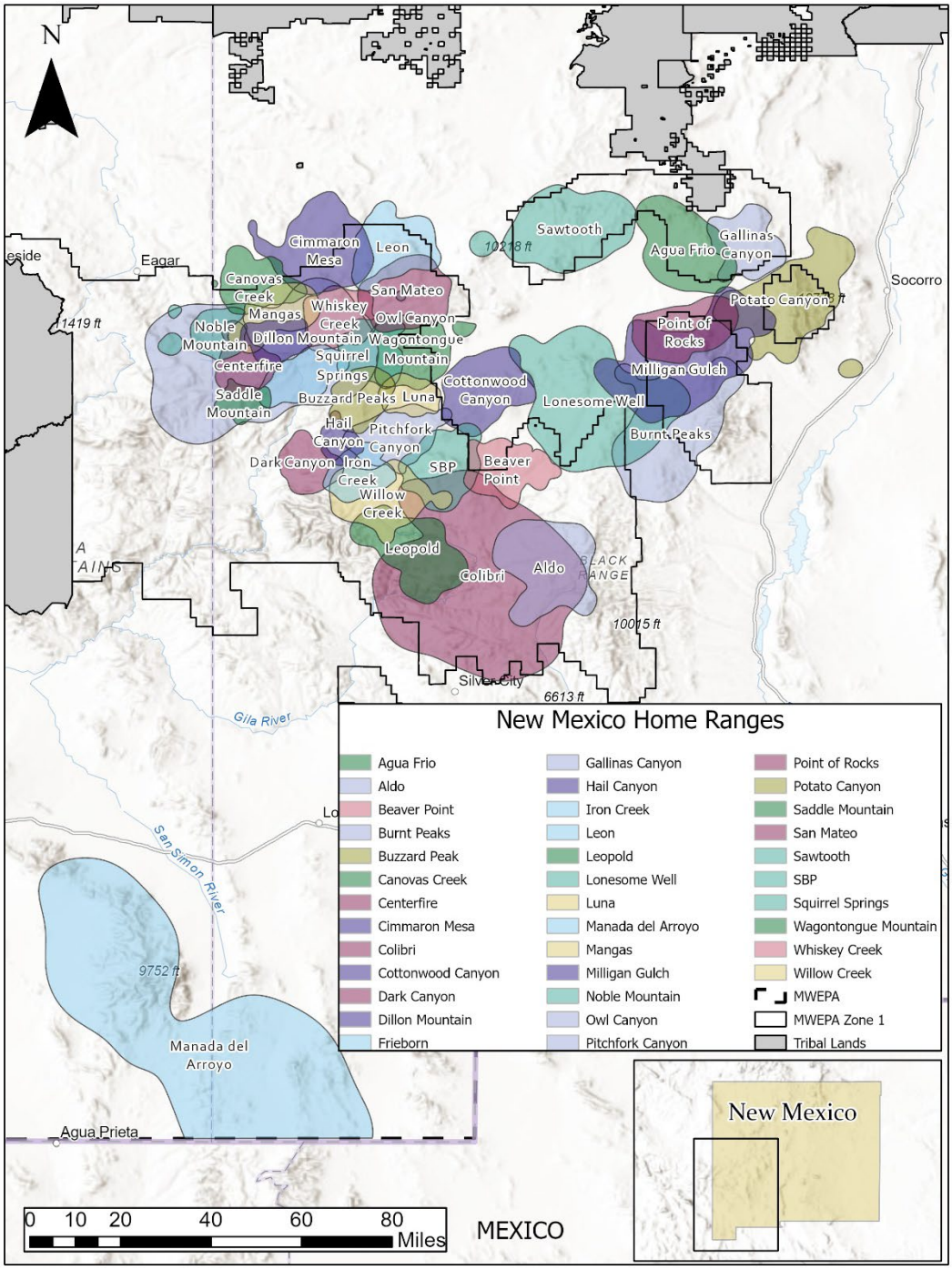

Figure 15: Mexican wolf home ranges in New Mexico in 2023.

Table 7. New Mexico Wolf Home Range Details

Wolf Pack	Home Range Size (mi^2)	County
Agua Frio	273	Socorro
Aldo	325	Catron/Grant/Sierra
Beaver Point	178	Catron
Burnt Peaks	472	Catron/Sierra/Socorro
Buzzard Peak	127	Catron
Canovas Creek	156	Catron
Centerfire	122	Catron
Cimmaron Mesa	302	Catron
Colibri	1,286	Catron/Grant/Sierra
Cottonwood Canyon	230	Catron
Dark Canyon	118	Catron
Dillon Mountain	98	Catron
Frieborn	139	Catron
Gallinas Canyon	165	Socorro
Hail Canyon	56	Catron
Iron Creek	120	Catron
Leon	209	Catron
Leopold	263	Catron/Grant
Lonesome Well	671	Catron/Sierra/Socorro
Luna	83	Catron
Manada del Arroyo	2,169	Hidalgo/Cochise
Mangas	155	Catron
Milligan Gulch	513	Catron/Socorro
Noble Mountain	117	Apache/Catron
Owl Canyon	1,063	Apache/Greenlee/Catron
Pitchfork Canyon	184	Catron
Point of Rocks	202	Socorro
Potato Canyon	396	Socorro
Saddle Mountain	69	Catron
San Mateo	218	Catron
Sawtooth	362	Catron
SBP	205	Catron
Squirrel Springs	155	Catron
Wagontongue Mtn	200	Catron
Whiskey Creek	150	Catron
Willow Creek	400	Catron/Sierra

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 Service's 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 2023, the Mexican wolf Use Area was 43,927 mi^2. The Territorial Area was 23,761 mi^2, while the Extra Territorial Area was 20,166 mi^2. The Mexican wolf Use Area increased by 17% from 2022. The Territorial Area increased by 38% from 2022, while the Extra Territorial Area remained similar between 2022 and 2023 (decreased by less than 1%).

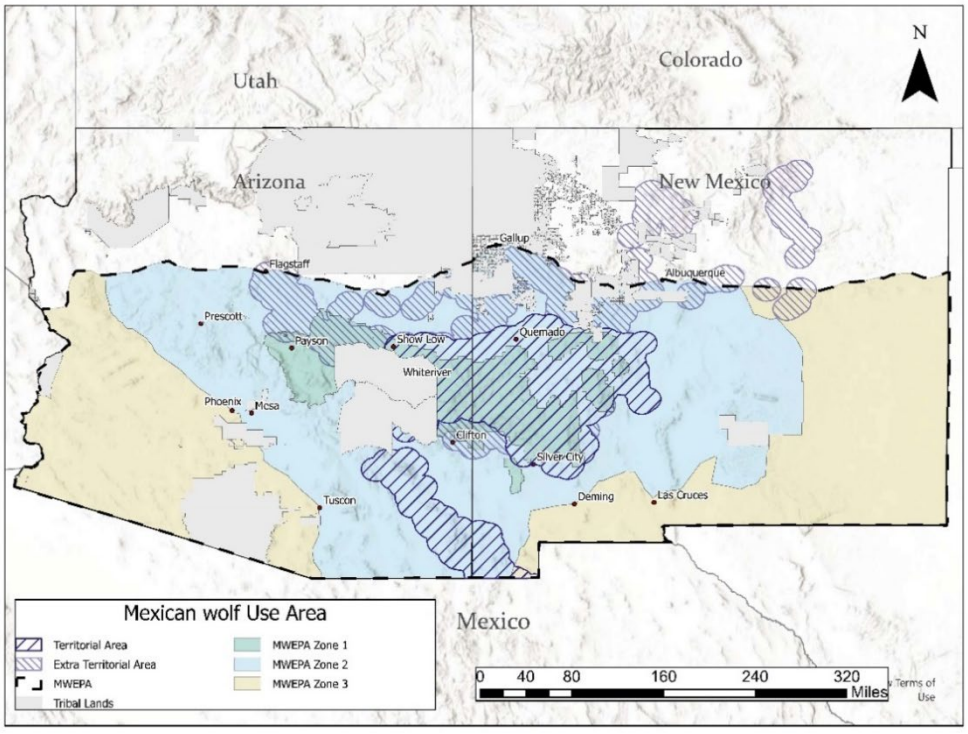

Figure 16. Mexican Wolf Use Area in Arizona and New Mexico in 2023.