MEXICAN WOLF RECOVERY PROGRAM

A Mexican wolf stands in a field in the Mexican Wolf Experimental Population Area. Photo credit: Interagency Field Team

Progress Report #21
Reporting Period: January 1 – December 31, 2018

Prepared by: U.S. Fish and Wildlife Service

Cooperators: Arizona Game and Fish Department, USDA-APHIS Wildlife Services, US Forest Service, and White Mountain Apache Tribe

Mexican Wolf Recovery Program

PROGRESS REPORT #21
REPORTING PERIOD: JANUARY 1 -- DECEMBER 31, 2018

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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 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, 2018.

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.

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 saved the Mexican wolf from extinction.

As recommended in the Mexican Wolf Recovery Plan, First Revision (Service 2017) (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, 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 (AGFD), White Mountain Apache Tribe (WMAT), US Forest Service, and U.S. Department of Agriculture-Wildlife Services (USDA-WS). The New Mexico Department of Game and Fish withdrew as a partner agency in 2011.

PART A: RECOVERY ADMINISTRATION

1. MEXICAN WOLF CAPTIVE BREEDING PROGRAM

a. ***Mexican Wolf Species Survival Plan***

The Mexican Wolf Species Survival Plan (SSP) is a binational captive breeding program between the United States and Mexico for the Mexican wolf. The SSP 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. SSP 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. Wolves in these facilities are managed in accordance with a Service-approved standard protocol. Without the SSP, recovery of the Mexican wolf would not be possible.

This year, the SSP's binational meeting to plan and coordinate wolf breeding, transfers, and related activities among facilities was hosted by the Chicago Zoological Society at the Brookfield Zoo in Brookfield, Illinois. The meeting included updates on the reintroduced populations in the US and Mexico, discussion on the gamete banking plan for 2019, 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.

A Mexican wolf stands in the snow at the Brookfield Zoo. Photo credit: Brookfield Zoo

As of July 2018, the SSP population includes 317 Mexican wolves managed in approximately 55 facilities in the United States and Mexico. The SSP goal is to house a minimum of 240 wolves, with a target population size of 300, to ensure the security of the species in captivity and produce surplus animals for reintroduction.

The SSP population has served as the sole source population to reestablish the species in the wild. In the United States, captive wolves released to the wild from the SSP population also serve a critically important role in improving the gene diversity of the wild population in the Mexican Wolf Experimental Population Area in Arizona and New Mexico. Wolves that are considered genetically well-represented in the SSP 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 population while minimizing adverse effects to the genetic integrity of the captive population in the event that wolves released to the wild do not survive.

b. Mexican Wolf Pre-Release Facilities

Mexican wolves are acclimated prior to release to the wild in captive facilities designed to house wolves in a manner that fosters wild behaviors. The Service oversees the management at the Ladder Ranch and Sevilleta Wolf Management Facilities, located in New Mexico within the MWEPA. 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 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 from local game processors (meat, organs, hides, and bones) 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. In 2018, the refuge staff continued to assist Mexican Wolf Recovery Program staff in the maintenance and administration of the wolf pens. The facility was closed for improvements to the water system from March through October.

Through the course of the year, nineteen individual wolves were housed at Sevilleta. Two wolves were transferred to Sevilleta from the MWEPA, one of which was translocated back into the MWEPA during the year. As part of the breeding and transfer recommendations, sixteen wolves were transferred to Sevilleta from SSP facilities, and four wolves were transferred from Sevilleta to SSP facilities in the United States. No births or deaths occurred at Sevilleta in 2018

A Mexican wolf caught on camera at the Sevilleta Wolf Management Facility. Photo credit: U.S. Fish and Wildlife Service

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 of 0.3 acre to approximately 0.70 acre. The caretaking of wolves at the facility is carried out by an employee of the Turner Endangered Species Fund, though the facility is managed and supported financially by the Service. During 2018, fifteen individual wolves were housed at the Ladder Ranch. As part of the breeding and transfer recommendations, one wolf was transferred to Ladder Ranch from an SSP facility, and 12 wolves were transferred from Ladder Ranch to SSP facilities. Six births and no deaths occurred at the facility in 2018.

2. RECOVERY PLAN IMPLEMENTATION / PROGRESS TOWARD RECOVERY

The 2017 Mexican Wolf Recovery Plan, First Revision (Recovery Plan), provides downlisting and delisting criteria for the Mexican wolf, as well as recovery actions that, if implemented, will achieve the criteria (USFWS 2017, pp. 18-20, 28-34). To assist the Service and our partners in the implementation of the Recovery Plan, we developed a Recovery Implementation Strategy (RIS) (https://www.fws.gov/southwest/es/mexicanwolf/pdf/2017MexicanWolfRIS_Final.pdf). We intend to update the RIS as needed during recovery.

In 2018, we implemented a number of recovery actions associated with the objectives in the RIS; e.g. 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 cross-fostering) and translocation of Mexican wolves, monitor the genetic health of the population, manage the captive breeding/SSP population, etc. See Part B of this report for more detail on many of 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 10 years into plan implementation to ensure the recovery strategy and actions are effective (USFWS 2017, pg. 26-27). For the five-year evaluation, the Recovery Plan provides the following demographic and genetic benchmarks:

- 145 wolves in the United States and 100 wolves in Mexico (demographic); and
- a sufficient number of wolves have been released or translocated to result in 9 released animals surviving to breeding age in the United States, and 25 released animals surviving to breeding age in Mexico (genetic).

We will conduct the five-year evaluation in 2023, using data from 2015-2022, including the 2022 year-end annual population count. Because we will conduct the 2022 annual population count, in part, early in 2023, we will complete the evaluation six years after finalization of the Recovery Plan. As of this annual report, the minimum population in the MWEPA is 131 Mexican wolves and two released or translocated wolves have survived to breeding age to count toward the genetic benchmark/criteria. Also as of this annual report, the minimum population in Mexico is 45 Mexican wolves and two released or translocated wolves have survived to breeding age to count toward the genetic benchmark/criteria.

3. SUMMARY OF LITIGATION

Plaintiffs: Center for Biological Diversity; Defenders of Wildlife

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

Intervenors: State of Arizona (Defendant)

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

Date NOI Filed: No NOI Filed on alleged APA violations; January 16, 2015 NOI pertaining to 10(a)(1)(A) permit

Date Complaint Filed: January 16, 2015; amended complaint filed March 23, 2015

Case Number/Court: 4:15-cv-00019-LAB (D. Ariz.)

Status: The Court entered Judgement in accordance with its March 31, 2018 Order remanding the 10(j) Rule. The Service shall issue a final, revised 10(j) Rule within 25 months.

Plaintiffs: AZ and NM Coalition of Counties for Stable Economic Growth et al (18 plaintiffs)

Defendants: US Fish and Wildlife Service; Secretary of the Interior; Dan Ashe; Benjamin Tuggle

Intervenors: None

Allegation: Violations of APA, NEPA, Regulatory Flex Act. E.O. 12898 in implementing the Record of Decision/FEIS and 2015 10(j) Rule

Date NOI Filed: No NOI filed

Date Complaint Filed: February 12, 2015

Case Number/Court: 4:15-cv-00179-FRZ (D. Ariz.)

Status: Consolidated with District of Arizona case 4:15-cv-00019-JGZ

Plaintiffs: Wild Earth Guardians; New Mexico Wilderness Alliance; Friends of Animals

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

Intervenors: None

Allegation: Violation of ESA for not considering essential status for Mexican wolves; Violation of NEPA for not assessing revisions to final rule

Date NOI Filed: March 24, 2015

Date Complaint Filed: July 2, 2015

Case Number/Court: 4:15-cv-00285-JGZ (D. Ariz.)

Status: Consolidated with District of Arizona case 4:15-cv-00019-JGZ

Plaintiffs: Safari Club International

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

Intervenors: Center for Biological Diversity, Defenders of Wildlife (Defendants)

Allegation: Violations of ESA, APA, and NEPA promulgating the 2015 10(j) Rule and FEIS/ROD

Date NOI Filed: August 3, 2015

Date Complaint Filed: October 16, 2015

Case Number/Court: 4:16-cv-00094-JGZ (D. Ariz.)

Status: The Court entered Judgement in accordance with its March 31, 2018 Order remanding the 10(j) Rule. The Service shall issue a final, revised 10(j) Rule within 25 months.

Plaintiffs: New Mexico Department of Game and Fish

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

Intervenors: Center for Biological Diversity, Defenders of Wildlife, WildEarth Guardians, New Mexico Wilderness Alliance (Defendants)

Allegation: Violations of State law and APA by failing to obtain importation and release permits

Date NOI Filed: N/A

Date Complaint Filed: May 20, 2016

Case Number/Court: 1:16-cv-00462-WJ-KBM (D. N.M.)

Status: The Parties stipulated to a voluntary dismissal of this case on March 19, 2018.

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

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/Court: 4:18-cv-00047-BGM (D. Ariz.)

Status: Ongoing

Plaintiffs: WildEarth Guardians, Western Watersheds

Defendants: Secretary of the Interior, Acting Director of the US Fish and Wildlife Service, US Fish and Wildlife Service

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 and 12/15/17

Date Complaint Filed: 1/30/18

Case Number/Court: 4:18-cv-00048-JGZ (D. Ariz.)

Status: Consolidated with District of Arizona case 4:18-cv-00047-BGM

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 is being revised to address the provisions of the revised 2015 10(j) Rule and Mexican Wolf Recovery Plan, First Revision. Signatories of the current MOU included AGFD, USDA-Forest Service, USDA-WS, WMAT, and the Service, as well as the cooperating counties of Gila, Graham, Greenlee, and Navajo in Arizona and the Eastern Arizona Counties Organization (ECO). A copy of this MOU can be found at *https://www.fws.gov/southwest/es/mexicanwolf/*.

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 2017 report is included as PART B of this document. Monthly MWEPA project updates are available at *https://www.fws.gov/southwest/es/mexicanwolf* or you may sign up to receive them electronically by visiting *http://www.azgfd.gov/eservices/subscribe.shtml*. Additional information about the management of wolves in the MWEPA can be found on the Service's web page at: *https://www.fws.gov/southwest/es/mexicanwolf* or AGFD's web page at: *https://www.azgfd.com/wildlife/speciesofgreatestconservneed/mexicanwolves/*

In 2018, the White Mountain Apache Tribe was awarded the Service's Recovery Champion award. The Service presents this honor to a person or group who has contributed substantially to the recovery of an endangered or threatened species.

Regional Director Amy Lueders presents Cynthia Dale and her team the Recovery Champion Award at the Native American Fish and Wildlife Society national conference. Photo credit: U.S. Fish and Wildlife Service

5. COOPERATIVE AGREEMENTS

In 2018, the Service funded cooperative agreements with AGFD, the Mexican Wolf Fund, TESF, The Living Desert, University of Idaho, University of New Mexico, and WMAT. The Service also provides funding to AGFD through section 6 of the Act, which requires 25% percent matching funds from Arizona. These agreements convey funding for the monitoring and management of captive and wild Mexican wolves (AGFD, TESF, The Living Desert, and White Mountain Apache Tribe), administration and facilitation of recovery planning and implementation efforts (Mexican Wolf Fund), and genetic analysis and preservation of biomaterials (University of Idaho and University of New Mexico).

Cooperator	**USFWS Mexican Wolf Project Funds Provided in 2018**
AGFD	$ 233,328
Mexican Wolf Fund	$ 40,000
TESF	$ 35,000
The Living Desert	$ 30,000
University of New Mexico	$ 15,000
University of Idaho	$ 17,000
White Mountain Apache Tribe	$ 225,000

In addition to the above agreements, the Service also provided funding for several miscellaneous contracts for veterinary, helicopter, mule packing and other services. For more information on Program costs to date visit *https://www.fws.gov/southwest/es/mexicanwolf/*

6. MEXICAN WOLF/LIVESTOCK COUNCIL

The Service, in cooperation with the National Fish and Wildlife Foundation, established the Mexican Wolf /Livestock Interdiction Trust Fund (Fund) on September 23, 2009. The objective of the Interdiction Fund is to generate long-term funding for prolonged financial support to livestock operators within the framework of conservation and recovery of Mexican wolf populations in the Southwest. Funding will be applied to initiatives that address management, monitoring, and other proactive conservation needs for Mexican wolves as they relate to livestock, including alternative livestock husbandry practices, grazing management alternatives, livestock protection, measures to avoid and minimize depredation, habitat protection, species protection, scientific research, conflict resolution, compensation for damage, education, and outreach activities.

The following table reflects disbursements of funds associated with the Fund from its initiation through the end of 2018. The Council continued implementation of its strategic plan, approved in 2014, focusing on reducing livestock/wolf conflicts and the need for management removals of depredating or nuisance wolves. More information can be found at *http://www.coexistencecouncil.org/*

Year	Direct Compensation for Livestock Lost	Payments for Wolf Presence	Total
2011	$18,181	N/A	$18,181
2012	$22,600	N/A	$22,600
2013	$27,594	$85,500	$113,094
2014	$63,724	$85,500	$149,224
2015	$107,703.90	$87,300	$195,003.90
2016	$73,826.18	$105,000	$178,826.18
2017	$59,213.02	$107,000	$166,213.02
2018	$109,123.38	2018 Payments TBD	TBD

Note, in 2017 the Arizona Livestock Loss Board (AZLLB) began providing direct compensation for livestock lost to wolf depredation in Arizona. The amount listed for 2018 accounts for $91,273.38 provided to livestock producers in New Mexico via the Mexican Wolf/Livestock Council, as well as $17,850 provided to producers in Arizona via the AZLLB.

7. LITERATURE CITED

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

US 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.

US 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.

US 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.

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

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

US Fish and Wildlife Service, 2017. Mexican Wolf Recovery Plan, First Revision, US 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, 2018

Mexican wolf with an elk carcass. Photo credit: Interagency Field Team

Prepared by:
Arizona Game and Fish Department, U.S. Department of Agriculture - Animal and Plant Health Inspection Service - Wildlife Services, U.S. Fish and Wildlife Service, U.S. Forest Service, and White Mountain Apache Tribe

Lead Agencies:
Arizona Game and Fish Department (AGFD)
USDA-APHIS Wildlife Services (USDA-WS)
U.S. Fish and Wildlife Service (USFWS)
U.S. Forest Service (USFS)
White Mountain Apache Tribe (WMAT)

The 2018 annual report reflects the 2018 population parameters published in the 2017 annual report addendum (http://www.fws.gov/southwest/es/mexicanwolf/recoverydocuments.html).

1. INTRODUCTION

This report summarizes the results of Mexican Wolf Interagency Field Team (IFT) activities during 2018. The Mexican Wolf Reintroduction Project (Reintroduction Project) is part of a larger recovery program that is intended to reestablish the Mexican wolf (*Canis lupus baileyi*) within its historical range.

The 2017 Mexican Wolf Recovery Plan, First Revision (Recovery Plan) establishes several important matrixes for the project to measure relative to progress towards recovery. First, the recovery criteria call for an average of 320 wolves over 8 years in the United States population. Thus, a growing population is an important measure of success. Miller (2017) scenarios with mean adult mortality rates less than 25%, combined with mean sub-adult mortality rates less than 33% and mean pup mortality (for radio-marked pups greater than 4 months old) less than 13% 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 rates. Thus, adult mortality rates will be an important metric for evaluation of the project. Finally, the recovery criteria 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 project will need to continually monitor releases from captivity and monitor the successful incorporation of animals into the population.

The Reintroduction Project is conducted in accordance with a nonessential experimental population Final Rule (USFWS 2015; 2015 10(j) Rule). This rule expanded the Mexican Wolf Experimental Area (MWEPA) south of Interstate 40 to the United States-Mexico border, discontinued the designation of the Blue Range Wolf Recovery Area and White Sands Wolf Recovery Area, and established three management areas (Zone 1, 2, and 3; Figure 1) south of Interstate 40 in Arizona and New Mexico. These new designations resulted in a fourfold increase in suitable habitat that Mexican wolves can occupy (Zones 1-3) and a tenfold increase in areas that Mexican wolves can be released and/or translocated (Zone 1-2). Zone 1 includes all of 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 White Mountain Apache Tribe (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 (6,319 km^2) of area that wolves may occupy.

In March 1998, the first release of Mexican wolves occurred on the Alpine and Clifton Ranger Districts of the Apache-Sitgreaves National Forest, Arizona. From these humble beginnings, the wild population minimum count increased to 131 wolves in 2018. More information on population metrics can be found at:

http://www.fws.gov/southwest/es/mexicanwolf/ and
http://www.azgfd.gov/w_c/es/wolf_reintroduction.shtml

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 (> two years old)

F = adult female (> two years old)

m = subadult male (one - two years old)

f = subadult female (one - two years old)

mp = male pup (< one year old)

fp = female pup (< one year old)

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.

Veterinarian Susan Dicks examines a Mexican wolf pup at a 2018 cross-foster event. Photo credit: U.S. Fish and Wildlife Service

2. METHODS AND RESULTS

a. Population Status

Breeding pair: a pack that consists of an adult male and female and at least one pup of the year surviving through December 31.

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, retains the pack name.

New pair: a male and female wolf, traveling together for one month, that are likely to form a new pack.

Population count

The year-end population count (population or population count) is derived from information gathered through a variety of methods that are deployed annually by the IFT from November 1 through the year-end helicopter operation. The IFT continued to employ comprehensive efforts initiated in 2006 to make the 2018 year-end population estimate more accurate, consistent and repeatable. Management actions implemented to document Mexican wolves included: surveys and focus on trapping for uncollared wolves, greater coordination and investigation of wolf sightings provided through the public and other agency sources, deployment of remote trail cameras (blind and scented), and utilizing howl surveys and food caches in conjunction with remote cameras in areas of suspected uncollared wolf use.

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 2019, aircraft were used to document free-ranging wolves for the 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 2018 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 is not counted in the population count). During the end of year 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 target animals (e.g. uncollared wolves, injured wolves, or wolves with failed or old collars) where the terrain and land status allowed.

As part of the 2018 population count, the IFT coordinated with and surveyed members of the local public to identify possible wolf sightings. Ranchers, private landowners, wildlife managers, USFS personnel, and other agency cooperators were contacted to increase wolf sighting data for the database. All such sightings were reviewed by the IFT to determine those that most likely represented unknown wolves or packs for purposes of completing the population count.

A sedated Mexican wolf is fitted with a new radio collar during the 2018 Mexican wolf count and capture. Photo credit: Interagency Field Team

Documentation of wolves or wolf sign, obtained through the above methods, was also used to guide IFT efforts to trap uncollared single wolves or groups of wolves. The IFT objective was to have at least one member of each pack collared. However, these various methods also allowed the IFT to count uncollared wolves not associated with collared wolves.

At the end of 2018, the minimum population count was 131 wolves, which was a 12% increase from the previous year's population (n = 117). Pups comprised 34% of this population, which is higher than the previous year (23%). Fifteen packs were considered breeding pairs in 2018, compared to thirteen in 2017.

At the beginning of 2018, the functioning collared population consisted of 65 wolves among 23 packs and nine single wolves. At the end of the year, the population consisted of 77 collared wolves among 26 packs, seven new pairs and six single wolves documented, which was an overall increase from 2017 (Table 1). A total of 54 uncollared and/or failed collared wolves were documented in the MWEPA at the end of 2018 (*note: all of the uncollared wolves captured during the January and February 2018 helicopter operation were included as uncollared animals associated with known packs above;* Table 1).

The IFT documented two uncollared single wolves (one in Arizona and one in New Mexico) and one uncollared pair of wolves (New Mexico) which were not associated with collared packs. Additional uncollared animals were found on the FAIR in 2018. These areas were priorities for IFT trapping efforts in 2019.

b. Reproduction

In 2018, 20 packs exhibited denning behavior which included 8 packs in Arizona (Bear Wallow, Elk Horn, Maverick, Hoodoo, Pine Spring, Prime Canyon, Saffel, and Tsay-O-Ah) and 12 packs in New Mexico (Dark Canyon, Datil Mountain, Frieborn, Hawks Nest, Iron Creek, Lava, Luna, Mangas, Prieto, San Mateo, Sheepherder's Baseball Park [SBP], and Squirrel Springs). Of these packs, all but four (Bear Wallow, Datil Mountain, Hawks Nest, and Squirrel Springs) were confirmed to have produced wild-born litters via observations in 2018. The IFT also cross-fostered a total of eight pups from captivity into four wild wolf dens in Arizona (Elk Horn) and New Mexico (Frieborn, Iron Creek, and Lava). The IFT documented a minimum of 83 pups produced in Arizona (n = 32) and New Mexico (n = 52) with a minimum of 45 surviving in the wild until year-end in Arizona (n = 22) and New Mexico (n = 23), which showed that 54% of the pups documented in early counts survived until the end of the year (Table 1). Of the 16 packs that produced pups in 2018, 15 packs had at least one pup recruited at the end of the year and were considered a breeding pair (Frieborn was not considered a breeding pair due to the death of AM1447). New Mexico pup survival (47%) was lower than that observed in Arizona (69%). All packs at the end of 2018 were formed naturally in the wild.

c. Releases and Translocations

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

Initial Releases: 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 5 month old within Zones 1 or 2. The initial release of pups less than 5 months old into Zone 2 allows for the cross-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 2015 10(j) Rule at http://www.fws.gov/southwest/es/mexicanwolf/pdf/Mx_wolf_10j_final_rule_to_OFR.pdf).

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 2015 10(j) Rule at http://www.fws.gov/southwest/es/mexicanwolf/pdf/Mx_wolf_10j_final_rule_to_OFR.pdf).

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

Diversionary Food Cache: road-killed native prey carcasses or carnivore logs provided to wolves in areas to reduce potential wolf conflicts with livestock and in nuisance scenarios.

In 2018, the IFT initial released eight wolves (cross-fostered wolves) and translocated five wolves, including a wild to wild cross-foster of two pups (Table 2). The IFT conducted five cross-foster events involving five packs (Frieborn, Lava, Iron Creek and Dark Canyon in New Mexico and Elk Horn in Arizona), resulting in the initial release (Table 2, Figure 2) of eight neonatal wolf pups and the translocation of two neonatal wolf pups. Two

pups each were introduced into the Frieborn, Lava, Iron Creek and Elk Horn dens; while two pups were translocated into the Dark Canyon den (1 pup was removed from the Iron Creek and Lava den for this translocation). All had corresponding whelp dates in April and May.

Three wolves were translocated in 2018. Originally, Mangas f1664 was captured by a private trapper, collared and released by the IFT. In late January, f1664 was recaptured and transported to veterinary care, where her leg was amputated. She was released back into the wild from veterinary care in February. Panther Creek AF1339 was captured during helicopter operations in late January and transported to captivity for breeding purposes due to her close relation to her mate (AM1382). AF1339 was released back into the wild in February. M1561 dispersed from his natal pack in June outside of the MWEPA. M1561 was captured and translocated back into the MWEPA in May.

The Frieborn den contained six wild-born pups at the initiation of the cross-foster event. Two cross-fostered pups were added to the litter, resulting in eight pups in the Frieborn den at the conclusion of the cross-foster event. The Lava den contained five wild-born pups at the initiation of the cross-foster event. Two cross-fostered pups were added to the litter and one wild-born pup was removed from the litter to be cross-fostered into the Dark Canyon den, resulting in a total of six pups in the Lava den at the conclusion of the cross-foster event. The Iron Creek den contained five wild-born pups at the initiation of the cross-foster event. Two cross-fostered pups were added to the litter and one wild-born pup was removed from the litter to be cross-fostered into the Dark Canyon den, resulting in a total of six pups in the Iron Creek den at the conclusion of the cross-foster event. The Dark Canyon den contained six wild-born pups at the initiation of the cross-foster event. In accordance with protocol, two wild-born pups, one from the Lava den and one from the Iron Creek den, were translocated into the Dark Canyon den, resulting in a total of eight pups in the Dark Canyon den at the conclusion of the cross-foster event. The Elk Horn den contained five wild-born pups at the initiation of the cross-foster event. Two cross-fostered pups were added to the litter, resulting in a total of seven pups in the Elk Horn den at the conclusion of the cross-foster event. Similar to previous years, the cross-foster events resulted in movement of the den, but did not result in abandonment of the pups by the breeding pair.

Captive-born pups are examined prior to being placed into a wild den during a 2018 cross-foster event. Photo credit: U.S. Fish and Wildlife Service

The IFT collared and confirmed that two of the eight cross-fostered captive-born pups (mp1710 and fp1712) and one of the two cross-fostered wild-born pups translocated into the Dark Canyon den (mp1717) were alive at the end of 2018. Frieborn had a minimum of two surviving pups (fp1702 and one uncollared pup) at the end of 2018. Lava had a minimum of two surviving pups (mp1715 and one uncollared pup) at the end of 2018. Iron Creek had a minimum of three surviving pups (mp1710, fp1712 and fp1721) at the end of 2018, two of which were captive-born cross-foster pups (mp1710 and fp1712). Dark Canyon had a minimum of two surviving pups (mp1717 and one uncollared pup) at the end of 2018 (mp1717 is a wild-born cross-foster originally from the Lava den). Elk Horn had a minimum of three surviving pups (mp1695, fp1696 and fp1697) at the end of 2018. Frieborn, Lava, Iron Creek and Elk Horn packs all received supplemental food caches to assist in raising the pups.

d. Home Ranges and Movements

In 2018, all wolves equipped with radio collars were monitored by standard radio telemetry opportunistically from the ground and air (White and Garrot 1990). In addition, 77 wolves were equipped with Global Positioning Collars (GPS) collars during all or portions of the year to provide more detailed location information and management capability. Visual observations, wolf behavior, evidence of a kill site, associated uncollared wolves, and fresh wolf sign were also noted in association with the locations. Location data was entered into the project's database for analysis.

Willow Springs alpha pair in the Mexican Wolf Experimental Population Area. Photo credit: Interagency Field Team

GPS locations of wolves were used to develop home ranges (White and Garrott 1990). Until 2014, the IFT estimated wolf home range polygons using the minimum convex polygon (MCP) method (White and Garrott 1990). However, kernel methods can provide more accurate home range estimates than MCP models (Seaman and Powell 1996) and are robust to variation in the number of locations used to create the home range (Seaman et al. 1999). Thus, kernel density estimates were used to generate home range polygons for 2018.

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. During 2018, the number of individual locations used ranged from 110 to 626 locations. 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). Breeders were selected to represent the territorial behavior of the pack with preference given to the breeding female. All known packs used to create home range estimates in 2018 had at least one breeder with a GPS collar throughout the year. To maximize sample independence, 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), GPS locations were right censored to avoid extra territorial movement. Home ranges were not calculated for wolves that displayed dispersal behavior or exhibited non-territorial behavior during 2018. Individual point selection was accomplished with program R (R Core Team 2015). Home range and core use polygons were generated using the 95% and 50% adaptive kernel method (Seaman and Powell 1996) with R and the adehabitatHR package in conjunction with ArcPro (Calenge 2019, ESRI 2018).

During 2018, the IFT calculated home ranges and core use areas for 24 packs or pairs exhibiting territorial behavior. These home ranges ranged from 57 square miles for the Dark Canyon pack to 552 square miles for the Tsay O Ah pack, with an average home range size of 210.1square miles. (Figure 3, Table 3).

e. Occupied Range

Occupied wolf range was calculated based on the following criteria: (1) a ten mile (16 km) radius around all aerial locations or GPS locations of radio monitored wolves over the past year; (2) a ten mile (16 km) radius around all uncollared wolf locations and wolf sign over the past year; and (3) in accordance with the 2015 10(j) Rule, occupied range does not include tribal lands or areas in Zone 3 (Figure 4).

Mexican wolves occupied 18,886 mi^2 (48,914 km^2) of the MWEPA during 2018 (Figure 4). In comparison, Mexican wolves occupied 17,431 mi^2 (45,147 km^2) of the MWEPA during 2017. Mexican wolf population continues to illustrate a general upward trend in occupied range area.

f. Mortality

Wolf mortalities were identified by the IFT 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 agents and necropsies were conducted to determine proximate cause of death (Table 4, Table 5). The IFT has documented 171 wolf mortalities in the wild since 1998 (Table 4), 21 of which occurred in 2018 (Table 4 and 5). Thirteen of the twenty-one documented wolf mortalities were considered illegal (M1569, AF1339, AF1335, fp1691, M1676, M1561, f1664, M1486, AM1447, AM1038, m1680, F1565, and AF1473). Two of the twenty-one documented wolf mortalities were caused by a vehicle collision (M1572 and mp1661). Three of the twenty-one documented wolf mortalities died from natural causes (AM1386, mp1793 and fp1826). Cause of death could not be determined for three of the twenty-one documented wolf mortalities (F1484, AM1343 and M1330). All causes of death should be considered a minimum estimate of mortality, since pups and uncollared wolves may die without those mortalities being documented by the IFT.

For wolves equipped with radio collars, mortality, missing, and removal rates were calculated using methods presented in Heisey and Fuller (1985). Wolves not located or 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. The IFT calculated annual cause-specific mortality rates (i.e. human-caused versus natural/unknown

mortality) for the population. Management removals can have an effect equivalent to mortalities on the free-ranging population of Mexican wolves (Paquet et al. 2001). Thus, the IFT also calculated yearly cause-specific removal rates for wolves equipped with radio collars. Wolves are removed from the population for four primary causes: (1) cattle depredations, (2) nuisance to humans, (3) wolves are north of I-40, and (4) other (e.g., pair with other wolves, veterinary treatment, move 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). The IFT calculated an overall failure rate of wolves in the wild 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 through time and thus do not represent a consistently monitored or observed sample of animals (e.g., many 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 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).

Six wolves last located in Arizona (m1672, AF1042, AM1382, mp1694, mp1698, and mp1693) and thirty wolves last located in New Mexico (fp1724, mp1723, mp1725, fp1726, fp1727, fp1728, mp1729, mp1690, fp1692, mp1699, fp1700, fp1701, fp1703, mp1704, mp1719, mp1720, fp1722, mp1711, fp1713, mp1714, mp1715, mp1716, mp1717, mp1718, f1670, AM1155, AM1284, mp1667, fp1682 and M1455) were listed as fate unknown (e.g., not observed via sightings, remote cameras, or radio telemetry for >3 months during portions of 2018. Two previously fate unknown wolves (AF1444, AM1349) were captured and re-collared in 2018. The majority of the wolves listed as fate unknown during 2018 were neonatal pups documented during cross-foster events. These individuals were never subsequently captured and collared during 2018; thus, were listed as fate unknown.

The IFT monitored 101 individual wolves equipped with radio collars for 26,106 radio days during 2018. Thirty-one wolves equipped with radio collars were considered removed (n = 4), dead (n = 19), or missing (n = 8). Uncollared animals or wolves with failed collars that were documented dead or removed (fp1691 and M1330) were not included in this analysis (See Table 5 for information on these animals). Four (AM1284, mp1667, fp1682, and m1672) of the eight wolves that went missing in 2018 were considered to have gone missing under questionable scenarios without documentation as being alive later in the year.

The overall survival rate was 0.6854 with a corresponding failure rate of 0.3146. The overall failure rate was composed of human caused mortality rate (0.1632; n = 14), natural mortality rate (0.0350; n = 3), unknown/awaiting necropsy mortality rate (0.0233; n = 2), boundary removal rate (0.0117; n = 1), missing wolves rate (0.0466; n = 4), cattle depredation removal rate (0.0117; n = 1), nuisance removal rate (0.00; n = 0), and other removal rate (0.0233; n = 2). Much of the mortality was concentrated on sub-adult (radio days = 8,087, failures = 12, survival rate = 0.5816), and pup (radio days = 2497, failures = 4, survival rate = 0.551) components of the population relative to the adults (radio days = 15,522, failures = 11, survival rate = 0.7720).

g. Wolf Depredation

Depredation: confirmed killing or wounding of lawfully-present domestic animals by one or more Mexican wolves.

Depredation incident: means 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 pursuant to Standard Operating Procedure (SOP) 11.0.

USDA-WS Wolf Specialists investigated suspected wolf depredations on livestock, including dead and injured livestock located by the IFT, within 24 hours of receiving a report unless extremely rare circumstances prevented arrival within 24 hours. Not all dead livestock were found, or found in time to document cause of death. Accordingly, depredation numbers in this report represent the minimum number of livestock killed by wolves.

From 1998 to 2017, the mean number of cattle confirmed killed by wolves per year is 19.6, which extrapolates to 31.6 cattle killed per year per 100 Mexican wolves. The mean of 31.6 cattle killed per year per 100 wolves is useful for comparison purposes in 2018.

Mean IFT response time between the reporting of an incident to the initiation of an on-site investigation was < 24 hours. Of the 114 investigations determined to be wolf-related (confirmed or probable; Table 7), 104 cattle deaths (four investigations had two dead cattle at the scene; Table 7) were confirmed as wolf depredations, seven cattle deaths were probable wolf depredations, three injured cattle were confirmed as being wolf related, and one cattle injury had probable wolf involvement (Table 6). Two dog injuries were confirmed as wolf related and one dog death was confirmed wolf related in 2018. Seventy-one percent (n = 81) of the 114 investigations determined to be wolf related occurred in New Mexico and 29% (n = 33) occurred in Arizona (Table 7).

New Mexico livestock owners applied to the Mexican Wolf /Livestock Council for 63 confirmed cattle deaths and 4 probable cattle deaths (67 out of 86 animals), and received $84,545.50 in compensation. Of the 67 cattle that were applied for, 35 were cows (52%), 28 were calves (42%), and 4 were bulls (6%). Arizona livestock owners applied to the Arizona Livestock Loss Board for 23 cattle deaths and one dog death (24 out of 29 killed animals killed in AZ by wolves) and received $30,504.01 in compensation.

The depredation rate for 2018 extrapolates to 79.4 confirmed killed cattle per 100 wolves using the number of confirmed killed cattle (n = 104; Table 7) compared to the final population count (n = 131). The 2018 rate is well above the previous 20 year (1998-2017) recovery program mean of 31.6 confirmed killed cattle/100 wolves/year, and well above the 2016 and 2017 rate of 43.4 and 30.8 confirmed killed cattle/100 wolves, respectively.

h. Management Actions

Turbo Fladry: electric fence with colored flagging installed around livestock pastures and private property to discourage wolf presence inside the perimeter of the fencing.

Hazing: means utilizing human presence, rubber bullets, pyrotechnics or other combinations of light and sound to scare the wolves from an area.

The IFT hazed wolves 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 if found feeding

on, chasing, or killing livestock. When necessary, the IFT used electrical charged turbo fladry, Radio Activated Guard (RAG) boxes and less than lethal munitions (e.g., rubber bullets, cracker shells) to encourage an aversive response to humans and to discourage nuisance and depredation behavior. The IFT captured wolves with foot-hold traps to collar or remove wolves from the wild for specific management purposes. In addition, wolves that established outside the MWEPA were captured and brought back into the MWEPA or temporarily held in captivity, per the 2015 10(j) Rule. One wolf (m1561) was translocated back into the MWEPA from north of I-40 under this provision in 2018.

In 2018, 53 different wolves were captured and/or removed a total of 56 times (Table 8). Twenty-five wolves were captured, collared for the first time, processed, and released on site for routine population monitoring purposes by the IFT (Table 8). Twenty-three wolves were captured, re-collared, processed and released on site, or simply released on site with the current collar by the IFT (Table 8). In addition, five wolves were captured by private trappers within the MWEPA. Two of these wolves were re-collared, processed and released on site by the IFT with no further issues. Three wolves that were captured by private trappers had to receive medical treatment or examination. Of these three wolves, two had the trapped leg amputated and one died while in veterinary care. In addition, one wolf was lethally removed from the wild, and two were placed into captivity (one of which was later translocated into the wild).

In 2018, the IFT investigated 33 reported instances of nuisance behavior (Table 9). The investigations were classified as in response to reports of potential wolves: near human dwellings/near people (n = 23), unacceptable behavior around humans (n = 2), and chasing/harassing/attacking livestock or pets (n = 8). Of the 33 reports, the IFT determined that 23 were likely or known to involve Mexican wolves (70%; Table 9). 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 on reported nuisance problems. Hazing was used to move wolves away from residences and livestock. Carcasses and other attractants were removed from residential areas when appropriate.

i. Proactive Management Activities

Permittee Flight Calls: Permittees with grazing allotments within occupied wolf range in Arizona and New Mexico that contact the IFT and request regular wolf location information are called every other week (after current GPS data is collected and posted online) and provided general wolf locations that occurred on or near their allotment. The same wolf location information is used to update the public internet-based public location map. The IFT notified permittees of wolf locations in areas where depredations were occurring more frequently than every other week.

Hay and Supplements: feed and mineral supplements purchased for livestock producers who opt to hold livestock (e.g. cows with young calves) on private property during livestock calving season or wolf denning periods in an effort to reduce the potential for conflict between wolves and cattle on grazing allotments or other private property.

Range Riders: contract employees with radio telemetry equipment who assist livestock producers in monitoring wolf movements in relation to livestock, providing human presence and conducting hazing to deter wolves away from cattle. Range riders without telemetry equipment provided additional human presence to deter wolves.

Altering Livestock Grazing Rotations: moving livestock between different pastures within USFS grazing allotments in order to avoid areas of high wolf use or depredations.

Exclusionary Fencing: eight-foot-high fence enclosing areas of private property for the purposes of protecting especially vulnerable animals or to address other specific property protection purposes.

Radio Telemetry Equipment: radio collar monitoring equipment used by the IFT and in some cases 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 used various proactive management activities in an attempt to reduce wolf-livestock conflicts in the MWEPA during 2018. Proactive management approaches and tools available to the IFT included diversionary food caches, turbo fladry, and hazing (defined in previous sections), as well as all of the other items listed above

The IFT, working with Non-Governmental Organizations (NGOs), used proactive management to assist in reducing wolf-livestock conflicts in the MWEPA (Table 10). The Reintroduction Project and NGOs spent approximately $154,000 on proactive management activities affecting an estimated 11 grazing allotments in Arizona and 7 in New Mexico. The IFT, agency contract employees, and NGO contract employees spent over 10,000 hours implementing proactive management activities during 2018. In addition, the Mexican Wolf/Livestock Council distributed $107,000 in 2018 to 55 applicants in Arizona (n = 27) and New Mexico (n = 28) to partially offset increased management costs (conflict avoidance) and other uncompensated cost (e.g., undetected kills, reduction of livestock weight gain/reproductive rates) to livestock producers in areas occupied by wolves during 2017 for the payment for wolf presence program.

The agencies and NGOs purchased hay and supplements during the calving season for one rancher in Arizona to help prevent conflict between wolves and livestock. Project personnel met with U.S. Forest Service District Rangers, biologists, and range staff to discuss livestock management options during the wolf denning season. The IFT coordinated with the Alpine, Black Mesa, Black Range, Clifton, Glenwood, Lakeside, Magdalena, Quemado, Reserve, Springerville, and Wilderness Ranger Districts and permittees in Arizona and New Mexico to address potential conflicts between livestock and wolves. In several cases, livestock were scheduled to graze in or near pastures where wolves were denning. In pursuing efforts to reduce interactions between livestock and denning wolves, the Districts and permittees changed pasture rotations and moved livestock into alternate pastures during the denning season, where possible. The suggested livestock movements were voluntary for the permittees.

During 2018, the Reintroduction Project and NGOs contracted 15 range riders (9 in Arizona, and 6 in New Mexico) to assist 13 stakeholders in monitoring wolves in proximity to cattle. Range riders monitored approximately 18 allotments within 17 wolf pack home ranges and one uncollared/failed collar group of wolves. Range riders provided additional oversight of livestock and hazing of wolves when they were among or in close proximity to livestock. Forty three confirmed depredation incidents occurred on monitored allotments while ranger riders were under contract (Table 10). Nineteen of these incidents were associated with uncollared or failed collared wolves. Range riders and project personnel have difficulty effectively preventing depredations from uncollared wolves because hazing and moving cattle are ineffective if wolf locations cannot be determined by ground triangulation techniques due to the lack of a functioning collar.

The IFT issued/maintained radio telemetry equipment for livestock producers or residents (12 in Arizona, 15 in New Mexico) in areas where wolf-livestock conflicts or nuisance scenarios were prevalent. Most of these equipment loans were in association with range riders. 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.

Diversionary food caches were established to reduce potential conflicts between wolves and livestock and are deployed primarily in areas where depredations have occurred in the past. Diversionary food caches were established for nine packs during 2018. In New Mexico, diversionary food caches were established to reduce depredations within the territories of Luna, Mangas, Prieto, Squirrel Springs and San Mateo packs. In Arizona, diversionary food caches were established within the territories of Saffel, Pine Springs, Hoodoo, and Prime Canyon packs. Four additional diversionary food caches were established in uncollared areas. Supplemental food caches were established in association with cross-fostering activities for the Elk Horn, Frieborn, Iron Creek, and Lava packs. These supplemental food caches can also act as diversionary food caches by reducing the potential wolf-livestock conflict.

j. Non-IFT Wolf Reports

In 2018, the IFT received a total of 74 wolf reports from the public. Of the 74 sighting reports, the IFT determined 59 reports were non-wolf sightings (80%; coyote, dogs, etc.), four reports were sightings of known wolves (5%) and 11 reports were likely uncollared/unknown wolves (15%). The public is encouraged to report Mexican wolf sightings, howling, or tracks to help the IFT locate undocumented wolves and track movements of wolves to 1-888-459-WOLF (9653) within and around the MWEPA.

In 2018, the IFT targeted 18 areas in Arizona and New Mexico (Figure 2) in an effort to document and/or radio collar unknown wolves in and around the MWEPA. The 18 areas were chosen based on uncollared wolf sign, public wolf reports, and areas without established wolf packs. The IFT documented wolves in seven of the targeted areas and captured wolves in one area (Figure 2, Table 11). These efforts resulted in seven wolves being added to the 2018 population count, inclusive of: the Squirrel Springs pack, four uncollared wolves in New Mexico and one uncollared wolves in Arizona.

k. Public Outreach

The IFT outreach efforts affirm the Reintroduction Project commitment to engage in effective communication, identify various outreach mechanisms, and standardize certain outreach activities. These goals help ensure timely, accurate, and effective two-way communication between and among cooperating agencies and the public. Project personnel conducted outreach activities 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 monthly updates, internet-based Mexican wolf location maps, permittee flight calls, field contacts, handouts, presentations, meetings, field trips and workshops, informational display booths, web page updates, fielding information requests, conversations with the public while recording public wolf reports, responding to the public during phone conversations and emails. IFT personnel also provided formal presentations at local livestock producer meetings.

During 2018, the IFT posted Mexican Wolf Reintroduction Project monthly updates within the MWEPA once each month at places such as USFS offices, U.S. post offices, community centers, libraries, and some local businesses. These monthy updates were also posted on the AGFD Mexican wolf web site at http://www.azgfd.gov/w_c/es/wolf_reintroduction.shtml and the USFWS Mexican wolf web site at http://www.fws.gov/southwest/es/mexicanwolf. Interested individuals could sign up to receive the monthly update electronically by visiting the AGFD web site at http://azgfd.gov/signup.

The IFT also produced a wolf location map every two weeks to inform cooperators and the public of areas occupied by wolves. The map was posted online at http://arcg.is/0iGSGH or http://www.fws.gov/southwest/es/mexicanwolf/RWL.cfms.

The IFT made contact with campers, hunters, and other members of the public within the MWEPA and provided them with information about the Reintroduction Project. These contacts 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 2015 10(j) Rule. The IFT also used these contacts to collect information on wolf sightings, tracks and scats from the public.

The IFT provided a total of 35 presentations and status reports to federal and state agencies, conservation groups, rural communities, schools, wildlife workshops, and various other public, private, and tribal institutions throughout Arizona, New Mexico, and White Mountain Apache Tribal lands. In addition, biweekly contacts were made to cooperating agencies and stakeholders to inform stakeholders of wolf locations. Mexican Wolf Reintroduction Project monthly updates were emailed to a mean of 17,090 people per month. The AGFD Mexican wolf website was visited 9,553 times during 2018. The AGFD interactive map was viewed an average of 782 times per month. Outreach presentations can be scheduled by contacting the IFT at 1-888-459-WOLF (9653).

The IFT maintained metal signs and laminated posters that provided information on how to minimize conflicts with wolves using available USFS kiosks and various road pullouts within the MWEPA in 2018. The IFT also maintained USFWS reward posters at USFS kiosks and local businesses in the MWEPA, to provide notice of a $10,000 reward for information leading to the apprehension of individuals responsible for illegally killing Mexican wolves.

Mangas pup in the Mexican Wolf Experimental Population Area. Photo credit: Interagency Field Team

2. SUMMARY AND DISCUSSION

The IFT documented a minimum of 131 Mexican wolves in the MWEPA at the end of 2018 (Figure 5; Table 1), and a minimum of 15 breeding pairs (Table 1). The minimum total number of pups alive at the end of the year was higher (n = 45; Table 1) than the previous year (n = 26) and pup survival (percent of pups alive of the total produced) was 54% at the end of the year. The number of known mortalities was higher (n = 21) than our previous stable trend; 11, 13, 14, and 12 in 2014, 2015, 2016, and 2017, respectively (Table 4). These population metrics were more similar to 2016 rather than 2017. The result was a continuation of the population growth observed from 2009 to 2014 (Figure 6). Canine distemper continued to be documented in the population in 2018. However, pup survival did not appear to be impacted relative to the long term trend of approximately 50% of the pups surviving from initial documentation until the end of the year. Our expectation of population growth in 2018 if pup recruitment was higher than 2017 was accurate despite higher mortality rates.

Based on meta-analysis of gray wolf literature, Fuller et al. (2003) identified a 0.34 mortality rate as the inflection point of 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 an overall failure (mortality plus removal plus missing rate) rate of 0.3146 in 2018. Following Fuller et al. (2003), our failure rate would predict an increasing population which was the case in 2018. Further, Miller (2018) found that population growth was particularly sensitive to adult failure rates, which were lower in our population (0.228) than other age classes (sub-adults 0.418, pups 0.449) in 2018. The increase in the population was likely due to the number of pups recruited increasing from 26 (2017) to 45 (2018), rather than low failure rates. While the number of management removals has remained low in the recent past, the majority of the population losses in 2018 were due to either human-caused mortalities or missing animals rather than management removals. Fifteen wolves died because of human-causes (thirteen of which were illegal mortalities), three were unknown, and three died of natural causes. Efforts to reduce the level of illegal mortality will continue to be a priority in 2019.

The 2018 confirmed killed cattle rate of approximately 79.4 depredations/100 wolves and is substantially higher than the previous 20-year recovery program mean of 32 confirmed killed cattle per 100 wolves. This is the highest rate observed during the entirety of the project (note: previous highs of approximately 50 depredations/100 wolves occurred in 2005, 2006, and 2015). It is important to note the standard for extrapolating the annual confirmed killed cattle rate/100 wolves uses the end of year population count, which does not include wolves that died or were removed during 2018. Thus, the confirmed killed cattle rate per 100 wolves underestimated the denominator, which inflates the total rate. Our goal is to maintain the depredation rate at or below the long-term average, which did not occur in 2018. The IFT will continue to implement a variety of proactive and reactive methods to reduce the depredation rate in 2019.

Initial results from the Mexican Wolf Reintroduction Project has demonstrated that cross-fostering is successful in releasing captive wolves that survive to breeding age. The IFT has conducted cross-fostering on 11 occasions, totaling 22 pups with 18 of these being moved from captive litters into wild dens. In 2014, the IFT fostered two pups from one wild litter (note: this litter was the result of a captive female breeding with a wild male in captivity and subsequent release in the spring; the male and female separated prior to the production of pups) to another wild litter. Both of the pups survived to breeding age (AF1346 and AM1347), paired, and produced pups with other wolves in the wild. In 2016, the IFT fostered six pups from three captive litters

into three wild litters (two pups into each wild litter) and documented that a minimum of two survived (AM1471 and an uncollared pup) to the end of the year. AM1471 survived to breeding age and raised pups that survived to the end of 2018. In 2017, the IFT fostered four pups from two captive litters into two wild litters (two pups into each wild litter). One cross-fostered pup, f1578, was radio collared in 2017 and formed a pair with another wolf by the end of 2018; pups from the other cross-fostered pack did not survive to the end of the year. In 2018, the IFT fostered eight pups from four captive litters into four wild litters (two pups into each litter) and moved two wild pups from their natal den to a recipient wild litter. Two of the eight cross-fostered captive born pups (m1710 and f1712 of Iron Creek) were confirmed alive and radio collared at the end of 2018. In addition, a pup from the wild-to-wild cross foster operation was confirmed alive and radio collared (mp1717 [Dark Canyon]) at the end of 2018. Collectively, these results indicate that: (1) in all 11 cross-fostering events (inclusive of 2018), human disturbance at the den site resulted in the adult wolves moving the den a short distance, but did not result in abandonment of the pups; (2) a minimum of 8 of the 22 cross-fostered pups from 2014 - 2018 survived to the end of the year; (3) 4 of 12 cross-fostered animals that would be old enough to be considered "breeding age" are known to be surviving at the end of 2018; and (4) all 4 cross-fostered animals that are known to have reached breeding age have formed packs and either successfully contributed genetically to the population (bred and raised pups) or are likely to contribute in the future, which is the ultimate goal of all release strategies. Collectively, these results are encouraging and suggest that the Mexican Wolf Recovery Program should continue to use cross-fostering as a strategy to manage genetic diversity of Mexican wolves in the wild. In addition, the survival rates of cross-fostered pups are consistent with that of wild Mexican wolf pups.

A higher adult mortality rate, offset by the high number of pups that survived to December 31, resulted in relatively high population growth (12% in 2018). Thus, the population met the management objective for 2018 of a 10% increase in the population count and/or the addition of at least two breeding pairs. However, the project did not reduce the depredation rate in 2018. The Reintroduction Project management objective for 2019 is a 10% increase in the minimum wolf population counts and/or the addition of at least two breeding pairs through natural pairing of wild wolves, while minimizing negative impacts of wolves and building social tolerance of Mexican wolves among stakeholders within the MWEPA.

The IFT will continue to strive towards meeting the recovery criteria outlined in the 2017 Mexican Wolf Recovery Plan, First Revision through cross-fostering efforts and population growth through wild reproduction. Recovery criteria related to population abundance in the United States requires an average of 320 Mexican wolves over an eight year period; recovery criteria related to the genetic health of the wild population in the United States requires 22 released wolves (released during or after 2016) to survive to breeding age. At the end of 2018, 1 released wolves counted toward the genetic criterion (AM1471; 1 of 6 pups cross-fostered in 2016), and one wolf appeared likely to hit the two year threshold early in 2019 (F1578; 1 of 4 pups cross-fostered in 2017).

4. 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. Environmental Systems Research Institute, Redlands, California.

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.

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.

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

Metz, M. C., D. W. Smith, J. A. Vucetich, D. R. Stahler, and R. O. Peterson. 2012. Seasonal patterns of predation for gray wolves in the multi-prey system of Yellowstone National Park. Journal of Animal Ecology 81:553-563.

Mexican Wolf Blue Range Adaptive Management Oversight Committee and Interagency Field Team. 2005. Mexican Wolf Blue Range Reintroduction Project 5-year review. USFWS, 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. URL https://www.R-project.org/

Ruth, T. K., P. C. Buotte, and H. B. Quigley. 2010. Comparing ground telemetry and global positioning system methods to determine cougar kill rates. The Journal of Wildlife Management 74(5):1122-1133.

Sand, J., B. Zimmerman, P. Wabakken, H. C. Pedersen. 2005. Using GPS technology and GIS cluster analyses to estimate kill rates in wolf-ungulate ecosystems. Wildlife Society Bulletin 33(3):914-925.

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.

Singer, F. J., W. Schreier, J. Oppenheim, and E. O. Garton. 1989. Drought, fires, and large mammals. BioScience 39:716-722.

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. USFWS, 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.

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

Table 1. Status of Mexican wolf packs in Arizona and New Mexico, as of December 31, 2018.

Pack	Wolf ID	Reproduction[a]	Pups at year end[b]	Number collared	Number uncollared	Minimum pack size[c]
Baldy	AM1347, F1560, m1672[f]	0	0	2	0	2
Bear Wallow	AM1338, AF1335[e], M1676[e]	0[r]	0	1	0	1
Bluestem	AF1042[f], AM1383[f]	0	0	0	0	0
Copper Creek	M1673, AF1444, AM1386[e]	0	0	2	0	2
Dark Canyon*	AM1354, AF1456, mp1717, fp1724[f], mp1723[f], mp1725[f], fp1726[f], fp1727[f], fp1728[f], mp1729[f]	8[h]	2	2	2	4
Datil Mountain	AM1453, AF1685	0[r]	0	2	0	2
Eagle Creek	M1477	0	0	1	1	2
Elk Horn*	AM1342l, AF1294, M1474[s], m1671, fp1691[e], mp1693[f], f1668, fp1697, fp1696, mp1695, mp1694[f], mp1698[f]	7[h]	3	6	1	7
Frieborn	AM1447[e], AF1443, fp1702	8[h]	2	2	1	3
Hawks Nest	AM1038[e], AF1473[e]	0	0	0	0	0
Hoodoo*	AM1290, AF1333, m1681, m1666[m], m1677, mp1789	4	1	5	3	8
Iron Creek*	AM1240, AF1278, M1556, f1670[f], mp1710, fp1712, mp1719[f], mp1720[f], fp1721, fp1722[f], m1821	6[h,i]	3	6	2	8
Lava*	AM1285, AF1405, mp1711[f], fp1713[f], mp1714[f], mp1715, mp1716[f], mp1718[f]	7[h,i]	2	2	2	4
Leopold	AM1293, AF1346	0	0	2	0	2
Luna*	AM1158, AF1487	4	4	2	5	7
Mangas*	AM1296, AF1439, f1664[e]	1	1	2	2	4
Morgart's	AM1155[f]	0	0	0	0	0
Maverick*	AF1291, AM1183l, fp1828	4	1	2	1	3
New Pair AZ #1	F1489	0	0	1	1	2
New Pair AZ #2	f1686	0	0	1	1	2
New Pair AZ #3	M1574	0	0	1	1	2
New Pair AZ #4	F1674	0	0	1	1	2
New Pair NM #1	M1824, F1578	0	0	2	0	2
New Pair NM #2	M1555	0	0	1	1	2
New Pair NM #3	f1705	0	0	1	1	2
Panther Creek	M1382, AF1339[e], f1683	0	0	2	0	2
Pine Spring*	AM1394, AF1562, fp1794, fp1825	5	4	4	2	6
Prieto*	AM1398l, AF1251, F1565[e], m1669[t], f1826[e], m1827	5	2	2	3	5
Prime Canyon*	AM1471, AF1488, mp1790, fp1791, fp1823	6	5	5	2	7
Saffel*	AM1441, AF1567, fp1792, m1680[e], m1661[e], mp1793[e]	6	5	5	2	7
San Mateo*	AM1345, AF1399, fp1822	6	5	2	7	9
SBP*	M1678, AF1553, M1561[e], AM1284[f], mp1667[f], fp1682[f]	3	2	2	2	4
Sierra Blanca	M1571, F1550	0	0	2	0	2
Squirrel Springs	AM1349, AF1788	0[r]	0	2	0	2
Single, AZ	F1484[e]	0	0	0	0	0

Pack	Wolf ID	Reproduction[a]	Pups at year end[b]	Number collared	Number uncollared	Minimum pack size[c]
Single, AZ	M1572[e]	0	0	0	0	0
Single, NM	f1684	0	0	1	0	1
Single, NM	M1569[e]	0	0	0	0	0
Single, NM	M1455[f]	0	0	0	0	0
Single, NM	M1552[f]	0	0	0	0	0
Single, NM	M1486[e]	0	0	0	0	0
Tsay-O-Ah*	AM1343[e], AF1283, M1559	N/A[d]	N/A[d]	N/A[d]	N/A[d]	N/A[d]
Tu dil hil	F1679	N/A[d]	N/A[d]	N/A[d]	N/A[d]	N/A[d]
Cerro Trigo, AZ	Uncollared wolf	0	0	0	1	1
Sawtooth, NM	Uncollared wolves	0	0	0	2	2
Shadow, NM	Uncollared wolf	0	0	0	1	1
North I-40, NM	Uncollared wolf	0	0	0	1	1
Uncollared FAIR	Uncollared wolf or wolves	N/A[d]	N/A[d]	N/A[d]	N/A[d]	N/A[d]
Uncollared SCAR	Uncollared wolf or wolves	N/A[d]	N/A[d]	N/A[d]	N/A[d]	N/A[d]
Totals		**83**	**45**	***77***	**54**	**131**

a Reproduction-maximum number of pups documented in 2018.
b Pups at year end documented surviving until December 31, 2018.
c Min pack size-total number of wolves (collared, uncollared, pups) documented at year end.
d Wolf numbers on FAIR and SCAR are not displayed at the request of the tribes.
e Died during 2018.
f Fate unknown during 2018.
g Radio collared wolf not missing for 3 months, but not located nor believed alive by IFT through December 31, 2018.
h Includes 2 cross-fosters released into wild den during 2018.
i Includes one pup removed from wild den during 2018.
l Radio collar no longer functions; but, documented alive through December 31, 2018 and counted in "No. Uncollared" column.
m Radio collar slipped off; but, documented alive through December 31, 2018 and counted in "No. Uncollared" column. "
n Breeding wolf displaced from pack by other wolves; retains original pack name.
o Totals include wolves occurring on FAIR and SCAR.
p Two females documented to have successfully reproduced within this pack.
r Pack denned but a pup count was not obtained
s Collar failed, documented as alive in 2018, but dispersed and was not documented alive during the count period.
t Captured and placed into captivity

*A pack that meets the definition of a breeding pair per the final rule.

Table 2. Mexican wolves initially released or translocated from captivity or the wild in Arizona and New Mexico during January 1 – December 31, 2018.

Wolf pack	Wolf ID	Release site	Release date	Released or translocated
Mangas	F1664	Rita Blanco Springs	2-16-2018	Translocated
Panther Creek	F1339	Fish Bench	2-27-2018	Translocated
Frieborn	mp1690	Frieborn Den	4-18-2018	Released (Cross-fostered)
Frieborn	fp1692	Frieborn Den	4-18-2018	Released (Cross-fostered)
Elk Horn	fp1691	Elk Horn Den	4-18-2018	Released (Cross-fostered)
Elk Horn	mp1693	Elk Horn Den	4-18-2018	Released (Cross-fostered)
Leopold	M1561	Gilita Ridge	5-13-2018	Translocated
Lava	mp1711	Lava Den	5-14-2018	Released (Cross-fostered)
Lava	fp1713	Lava Den	5-14-2018	Released (Cross-fostered)
Iron Creek	mp1710	Iron Creek Den	5-14-2018	Released (Cross-fostered)
Iron Creek	fp1712	Iron Creek Den	5-14-2018	Released (Cross-fostered)
Dark Canyon	mp1717	Dark Canyon Den	5-15-2018	Translocated (Cross-fostered)
Dark Canyon	mp1723	Dark Canyon Den	5-15-2018	Translocated (Cross-fostered)

Table 3. Home range sizes of free-ranging Mexican wolf packs in Arizona and New Mexico, January 1 – December 31, 2018.

Pack	Wolf ID used in analysis	Home range size mi² (km²)	Number of individual locations	State
Baldy	AM1347	319 (827)	403	AZ
Bear Wallow	AF1335	174 (451)	164	AZ
Dark Canyon	AM1354	57 (149)	285	NM
Datil Mountain	AF1685	350 (906)	484	NM
Eagle Creek	M1477	112 (289)	460	AZ
Elkhorn	AF1294	158 (410)	421	AZ
Frieborn	AF1443	145 (375)	404	NM
Hawk's Nest	F1473	297 (769)	288	NM
Hoodoo	AF1333	141 (364)	466	AZ
Iron Creek	AF1278	131 (340)	417	NM
Lava	AF1405	245 (634)	466	NM
Leopold	AF1346	233 (604)	626	NM
Luna	AM1158	194 (501)	225	NM
Mangas	AM1296	298 (771)	455	NM
Panther Creek	AF1339	347 (900)	110	AZ
Pine Spring	AM1394	94 (244)	392	AZ
Prieto	AF1251	157 (405)	616	NM
Prime Canyon	AF1488	61 (158)	460	AZ
Saffel	AF1567	101 (262)	308	AZ
San Mateo	AF1399	333 (862)	583	NM
SBP	AF1553	227 (588)	446	NM
Sierra Blanca	M1571	64 (166)	491	AZ
Squirrel Springs	AF1788	252 (652)	261	NM
Tsay O Ah	AF1283	552 (1429)	380	AZ
Average		210.1 (544.0)	400.5	

Table 4. Wild Mexican wolf mortalities documented in Arizona and New Mexico, 1998-2018.

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	1	2	0	1	1	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
Total	**96**	**21**	**31**	**7**	**15**	**1**	**171**

[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.

Table 5. Mexican wolf mortalities documented in Arizona and New Mexico during January 1 - December 31, 2018.

Wolf ID	Pack	Age	Date found	Cause of death
1484	Single	2	2/16/2018	Unknown
1572	Single	2	2/23/2018	Vehicle Collision
1386	Copper Creek	4	3/6/2018	Natural causes
1569	Single	3	4/3/2018	Illegal
1339	Panther Creek	5	5/8/2018	Illegal
1335	Bear Wallow	6	5/11/2018	Illegal
1691	Elk Horn	<1	8/5/2018	Illegal
1343	Tsay-O-Ah	7	8/29/2018	Unknown
1330	Marble	5	9/7/2018	Unknown
1676	Bear Wallow	2	9/10/2018	Illegal
1561	SBP	2	9/20/2018	Illegal
1793	Saffel	<1	9/28/2018	Natural (Canine Distemper)
1664	Mangas	1	10/17/2018	Illegal
1486	Single	2	11/17/2018	Illegal
1447	Frieborn	4	11/18/2018	Illegal
1826	Prieto	<1	11/18/2018	Natural (Intraspecific Strife)
1038	Hawks Nest	12	11/27/2018	Illegal
1680	Saffel	1	11/28/2018	Illegal
1661	Saffel	1	12/4/2018	Vehicle collision
1565	Prieto	2	12/11/2018	Illegal
1473	Hawks Nest	3	12/29/2018	Illegal

Table 6. Mexican wolf depredations of livestock documented in Arizona and New Mexico during January 1 – December 31, 2018.

	Confirmed	Probable	Total
Fatal	104	6	110
Injury	3	1	4

Table 7. Investigations of confirmed and probable depredations and injuries caused by Mexican wolves to livestock and dogs during 2018 in New Mexico and Arizona. Depredation incidents are defined as the aggregate number of livestock confirmed killed or mortally wounded by an individual wolf or a single pack of wolves at a single location within a 1-day (24-hour) period, beginning with the first confirmed kill, as documented in the initial IFT incident investigation pursuant to SOP 11.0. Number of depredation incidents on a given wolf at a given point in time is calculated based on the number of incidents in the preceding 365 days. Number of uncollared depredation incidents are based on the area in which the depredation occurred.

	Wolves in area	Investigation date	Located by IFT	Species	State	No. killed/ No. injured	Call	Wolves responsible	Depredation incident	No. of incidents	Management action
1	Willow Springs	1/6/2018	No	Cattle	NM	1 Killed	Confirmed	Willow Springs	Yes	1	Setup trail camera and increased monitoring.
2	Uncollared	1/8/2018	No	Dog	AZ	1 Killed	Confirmed	Uncollared	Yes	1	Trapping and setup trail camera.
3	Uncollared	1/10/2018	No	Cattle	AZ	1 Killed	Confirmed	Uncollared	Yes	1	Less than lethal permit issued to resource owner
4	Uncollared	1/13/2018	No	Cattle	AZ	1 Killed	Confirmed	Uncollared	Yes	1	Increased monitoring
5	Uncollared	1/15/2018	No	Cattle	NM	1 Killed	Confirmed	1571 or uncollared	Yes	1	Increased monitoring
6	Uncollared	1/19/2018	No	Cattle	NM	1 Killed	Confirmed	Uncollared	Yes	1	Increased monitoring
7	Uncollared	1/26/2018	No	Cattle	NM	1 Killed	Confirmed	Uncollared	Yes	1	Setup trail camera, diversionary food cache setup, trapping in area.
8	Mangas	2/1/2018	No	Cattle	NM	1 Killed	Confirmed	Uncollared or Mangas 1296	Yes	1	Increased monitoring
9	Uncollared	2/2/2018	No	Cattle	NM	1 Killed	Confirmed	Uncollared	Yes	1	Searched area with helicopter, setup diversionary food cache and setup trail camera.
10	Mangas	2/5/2018	Yes	Cattle	NM	1 Killed	Probable	Mangas	No		Increased monitoring
11	Uncollared	2/5/2018	No	Cattle	NM	1 Killed	Confirmed	Uncollared	Yes	2	Increased monitoring
12	Mangas	2/6/2018	No	Cattle	NM	1 Killed	Probable	Mangas 1296, 1439	No		Increased monitoring
13	Prieto	2/13/2018	No	Cattle	NM	1 Killed	Confirmed	Prieto 1251, 1398, 1565, 1669, 1678	Yes	1	Increased monitoring, hazing attempts

	Wolves in area	Investigation date	Located by IFT	Species	State	No. killed/ No. injured	Call	Wolves responsible	Depredation incident	No. of incidents	Management action
14	Mangas	2/20/2018	No	Cattle	NM	1 Killed	Confirmed	Mangas 1296, 1439	Yes	2	Hazing and setup diversionary food cache
15	Single 1473	2/21/2018	No	Cattle	NM	1 Killed	Confirmed	Single 1473	Yes	1	Hazing
16	Single 1473	2/24/2018	No	Cattle	NM	1 Killed	Confirmed	Single 1473	Yes	2	Hazing
17	Uncollared	2/27/2018	No	Cattle	NM	1 Killed	Confirmed	Uncollared	Yes	3	Hazing attempts, diversionary food cache, increased monitoring, trail camera
18	Uncollared	2/28/2018	No	Cattle	NM	1 Killed	Confirmed	Uncollared	Yes	2	Increased monitoring
19	Uncollared	2/28/2018	No	Cattle	NM	1 Killed	Confirmed	Uncollared	Yes	2	Increased monitoring
20	Uncollared	3/4/2018	No	Cattle	NM	1 Killed	Confirmed	Uncollared	Yes	1	Increased monitoring
21	Uncollared	3/4/2018	No	Cattle	NM	1 Killed	Confirmed	Uncollared	Yes	1	Increased monitoring
22	Uncollared	3/6/2018	No	Cattle	AZ	1 Killed	Confirmed	Uncollared	Yes	2	Increased monitoring, trail cameras, increased communication with resource owner
23	Uncollared	3/6/2018	No	Cattle	AZ	1 Killed	Probable	Uncollared	No		Increased Monitoring
24	Single 1574	3/8/2018	Yes	Cattle	AZ	1 Killed	Confirmed	Single 1574	Yes	1	Hazing
25	Single 1574	3/8/2018	Yes	Cattle	AZ	1 Killed	Confirmed	Single 1574	Yes	2	Hazing
26	Prieto	3/12/2018	No	Cattle	NM	1 Killed	Confirmed	Prieto 1251, 1398	Yes	2	Hazing, diversionary food cache, increased monitoring
27	Uncollared	3/13/2018	No	Cattle	NM	1 Killed	Confirmed	Uncollared	Yes	4	Trapping
28	Uncollared	3/15/2018	No	Cattle	NM	1 Killed	Confirmed	Uncollared	Yes	1	Increased monitoring, setup trail cameras
29	Uncollared	3/17/2018	No	Cattle	NM	1 Killed	Probable	Uncollared	No		Hazing
30	Uncollared	3/17/2018	Yes	Cattle	NM	1 Killed	Confirmed	Uncollared	Yes	4	Trapping, management order
31	Uncollared	3/21/2018	Yes	Cattle	NM	1 Killed	Confirmed	Uncollared	Yes	5	Trapping, management order
32	Uncollared	3/27/2018	Yes	Cattle	NM	1 Killed	Confirmed	Uncollared	Yes	6	Trail cameras, increased monitoring, hazing attempts, management order.
33	Uncollared	3/30/2018	No	Dog	AZ	1 Injured	Confirmed	Uncollared	No		Trail cameras, diversionary food cache, increased monitoring, trapping
34	Uncollared	3/30/2018	No	Cattle	AZ	1 Injured	Confirmed	Uncollared	No		Trail cameras, diversionary food cache, increased monitoring, trapping
35	Uncollared	3/31/2018	No	Cattle	NM	1 Killed	Confirmed	Uncollared	Yes	3	Increased monitoring
36	Uncollared	4/2/2018	No	Cattle	NM	1 Killed	Confirmed	Uncollared	Yes	2	Increased monitoring

	Wolves in area	Investigation date	Located by IFT	Species	State	No. killed/ No. injured	Call	Wolves responsible	Depredation incident	No. of incidents	Management action
37	Luna 1158	4/6/2018	No	Cattle	NM	1 Killed	Confirmed	Luna 1158 or uncollared	Yes	1	Increased monitoring
38	Uncollared	4/7/2018	No	Cattle	NM	1 Killed	Confirmed	Uncollared	Yes	1	Increased monitoring
39	Uncollared	4/11/2018	No	Cattle	NM	1 Killed	Confirmed	Uncollared	Yes	7	Trapping, increased monitoring, management order
40	Sierra Blanca	4/12/2018	Yes	Cattle	AZ	1 Killed	Probable	Sierra Blanca 1571	No		Increased monitoring
41	Elk Horn	4/13/2018	No	Cattle	AZ	1 Killed	Confirmed	Elk Horn 1668, 1342 and 1474	Yes	1	Hazing and diversionary food cache
42	Prieto	4/16/2018	No	Cattle	NM	1 Killed	Confirmed	Prieto (not 1251)	Yes	3	Increased monitoring
43	San Mateo	4/17/2018	No	Cattle	NM	1 Killed	Confirmed	San Mateo 1399 and 1578	Yes	1	Increased monitoring
44	Elk Horn	4/18/2018	No	Cattle	AZ	1 Killed	Confirmed	Elk Horn 1668, 1342 and 1474	Yes	2	Hazing and diversionary food cache
45	Uncollared	4/19/2018	No	Cattle	NM	1 Killed	Confirmed	Uncollared	Yes	2	Increased monitoring
46	Uncollared	4/19/2018	No	Cattle	NM	1 Killed	Confirmed	Uncollared	Yes	2	Increased monitoring
47	Uncollared	4/21/2018	Yes	Cattle	AZ	1 Killed	Confirmed	Uncollared	Yes	3	Trapping, trail cameras and diversionary food cache.
48	Uncollared	4/21/2018	Yes	Cattle	AZ	1 Killed	Confirmed	Uncollared	Yes	4	Trapping, trail cameras and diversionary food cache.
49	Uncollared	4/27/2018	No	Cattle	AZ	1 Killed	Confirmed	Uncollared	Yes	5	Trapping, trail cameras, diversionary food cache and increased monitoring.
50	Uncollared	4/30/2018	No	Cattle	NM	1 Killed	Confirmed	Uncollared	Yes	3	Increased monitoring
51	Uncollared	5/13/2018	No	Cattle	NM	1 Killed	Confirmed	Uncollared	Yes	4	Increased monitoring and trapping
52	Prieto	5/13/2018	No	Cattle	NM	1 Killed	Confirmed	Prieto 1669 and 1678	Yes	4	Increased monitoring
53	Prieto	5/13/2018	No	Cattle	NM	1 Killed	Confirmed	Prieto	Yes	5	Increased monitoring
54	Uncollared	5/14/2018	No	Cattle	NM	1 Killed	Confirmed	Uncollared	Yes	3	Trail cameras and increased monitoring
55	Uncollared	5/15/2018	No	Cattle	NM	1 Injured	Confirmed	Uncollared	No		Trapping
56	Uncollared	5/15/2018	No	Cattle	NM	1 Killed	Confirmed	Uncollared	Yes	3	Trail cameras and increased monitoring
57	Uncollared	5/22/2018	No	Cattle	NM	1 Killed	Confirmed	Uncollared	Yes	5	Increased monitoring
58	Uncollared	5/22/2018	No	Cattle	AZ	1 Killed	Confirmed	Uncollared	Yes	6	Increased monitoring and trapping
59	Uncollared	5/23/2018	No	Cattle	NM	1 Killed	Confirmed	Uncollared	Yes	6	Increased monitoring

	Wolves in area	Investigation date	Located by IFT	Species	State	No. killed/ No. injured	Call	Wolves responsible	Depredation incident	No. of incidents	Management action
60	Uncollared	5/23/2018	No	Cattle	AZ	1 Killed	Confirmed	Uncollared	Yes	3	Increased monitoring and trapping
61	Uncollared	5/23/2018	No	Cattle	AZ	1 Killed	Confirmed	Uncollared	Yes	1	Increased monitoring, trail cameras and deployed proactive management tools.
62	Prieto	5/27/2018	No	Cattle	NM	1 Killed	Confirmed	Prieto 1669	Yes	6	Increased monitoring
63	Uncollared	5/28/2018	No	Cattle	NM	1 Killed	Confirmed	Uncollared	Yes	4	Increased monitoring and trail cameras
64	Uncollared	5/29/2018	No	Cattle	AZ	1 Killed	Confirmed	Uncollared	Yes	7	Increased monitoring, diversionary food cache, trail cameras and trapping
65	Uncollared	5/29/2018	No	Cattle	NM	1 Killed	Confirmed	Uncollared	Yes	7	Increased monitoring
66	Uncollared and Prime Canyon	6/3/2018	No	Cattle	AZ	1 Killed	Confirmed	Prime Canyon 1471 or Uncollared	Yes	1	Increased monitoring
67	Uncollared	6/5/2018	No	Cattle	NM	1 Killed	Confirmed	Uncollared	Yes	7	Trapping
68	Prieto 1669 and Single 1673	6/11/2018	No	Cattle	NM	2 Killed	Confirmed	Prieto 1669 and Single 1673	Yes	7	Hazing, increased monitoring, management order
69	Prieto	6/12/2018	No	Cattle	NM	1 Killed	Confirmed	Prieto (not 1251)	Yes	8	Hazing, increased monitoring, management order
70	Uncollared	6/12/2018	No	Cattle	NM	1 Killed	Confirmed	Uncollared	Yes	4	Trapping
71	Uncollared	6/23/2018	No	Cattle	NM	1 Killed	Confirmed	Uncollared	Yes	2	Trail cameras and increased monitoring
72	Uncollared	6/24/2018	No	Cattle	AZ	1 Killed	Confirmed	Uncollared	Yes	7	Trail cameras, diversionary food cache, increased monitoring and trapping
73	Uncollared	6/26/2018	No	Cattle	NM	1 Killed	Confirmed	Uncollared	Yes	1	Trapping
74	Uncollared	6/26/2018	No	Cattle	NM	1 Killed	Confirmed	Uncollared	Yes	2	Trapping
75	Uncollared	6/26/2018	No	Cattle	NM	1 Killed	Probable	Uncollared	No		Trapping
76	Uncollared	6/26/2018	No	Cattle	NM	1 Killed	Confirmed	Uncollared	Yes	3	Trapping
77	Uncollared	6/26/2018	No	Cattle	NM	1 Killed	Confirmed	Uncollared	Yes	4	Trapping
78	Uncollared	6/26/2018	No	Cattle	AZ	1 Killed	Confirmed	Uncollared	Yes	5	Trapping
79	Hawks Nest	6/27/2018	No	Cattle	NM	1 Killed	Confirmed	Hawks Nest 1038	Yes	1	Increased monitoring
80	Uncollared	6/28/2018	No	Cattle	NM	1 Killed	Confirmed	Uncollared	Yes	1	Increased monitoring
81	Single 1676	6/28/2018	Yes	Cattle	AZ	1 Killed	Confirmed	Single 1676 and associated uncollared	Yes	1	Increased monitoring

	Wolves in area	Investigation date	Located by IFT	Species	State	No. killed/ No. injured	Call	Wolves responsible	Depredation incident	No. of incidents	Management action
82	Single 1489	7/2/2018	No	Cattle	AZ	1 Killed	Confirmed	Single 1489 and uncollared	Yes	1	Carcass removed, hazing attempted and diversionary food cache
83	Dark Canyon	7/7/2018	No	Cattle	NM	1 Injured	Confirmed	Dark Canyon 1354	No		Hazing
84	Squirrel Springs	7/7/2018	No	Cattle	NM	1 Injured	Probable	Squirrel Springs	No		Increased monitoring
85	SBP 1553	7/10/2018	No	Cattle	NM	1 Killed	Confirmed	SBP 1553	Yes	1	Increased monitoring
86	Pine Spring 1394 and 1562	7/15/2018	No	Cattle	AZ	1 Killed	Confirmed	Pine Spring 1394 and 1562	Yes	1	Diversionary food cache and increased monitoring
87	Mangas	7/16/2018	No	Cattle	NM	1 Killed	Confirmed	Mangas	Yes	3	Increased monitoring and hazing
88	Squirrel Springs	7/17/2018	No	Cattle	NM	1 Killed	Probable	Squirrel Springs	No		Increased monitoring and hazing
89	San Mateo	7/17/2018	No	Cattle	NM	1 Killed	Confirmed	San Mateo	Yes	2	Increased monitoring
90	Uncollared	7/18/2018	No	Cattle	NM	1 Killed	Confirmed	Uncollared	Yes	8	Increased monitoring and trail cameras
91	Uncollared	8/1/2018	No	Dog	NM	1 Injured	Confirmed	Uncollared	No		Increased monitoring
92	Lava	8/8/2018	Yes	Cattle	NM	1 Killed	Confirmed	Lava 1405 and 1285	Yes	1	Hazing
93	Uncollared	8/25/2018	No	Cattle	AZ	1 Killed	Confirmed	Uncollared	Yes	2	Increased monitoring, carcass removed, trail cameras and trapping
94	Uncollared	9/6/2018	No	Cattle	NM	2 Killed	Confirmed	Uncollared	Yes	5	Increased monitoring
95	Uncollared	9/8/2018	No	Cattle	NM	1 Killed	Confirmed	Uncollared	Yes	9	Increased monitoring
96	Pine Spring	9/19/2018	No	Cattle	AZ	1 Killed	Confirmed	Pine Spring 1394 and 1562	Yes	2	Increased monitoring and diversionary food cache
97	Uncollared	9/29/2018	No	Cattle	AZ	1 Killed	Confirmed	Uncollared	Yes	3	Increased monitoring and diversionary food cache
98	Single 1489	10/7/2018	No	Cattle	AZ	1 Killed	Confirmed	Single 1489 or uncollared	Yes	2	Increased monitoring
99	Saffel	10/9/2018	No	Cattle	AZ	1 Killed	Confirmed	Saffel	Yes	1	Diversionary food cache
100	Uncollared	10/11/2018	No	Cattle	NM	1 Killed	Confirmed	Uncollared	Yes	6	Increased monitoring
101	Mangas	10/14/2018	No	Cattle	NM	1 Killed	Confirmed	Mangas	Yes	4	Increased monitoring and implemented proactive management tools
102	Uncollared	10/18/2018	No	Cattle	AZ	1 Killed	Confirmed	Uncollared	Yes	1	Increased monitoring, diversionary food cache and trapping

	Wolves in area	Investigation date	Located by IFT	Species	State	No. killed/ No. injured	Call	Wolves responsible	Depredation incident	No. of incidents	Management action
103	Iron Creek	10/22/2018	No	Cattle	NM	1 Killed	Confirmed	Iron Creek	Yes	1	Increased monitoring, hazing and diversionary food cache
104	Iron Creek	10/24/2018	No	Cattle	NM	1 Killed	Confirmed	Iron Creek	Yes	2	Increased monitoring, hazing and diversionary food cache
105	Squirrel Springs	10/25/2018	No	Cattle	NM	1 Killed	Confirmed	Squirrel Springs	Yes	6	Hazing and trapping
106	Hawks Nest	11/15/2018	No	Cattle	NM	2 Killed	Confirmed	Hawks Nest	Yes	2	Hazing and increased monitoring
107	San Mateo	11/15/2018	No	Cattle	NM	1 Killed	Confirmed	San Mateo	Yes	3	Increased monitoring
108	Hoodoo	11/16/2018	No	Cattle	AZ	1 Killed	Confirmed	Hoodoo	Yes	1	Increased monitoring
109	Uncollared	11/17/2018	Yes	Cattle	NM	1 Killed	Confirmed	Uncollared	Yes	2	Increased monitoring
110	Frieborn	11/17/2018	No	Cattle	NM	1 Killed	Confirmed	Frieborn	Yes	1	Increased monitoring
111	Mangas	11/20/2018	No	Cattle	NM	2 Killed	Confirmed	Uncollared associated with Mangas	Yes	5	Increased monitoring, diversionary food cache
112	Elk Horn	11/21/2018	No	Cattle	AZ	1 Killed	Confirmed	Elk Horn 1294, 1695 and 1697	Yes	3	Increased monitoring, hazing and diversionary food cache
113	Prieto	12/16/2018	No	Cattle	NM	1 Killed	Confirmed	Prieto	Yes	9	Diversionary food cache and proactive management tools
114	Uncollared	12/22/2018	No	Cattle	NM	1 Killed	Confirmed	Uncollared	Yes	7	N/A

Table 8. Mexican wolves captured in Arizona and New Mexico from January 1 – December 31, 2018.

	Pack	Wolf ID	Capture date	Reason for capture
1	Bear Wallow	1676	January 24, 2018	Helicopter capture. Routine monitoring purposes. Captured, recollared, and released on site.
2	Hoodoo	1677	January 24, 2018	Helicopter capture. Routine monitoring purposes. Captured, recollared, and released on site.
3	Mangas	1664	January 25, 2018	Non-target caught by private trapper. Recollared and released on site.
4	Iron Creek	1278	January 27, 2018	Helicopter capture. Routine monitoring purposes. Captured, recollared, and released on site.
5	Elk Horn	1294	January 28, 2018	Helicopter capture. Routine monitoring purposes. Captured, recollared, and released on site.
6	Leopold	1561	January 27, 2018	Helicopter capture. Routine monitoring purposes. Captured, collared, and released on site.
7	Mangas	1296	January 26, 2018	Helicopter capture. Routine monitoring purposes. Captured, recollared, and released on site.
8	Frieborn	1443	January 26, 2018	Helicopter capture. Routine monitoring purposes. Captured, recollared, and released on site.
9	Pine Spring	1394	January 28, 2018	Helicopter capture. Routine monitoring purposes. Captured, recollared, and released on site.
10	Prieto	1678	January 26, 2018	Helicopter capture. Routine monitoring purposes. Captured, collared, and released on site.
11	Saffel	1680	January 29, 2018	Helicopter capture. Routine monitoring purposes. Captured, collared, and released on site.
12	Panther Creek	1339	January 30, 2018	Helicopter capture. Moved to captivity.
13	Mangas	1664	January 31, 2018	Helicopter captured to perform a medical evaluation. Moved to a captive facility to receive veterinary care due to previous
14	SBP	1682	January 30, 2018	Helicopter capture. Routine monitoring purposes. Captured, collared, and released on site.
15	SBP	1553	January 30, 2018	Helicopter capture. Routine monitoring purposes. Captured, recollared, and released on site.
16	Tsay-O-Ah	1283	January 28, 2018	Helicopter capture. Routine monitoring purposes. Captured, recollared, and released on site.
17	Tu dil hil	1679	January 28, 2018	Helicopter capture. Routine monitoring purposes. Captured, collared, and released on site.
18	Bear Wallow	1683	February 1, 2018	Helicopter capture. Routine monitoring purposes. Captured, recollared, and released on site.
19	Datil Mountain	1685	February 2, 2018	Helicopter capture. Routine monitoring purposes. Captured, recollared, and released on site.

	Pack	Wolf ID	Capture date	Reason for capture
20	Luna	1684	February 2, 2018	Helicopter capture. Routine monitoring purposes. Captured, recollared, and released on site.
21	Tsay-O-Ah	1343	January 29, 2018	Helicopter capture. Routine monitoring purposes. Captured, collared, and released on site.
22	Baldy	1347	February 3, 2018	Helicopter capture. Routine monitoring purposes. Captured, collared, and released on site.
23	Lava	1405	January 30, 2018	Helicopter capture. Routine monitoring purposes. Captured, collared, and released on site.
24	Saffel	1441	January 29, 2018	Helicopter capture. Routine monitoring purposes. Captured, collared, and released on site.
25	Hoodoo	1681	January 29, 2018	Helicopter capture. Routine monitoring purposes. Captured, collared, and released on site.
26	Bluestem	1686	March 29, 2018	Routine monitoring purposes. Captured, recollared, and released on site.
27	Leopold	1561	May 13, 2018	Helicopter capture. Animal traveled outside MWEPA and was translocated back into the MWEPA.
28	Mangas	1705	May 6, 2018	Routine monitoring purposes. Captured, collared, and released on site.
29	Uncollared	1788	June 28, 2018	Routine monitoring purposes. Captured, collared, and released on site.
30	Prime Canyon	1790	September 11, 2018	Routine monitoring purposes. Captured, collared, and released on site.
31	Prime Canyon	1791	September 12, 2018	Routine monitoring purposes. Captured, recollared, and released on site.
32	Frieborn	1702	September 15, 2018	Routine monitoring purposes. Captured, collared, and released on site.
33	Pine Spring	1794	September 21, 2018	Routine monitoring purposes. Captured, collared, and released on site.
34	Elk Horn	1697	September 23, 2018	Routine monitoring purposes. Captured, collared, and released on site.
35	San Mateo	1399	September 28, 2018	Routine monitoring purposes. Captured, recollared, and released on site.
36	Iron Creek	1821	September 20, 2018	Routine monitoring purposes. Captured, collared, and released on site.
37	Iron Creek	1556	September 29, 2018	Routine monitoring purposes. Captured, recollared, and released on site.
38	Iron Creek	1721	September 25, 2018	Routine monitoring purposes. Captured, collared, and released on site.
39	Saffel	1792	September 18, 2018	Routine monitoring purposes. Captured, collared, and released on site.
40	Saffel	1793	September 18, 2018	Routine monitoring purposes. Captured, recollared, and released on site.

	Pack	Wolf ID	Capture date	Reason for capture
41	Hoodoo	1789	September 7, 2018	Routine monitoring purposes. Captured, recollared, and released on site.
42	Copper Creek	1444	October 7, 2018	Routine monitoring purposes. Captured, recollared, and released on site.
43	Iron Creek	1710	October 12, 2018	Routine monitoring purposes. Captured, recollared, and released on site.
44	San Mateo	1822	October 16, 2018	Routine monitoring purposes. Captured, recollared, and released on site.
45	Prime Canyon	1823	October 16, 2018	Routine monitoring purposes. Captured, collared, and released on site.
46	Uncollared	1824	October 17, 2018	Routine monitoring purposes. Captured, collared, and released on site.
47	Pine Spring	1825	October 17, 2018	Routine monitoring purposes. Captured, collared, and released on site.
48	Prieto	1826	October 26, 2018	Routine monitoring purposes. Captured, recollared, and released on site.
49	Prieto	1827	October 26, 2018	Routine monitoring purposes. Captured, collared, and released on site.
50	Maverick	1828	October 31, 2018	Routine monitoring purposes. Captured, collared, and released on site.
51	Elk Horn	1696	November 3, 2018	Routine monitoring purposes. Captured, recollared, and released on site.
52	Elk Horn	1695	November 7, 2018	Routine monitoring purposes. Captured, collared, and released on site.
53	Luna	1684	November 26, 2018	Non-target caught by private trapper. Recollared and released on site
54	Prieto	1669	December 9, 2018	Non-target caught by private trapper. Helicopter captured to perform a medical evaluation. Moved to a captive facility to
55	Prieto	1565	December 10, 2018	Non-target caught by private trapper. Helicopter captured to perform a medical evaluation. Moved to a captive facility to
56	Squirrel Springs	1349	December 22, 2018	Non-target caught by private trapper. Collared and released on site.

Table 9. IFT management actions resulting from reported cases of potential Mexican wolf nuisance activities in Arizona and New Mexico during 2018.

Date reported	Wolf ID	General location	Type of activity	IFT response	Management result
January 21	Diamond 1574	Cow Springs Draw, NM	Wolf observed 50 meters away	IFT investigated and wolves already out of that area by the time of the report.	No further incidents
February 2	Hoodoo	Nutrioso, AZ	Three wolves were observed near a house. Observer yelled at the wolves and reported that they slowly retreated.	IFT investigated and provided information on hazing and team contacts.	IFT continued to monitor
February 7	Unknown	Apache Creek, NM	Observer saw wolf running through meadow from highway near residence. Wolf was observed the next day in the same area.	IFT investigated and found fresh coyote sign and old wolf tracks. Attempted to haze but found no wolves in the area.	No further incidents
February 12	N/A	Vernon State Land, AZ	Three wolves moving through a group of cows. Observer drove truck to check on the cows and the wolves ran off.	IFT contacted reporting party and provided information on weekly location map and team contacts. IFT investigated and found no sign to confirm as wolf. No known wolves in the area so assigned as unknown.	No further incidents in the area
February 16	N/A	Show Low, AZ	Wolf seen on Golf Course	IFT investigated and determined it was likely a coyote	Not Mexican Wolf
February 23	Unknown	Alpine, AZ	Wolf was observed eating a disarticulated elk carcass near houses.	IFT investigated, hazed the wolf out of the area and removed the carcass.	IFT continued to monitor
March 8	Hoodoo	Alpine, AZ	Wolves killed an elk on the edge of a property. Wolves left the area when they became aware of the observer.	IFT investigated the site with the reporter and removed the two carcasses.	IFT continued to monitor
March 12	N/A	Hulsey Creek, AZ	A canid and ravens were observed on an elk carcass. The animal saw the observer and ran.	IFT investigated the scene and removed the carcass.	Unknown if it was a Mexican wolf. No further activity reported.
March 14	Unknown	Cruzville, NM	Wolf observed harassing horse.	IFT responded and attempted to haze wolves out of the area.	None
March 14	Elkhorn	North of Alpine, AZ	Report of five wolves howling near Alpine Divide Campground and coming into a campsite.	IFT contacted reporter, discussed ways to minimize attractants around camp, and provided instruction on hazing.	No further activity reported.
March 16	1550	Nutrioso, AZ	Wolf was observed crossing road and limping	IFT investigated and picked up a signal in the area.	No further reports
March 17	Prime Canyon	Alpine, AZ	Wolves observed walking along fence.	IFT investigated the site and spoke with the reporter about the 10j rule and less than lethal options.	Wolves left the area and no further reports.
March 20	Hoodoo	Nutrioso, AZ	Five wolves observed on a ridge in the general area of residences	IFT investigated the area and issued less than lethal training.	IFT continued to monitor and haze Hoodoo
March 20	Hoodoo	Nutrioso, AZ	Wolf observed travelling 90 yards from residence, did not react when yelled at but ran off when chased by a dog.	IFT investigated and issued less than lethal training to the reporting party.	IFT continued to monitor and haze Hoodoo

Date reported	Wolf ID	General location	Type of activity	IFT response	Management result
April 5	Uncollared	Cow Spring Draw, NM	Wolf observed from a house moving along fence in the direction of cattle. Two wolves observed the following morning leaving area.	IFT investigate and heard no signals in the area and found only coyote tracks and scats in the area. Scheduled less than lethal training with the reporter.	Unknown wolf or wolves
April 9	Hoodoo	Nutrioso, AZ	Four possible wolves were observed in a herd of elk and the observer found an elk carcass.	IFT contacted the reporter and advised her on wolf behavior and provided information on hazing. The elk carcass was removed from the area and hazing efforts continued.	IFT continued to monitor and haze Hoodoo.
April 10	Hoodoo	Nutrioso, AZ	Three wolves on an elk carcass observed using a spotting scope.	IFT investigated, removed the elk carcass and continued hazing efforts until 4/13	IFT continued to monitor and haze Hoodoo
April 11	Mangas Uncollared	H-V Reservoir, AZ	Three wolves observed by the reservoir in pasture with livestock and no signals were heard in the area.	IFT investigated and found tracks leading to and from the reservoir and saw three wolves. Less than lethal training provided to the ranch manager.	IFT continued trapping efforts to collar the wolves.
April 21	Prime Canyon	Alpine, AZ	Two wolves observed moving through a residential area from inside house	IFT contacted reporting party and provided numbers for immediate response and hazing if observed. Hazing of Prime Canyon occurred on June 8-13.	Number of nuisance incidents declined
May 3	Unknown	Cruzville, NM	Observers were outside at night and saw a large canid chasing their dog. Fired shots into the air and the canid ran off. Too dark to determine if it was a wolf or coyote.	IFT investigated and volunteered to go there at night to listen for signals and haze, if necessary, but landowner declined. Continually monitored GPS points and signals in the area. A dead elk was removed from the highway near the area.	IFT updated reporter with any wolf locations near the area. No further incidents.
May 5	Unknown	Alpine, AZ	Observer reported seeing four uncollared wolves throughout the fall, winter, and spring	IFT discussed with RP and discussed need for immediate reports if possible, unlikely wolves based on locations of animals and permanency in a small area.	Unlikely Mexican Wolves.
May 11	N/A	Greer, AZ	Report of wolves killing a deer near a house.	IFT spoke to reporting party and determined it was not wolves based on pack locations and photos.	Not Mexican wolves and no further reports in the area.
May 13	Elkhorn 1671	Hulsey Creek, AZ	Wolf on elk carcass near a house.	IFT investigated the site and removed the carcass.	Wolf had moved out of the area. No further incidents.
June 13	Hawks Nest	Whiskey Creek, NM	Two wolves observed eating a dead elk caught in a fence.	IFT removed the carcass from the area.	No further incidents.
June 26	N/A	Vernon, AZ	Observer reported two animals had attacked her dog and tried to pull it under the fence. Observer fired two shots on either side of the animals and they disengaged.	IFT contacted observer and investigated the site. Confirmed coyote attack on the dog based on dozens of track measurements in good substrate.	Not Mexican Wolves

Date reported	Wolf ID	General location	Type of activity	IFT response	Management result
July 2	N/A	Hanover, NM	Fresh canid tracks and missing cat reported.	New Mexico Game and Fish Department (NMGFD) took the report and investigated. NMGFD set up cameras and found fresh tracks and scat. Determined it was a coyote.	Not Mexican Wolves.
August 14	Prime Canyon	Alpine, AZ	Two wolves were observed standing close to a dead elk calf near a residence. Wolves walked away after the observer walked outside the residence.	IFT investigated and provided instruction on opportunistic hazing. The elk carcass was removed from the area.	Wolves moved out of the area and no further reports.
September 1	Prime Canyon	Crow Poison, AZ	Observer was hunting when he came upon a wolf rendezvous site where pups would be present. Wolves were reportedly 100 yards away growling, barking and pacing. Hunter left the area and returned to his truck.	IFT investigated and determined that the reporting party had an encounter with a known pack at a rendezvous site in the forest. The IFT spoke to the hunter and explained the 10j rule and later trapped in that area to collar the pups.	Trapped and collared pups in the area. No further incidents.
September 2	Unknown	Beavercreek, AZ	Observer reported a collared wolf started walking up the porch steps of a property that had been vacant. Observer yelled at the wolf which resulted in the wolf leaving the property. The following day the wolf was observed walking through the property, reporter went outside and yelled at it and it ran off.	IFT spoke to reporting party and provided contact information so that incidents can be reported and investigated sooner.	No further incidents. Property was unoccupied several months prior to the incident so human presence likely keeping wolves away.
September 14	Saffel	Near Winn Campground, AZ	Observer was hiking with his dogs off leash when wolves started to chase his dogs.. The wolves were about 10 feet behind the last dog but stopped when they saw the hikers. The wolves ran off about 60 yards and started barking and howling.	IFT spoke to reporting party and advised him about hazing to reinforce their fear of people. IFT visited with hosts at Winn Campground and advised them of the incident, shared the same wolf hazing information and provided an informational sign to display with contact information.	Wolves left the area the following day and no additional reports.
September 15	N/A	W of Greer, AZ	Report of a wolf making repeated visits at night to a campsite near Greer.	IFT spoke to reporting party and based on the physical description, the incident likely involved a domestic dog from the town of Greer.	Not Mexican Wolves
October 5	Unknown	Horton Creek, AZ	Wolf observed walking about 40 yards from a camp trailer at a dispersed campsite. Observer was inside the camp trailer, exited and approached the wolf, which caused it to leave.	IFT contacted the reporting party and explained inappropriate wolf behavior, hazing techniques and the 10j rule to the party.	No further sightings or incidents.
December 5	Prieto	Deadman Spring, NM	Wolves near private property	IFT investigated, spoke with the reporting party and attempted to haze wolves in the area.	None

Table 10. IFT proactive management activities in Arizona and New Mexico during 2018.

Proactive management	Purpose	Time period	Location	Packs associated with proactive management	Management result
Range Rider	Reduce livestock depredations	Calving Season	Blue River, AZ	Frieborn, uncollared wolves	7 total depredations 4 associated with uncollared
Range Rider	Reduce livestock depredations	June – Oct (5 months)	Stray Horse, AZ	Bluestem, Panther Creek	1 confirmed uncollared
Range Rider	Reduce livestock depredations	March-June (4 months)	South Escudilla, AZ	Elk Horn	No known depredations
Range Rider	Reduce livestock depredations	June – Sept (4 months)	Crosby Crossing, AZ	Hoodoo	1 confirmed depredations
Range Rider	Reduce livestock depredations	June – Sept (4 months)	Harris Lake, AZ	Pine Springs, uncollared wolves	1 confirmed depredations
Range Rider	Reduce livestock depredations	June – Oct (4 months)	Sheep Springs, AZ	Baldy, uncollared wolves	2 confirmed depredations 1 associated with uncollared
Range Rider	Reduce livestock depredations	June – Sept (4 months)	Greer, AZ	Saffel	No known depredations
Range Rider	Reduce livestock depredations	June – Sept (4 months)	Greens Peak, AZ	Pine Springs, uncollared wolves	2 confirmed depredation
Range Rider	Reduce livestock Depredations	June – Sept (4 months)	Haygrounds, AZ	Sierra Blanca, Baldy	No known depredations
Range Rider	Reduce livestock depredations	March – June (4 months)	Centerfire Bog, NM	Mangas, uncollared wolves	1 confirmed depredation
Range Rider	Reduce livestock depredations	March – July (5 months)	Gasoline Lake, NM	Mangas, uncollared wolves	4 confirmed depredation associated with uncollared
Range Rider	Reduce livestock depredations	February – May (4 months)	T-Bar/Y Canyon, NM	Luna, SBP, Prieto, Iron Creek, Lava, Dark Canyon	7 total confirmed depredation 2 associated with uncollared
Range Rider	Reduce livestock depredations	Feb-May (4 months)	Rainy Mesa, NM	Prieto	9 total confirmed depredations 2 from uncollared
Range Rider	Reduce livestock depredations	June-September (4 months)	5 Springs, NM	Squirrel Springs	8 total confirmed depredations 5 associated with uncollared
Range Rider	Reduce livestock depredations	June-October (5 months)	Dark Canyon, NM	Squirrel Springs	No known depredations

Table 11. Areas searched and uncollared wolves documented in Arizona and New Mexico by the IFT during 2018.

Area ID	General Area	Effort	State	Number documented
A	Black Canyon/South of Heber	Deployed remote camera, sign searched roads and trails.	AZ	1
B	Cerro Trigo	Deployed remote camera, sign searched roads and trails.	AZ	1
C	Black River	Deployed remote camera, sign searched roads and trails.	AZ	0
D	Blue River	Deployed remote cameras, sign searched roads and trails, trapped for uncollared wolves.	AZ	0
E	Coyote Creek	Deployed remote camera, sign searched roads and trails.	AZ	0
F	Bishop Canyon	Deployed remote camera, sign searched roads and trails, trapped for uncollared wolves.	NM	0
G	Spur Lake	Deployed remote camera, sign searched roads and trails, trapped for uncollared wolves.	NM	1
H	Cottonwood Canyon	Deployed remote camera, sign searched roads and trails, trapped for uncollared wolves.	NM	1
I	Squirrel Springs Canyon	Deployed remote camera, sign searched roads and trails, trapped for uncollared wolves. Captured and collared new pair of wolves (Squirrel Springs pack).	NM	2
J	Sand Flat Canyon	Deployed remote camera, sign searched roads and trails, trapped for uncollared wolves.	NM	0
K	Alma Mesa	Deployed remote camera, sign searched roads and trails, trapped for uncollared wolves.	NM	0
L	Datil Mountains	Deployed remote camera, sign searched roads and trails.	NM	0
M	Luera Mountains	Deployed remote camera, sign searched roads and trails.	NM	0
N	San Mateo Mountains	Deployed remote camera, sign searched roads and trails.	NM	0
O	Magdalena Mountains	Deployed remote camera, sign searched roads and trails.	NM	1
P	Bear Mountains	Deployed remote camera, sign searched roads and trails (counted in Sawtooth Mountains).	NM	1
Q	Sawtooth Mountains	Deployed remote camera, sign searched roads and trails.	NM	2

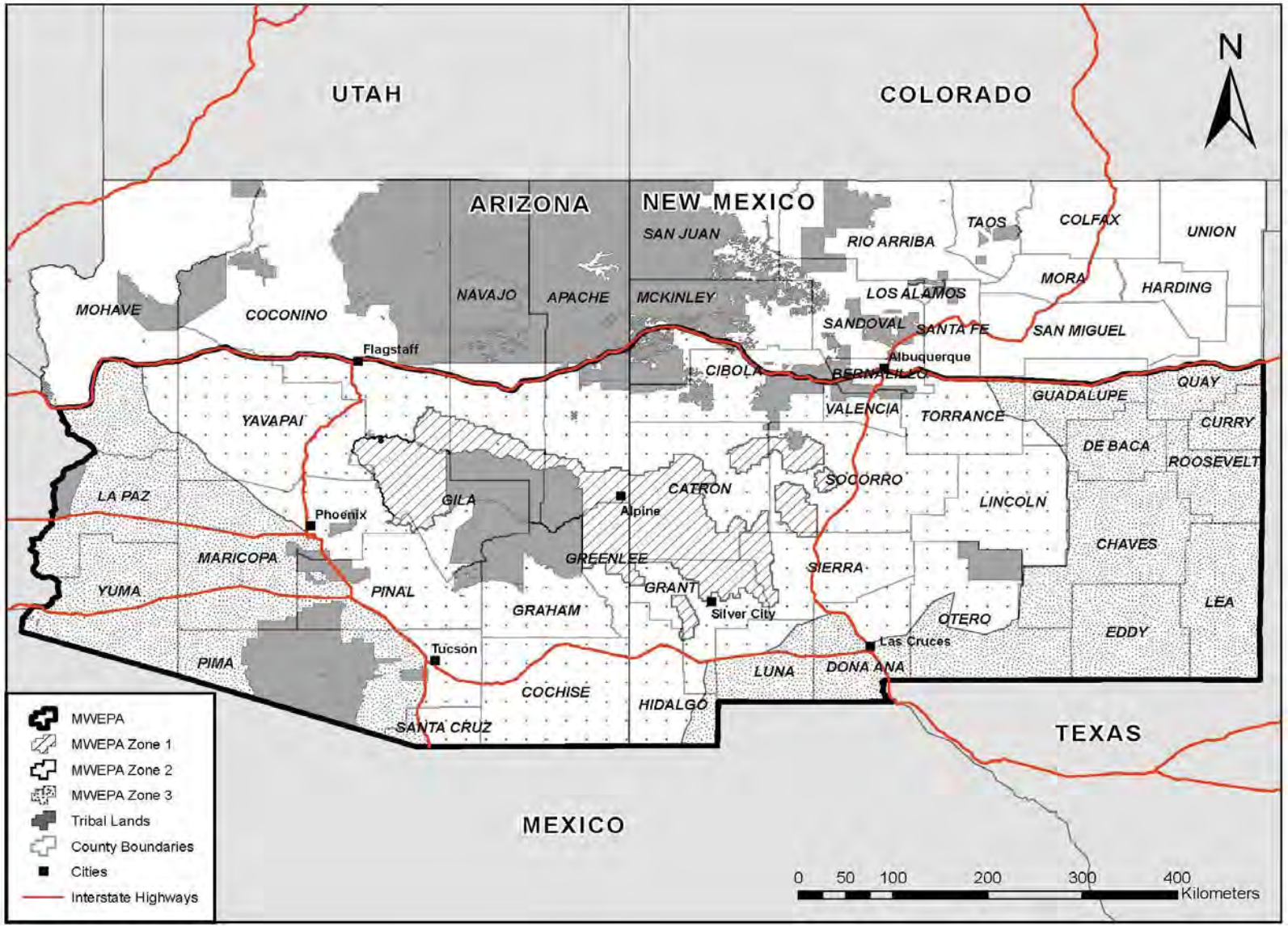

Figure 1. The Mexican Wolf Experimental Population Area (MWEPA) and Zones 1-3 in Arizona and New Mexico as described in the Final Rule found at http://www.fws.gov/southwest/es/mexicanwolf/pdf/Mx_wolf_10j_final_rule_to_OFR.pdf.

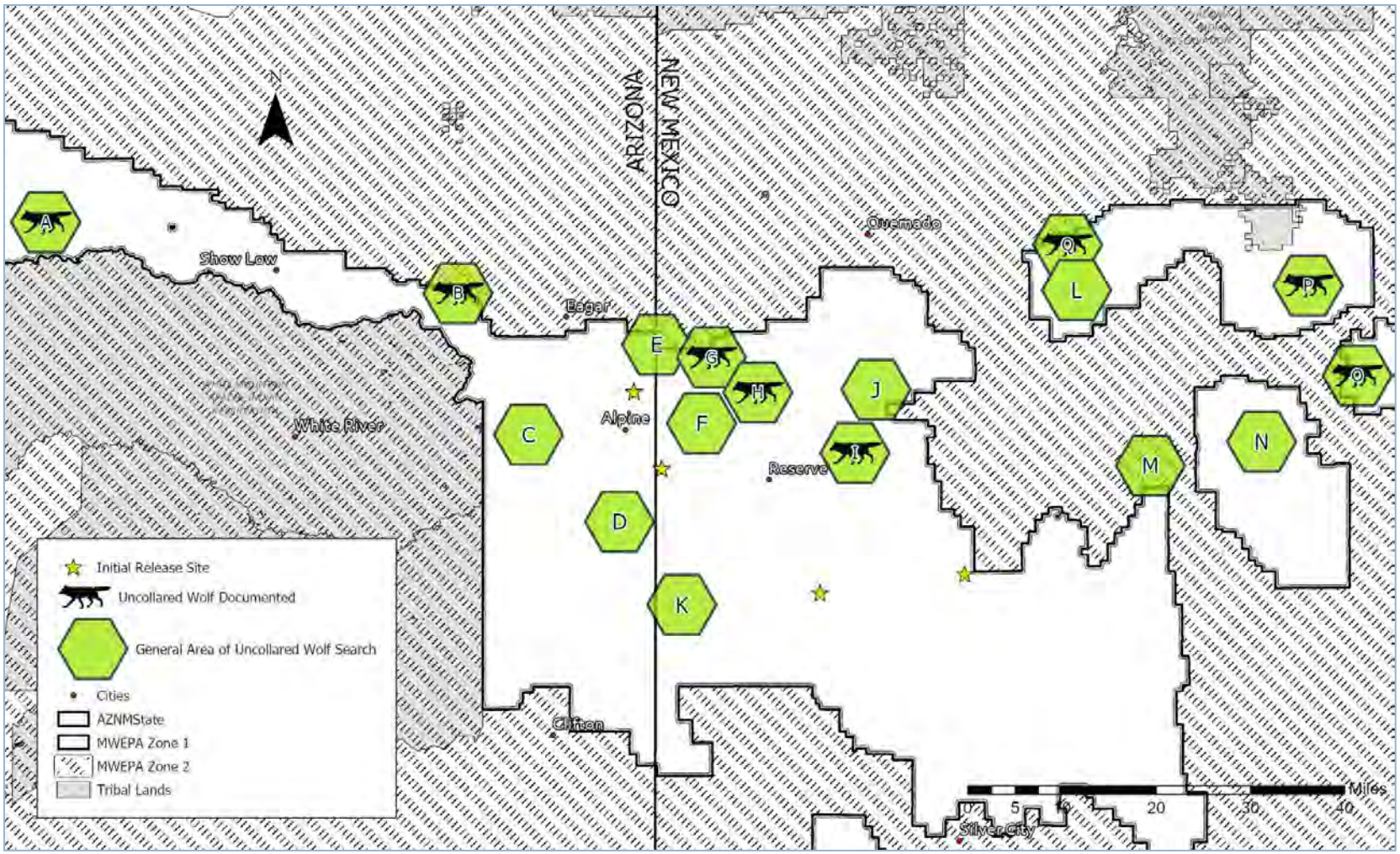

Figure 2. Initial release sites and general areas searched for uncollared wolf sign within the Mexican Wolf Experimental Population Area (MWEPA). Areas where wolf sign was located is indicated by a wolf in the search area. Not all of the areas where sign was observed were counted in the population because the observation of sign occurred outside of the count window (November 2018 – January 2019). Search areas correspond with map letters found in Table 11. General search areas overlapping the Fort Apache Indian Reservation do not necessarily indicate sign search conducted on tribal land. Four initial release sites were used during 2018 in Arizona and New Mexico within the MWEPA.

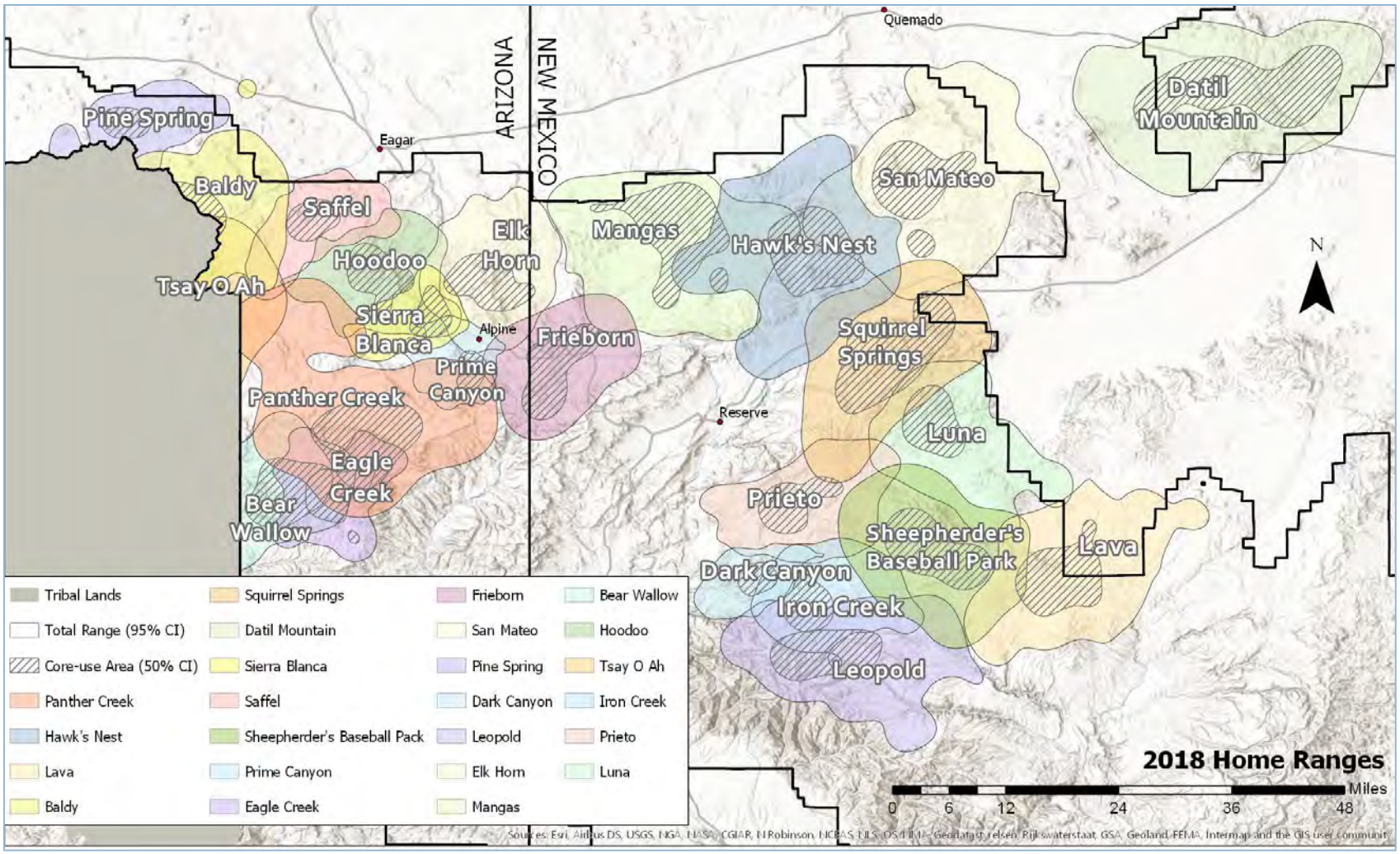

Figure 3. Mexican wolf home ranges (95% fixed kernel utilization distribution) and core use areas (50% fixed kernel utilization distribution) for 2018 in Arizona and New Mexico within the Mexican Wolf Experimental Population Area (MWEPA) excluding tribal lands. The shaded polygons on the map represent wolves having a minimum of 110 and a maximum 626 independent locations from global positioning system (GPS) collars. The IFT collected enough location data in 2018 to accurately calculate home ranges for all the packs that exhibited home range characteristics except the Maverick pack.

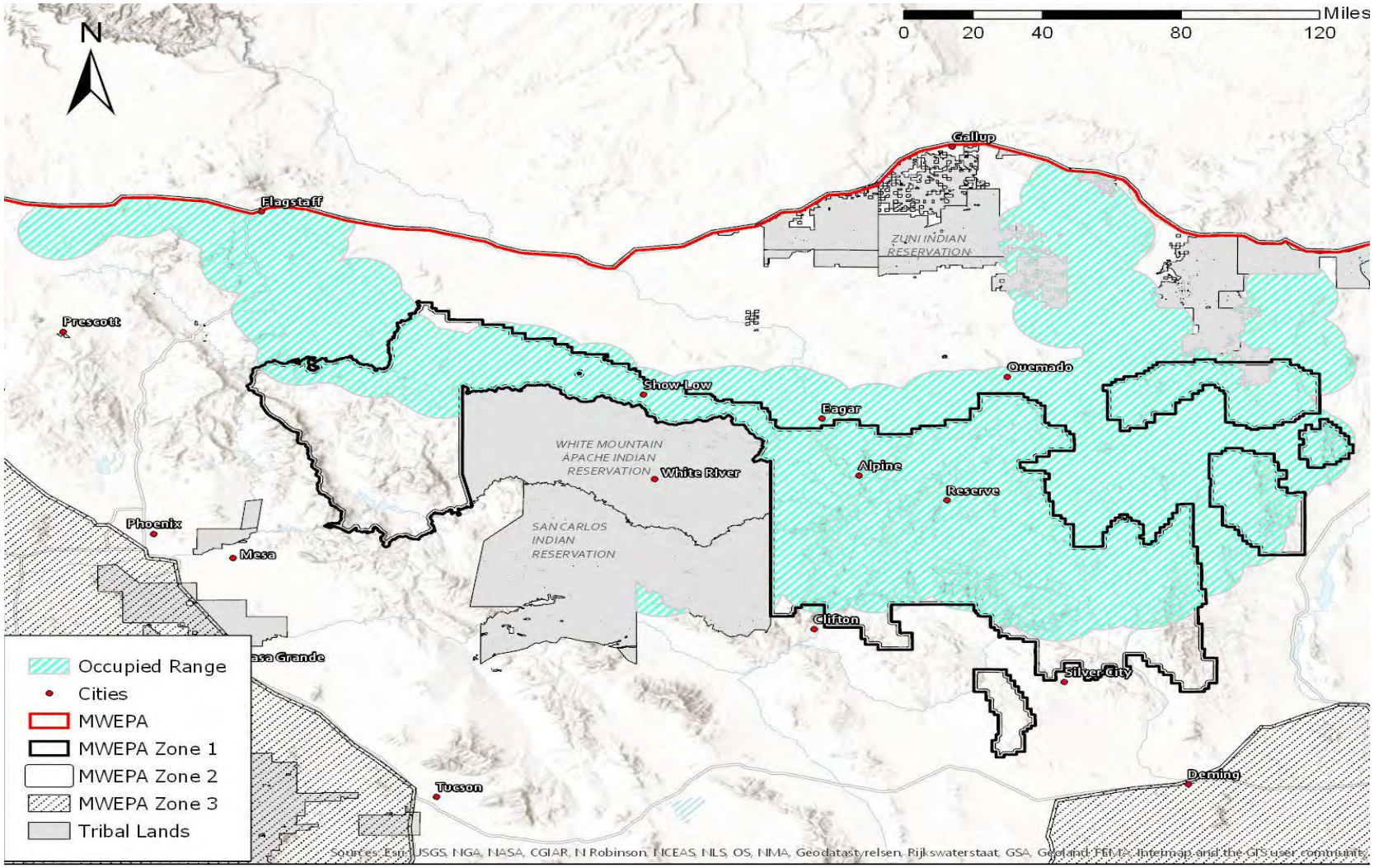

Figure 4. Mexican wolf occupied range in Arizona and New Mexico during 2018 within the Mexican Wolf Experimental Population Area (MWEPA). Occupied range was based on the following criteria: (1) a ten mile (16 km) radius around all aerial locations or GPS locations of radio monitored wolves over the past year; (2) a ten mile (16 km) radius around all uncollared wolf locations and wolf sign over the past year; and (3) in accordance with the 2015 10(j) Rule, occupied range does not include tribal lands or areas in Zone 3

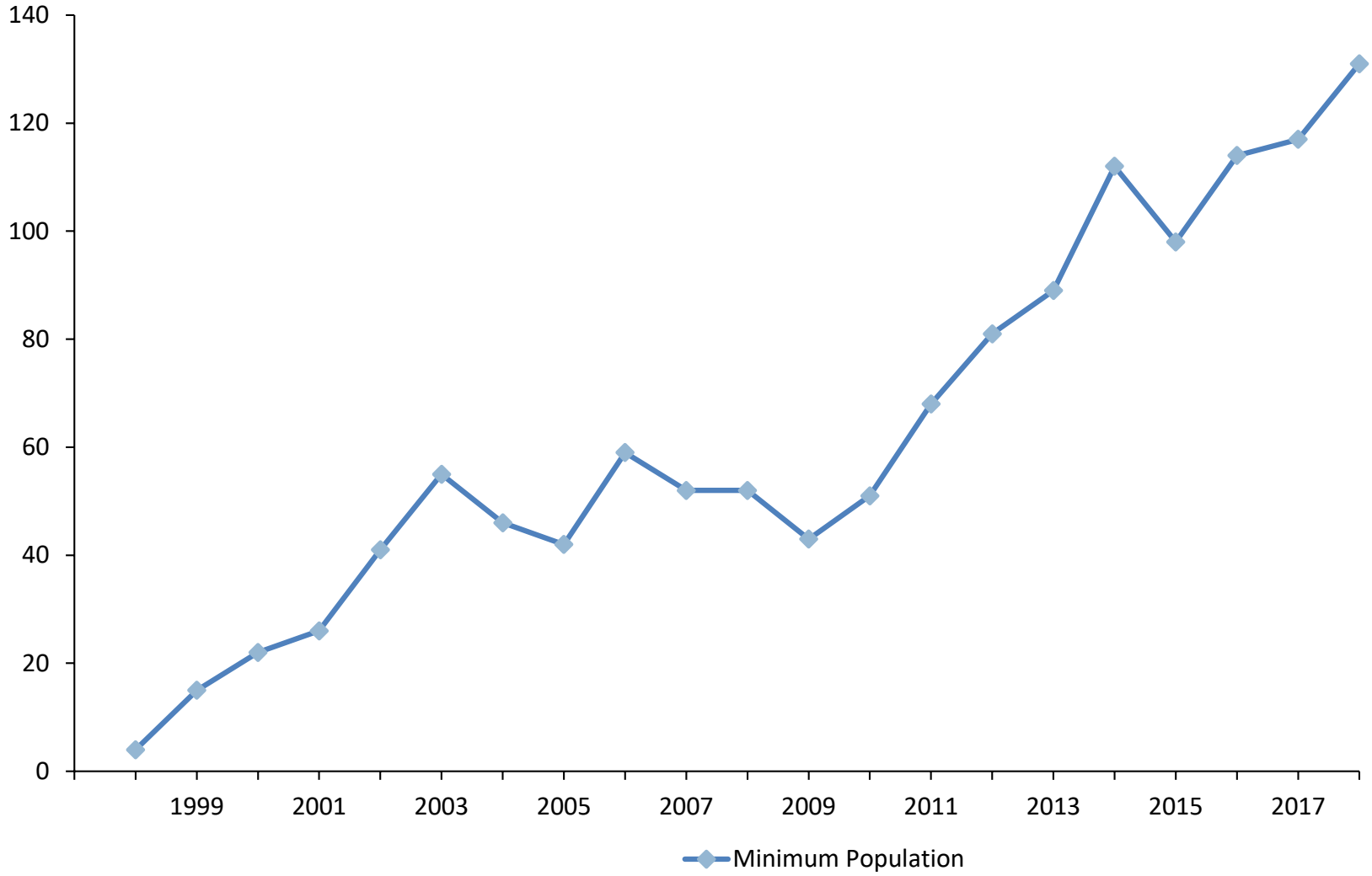

Figure 5. Mexican wolf minimum population counts from 1998 through 2018 in Arizona and New Mexico.

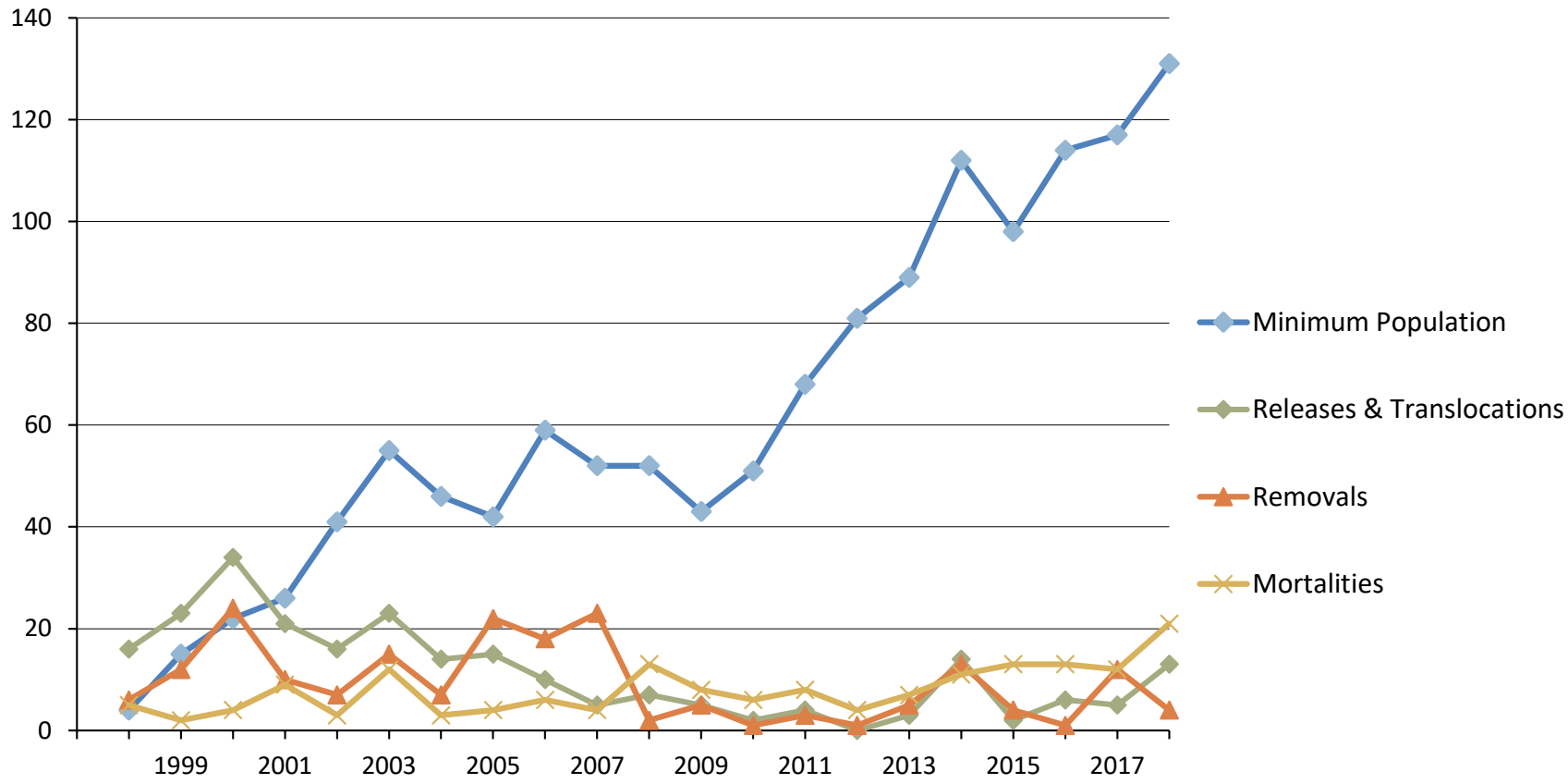

Figure 6. Mexican wolf minimum population estimates and associated population parameters (1998-2018). Releases and translocations included: initial releases (wolves released with no wild experience), translocations (wolves re-released from captivity back into the wild, and free-ranging wolves that were captured and re-released back into the wild for management purposes such as but not limited to boundary issues without having been placed temporarily into captivity). Removals included: wolves permanently removed from the wild (including wolves lethally controlled because they are associated with management actions), wolves temporarily removed from the wild and available for future translocation, and free-ranging wolves temporarily removed for management purposes such as boundary issues but without having been placed temporarily into captivity.

APPENDIX A. 2018 PACK AND SINGLE WOLF SUMMARIES

5. PACK SUMMARIES

Baldy (AM1347, F1560, m1672)
In January, Baldy consisted of AM1347, F1560 and m1672. In January, AM1347 was captured, recollared and released in Arizona during the annual aerial count and capture. m1672 became fate unknown in November. The Baldy pack was documented using the eastern portion of the FAIR and the north-central region of the ASNF. As of December 31, Baldy consisted of AM1347 and F1560. Baldy had no confirmed depredations, one capture, no mortalities, one fate unknown, no removals and no translocations. Baldy was not considered a breeding pair.

Bear Wallow (AF1335, AM1338, M1676)
At the beginning of 2018, Bear Wallow consisted of AF1335, AM1338, three uncollared sub-adults, and three uncollared pups. Throughout 2018, Bear Wallow was located within their traditional territory in the east-central portion of the ASNF and the northeast portion of the SCAR. During the annual count and capture operation, M1676 and f1683 were captured, re-collared, and released back into their territory. Denning behavior was documented for this pair, but no pups were documented travelling with this pack. This is likely due to the mortality of AF1335 in May. AF1335 was determined to have died due to illegal cause. In June, the three remaining wolves were documented travelling separately. M1676 made wide dispersal movements across the central and western portion of the ASNF in July and was located dead in September in the western portion of the ANSF. M1676 died of illegal causes. As of December 31, Bear Wallow consisted of only AM1338. Bear Wallow had one confirmed depredation, two captures, two mortalities, no fate unknowns, no removals, and no translocations. Bear Wallow was not considered a breeding pair in 2018.

Bluestem (AF1042, AM1383)
At the beginning of 2018, Bluestem consisted of AF1042, AM1383 and at least two uncollared pups/yearlings, but no functional collars were present in this pack. Bluestem continued to use their traditional territory in the central portion of the ASNF as recorded by trail cameras. In March, yearling f1686 was caught, collared and released. GPS collar data suggested that AF1042 may have denned in April, but no pups were documented with this pack. In May f1686 began making dispersal movements in the central portion of the ANSF. The Bluestem AF1042 and AM1383 were not documented for the rest of 2018. As of December 31, AF1042 and AM1383 are considered fate unknown. Bluestem had no confirmed depredations, one capture, no mortalities, two fate unknowns, no removals, and no translocations. Bluestem was not considered a breeding pair in 2018. The lack of documentation of living wolves and the designation of fate unknown for all remaining pack members marked the end of the long-standing Bluestem pack.

Copper Creek (AM1386, AF1444 and M1673)
At the beginning of 2018, Copper Creek consisted of AF1444 and AM1386. Throughout 2018, Copper Creek was located both within and outside of its traditional territory in the western portion of the Gila National Forest (GNF). In the beginning of 2018, AF1444's was considered fate unknown but believed alive. AM1386 was documented traveling within the pack's territory throughout 2018. AM1386 died in March of natural causes. As of April 1, Copper Creek consisted of just AF1444, who was fate unknown. The IFT did not document denning behavior consistent with denning. In April, Single M1673 was documented traveling in

Copper Creek's traditional territory and in September M1673 was documented traveling with AF1444. In October, AF1444 was captured, re-collared and released. At the end of December, the Copper Creek pack consisted of AF1444 and M1673. Copper creek had no depredations, one capture, one mortality, no fate unknown, no removals and no translocations. Copper Creek was not a breeding pair.

Dark Canyon (AF1456, AM1354, mp1717, mp1723, fp1724, mp1725, fp1726, fp1727, fp1728, an mp1729)

At the beginning of 2018, Dark Canyon consisted of AM1354 and AF1456. The Dark Canyon pack maintained a territory within the west central portion of the Gila National Forest (GNF). The pack exhibited behavior consistent with denning and in May the IFT cross-fostered two wild-born pups (one from Iron Creek (mp1723) and one from Lava (mp1717)) into the Dark Canyon den subsequent to cross-foster events of genetically valuable pups from captivity into both Iron Creek and Lava packs. A total of 8 pups (6 wild (fp1724, mp1725, fp1726, fp1727, fp1728, and mp1729); 2 cross-fostered) were counted at the cross-foster event, no successful pup counts were conducted after the cross-foster event. At the end of December, the Dark Canyon pack consisted of AM1354, AF1456 and two uncollared pups. Dark Canyon had one depredation, no captures, no mortalities, no fate unknown, no removals and no translocations. Dark Canyon was a breeding pair.

Datil Mountain (AF1685 and AM1453)

At the beginning of 2018, AM1453 was documented traveling with an uncollared wolf in the western portion of the Cibola National Forest (CNF). During the annual helicopter count and capture, AF1685 was captured, collared, and released. The pair became a pack in April and were named the Datil Mountain pack. The pair displayed behavior consistent with denning, however, by late May the den was considered to have failed. At the end of the year, the Datil Mountain pack consisted of AF1685 and AM1453.

Eagle Creek (M1477)

In January 2018, M1477 was dispersing from the Elk Horn pack and was documented travelling with an uncollared female wolf. They established a territory in the southern portion of the ASNF in May and became known as the Eagle Creek pack. As of December 31, the Eagle Creek pack consisted of M1477 and an uncollared female. Eagle Creek had no confirmed depredations, no captures, no mortalities, no fate unknowns, no removals, and no translocations. Eagle Creek was not considered a breeding pair in 2018.

Elk Horn (AF1294, AM1342, M1474, f1668, m1671, fp1681, fp1691, mp1693, mp1694, mp1695, fp1696, fp1697and mp1698)

At the beginning of 2018, Elk Horn consisted of AF1294, AM1342, m1474, f1473, fp1668 and mp1671. The pack's movements remained in their traditional territory in the northeastern portion of the ASNF in Arizona and the northwestern portion of the GNF in New Mexico. AF1294 was captured, collared and released during the annual helicopter survey. Elk Horn denned in early April and produced a minimum of five pups (mp1694, mp1695, fp1696, fp1697and mp1698) and the IFT cross-fostered two more pups (fp1691, mp1693) from captivity into the den. In August, fp1691 was found dead in New Mexico. Cause of death was illegal take. During fall trapping efforts, fp1697, fp1696 and mp1595 were captured, collared and released. As of December 31, the Elk Horn pack consisted of seven individuals: AF1294, AM1342, f1668, m1671, mp1695, fp1696 and fp1697. Elk Horn had three confirmed depredations, four captures, one mortality, one fate unknown (excluding young pups), no removals, and no translocations. Elk Horn was a breeding pair.

Frieborn (AM1447, AF1443 mp1690, fp1692, mp1699, fp1700, fp1701, fp1702, fp1703, mp1704)
In the beginning of 2018, the Frieborn pack consisted of AM1447 and AF1443. The pack continued to maintain a territory in the east central portion of the Apache-Sitgreaves National Forest (ASNF) in Arizona and New Mexico. In January, AF1443 was captured, re-collared and released during annual helicopter count and capture operations. The pack displayed behavior consistent with denning and in April, two genetically valuable captive pups (mp1690 and fp1692) were cross-fostered by the IFT into the Frieborn den. A total of 8 pups (6 wild (mp1699, fp1700, fp1701, fp1702, fp1703, and mp1704), 2 cross-fostered) were counted at the cross-foster event. In September, fp1702, a wild-born pup, was captured, processed and released. In November, AM1447 died of illegal causes. At the end of December, the Frieborn pack consisted of AF1443, fp1702 and one uncollared pup. Frieborn had one depredations, two captures, one mortality, no fate unknown (excluding young pups), no removals and no translocations. Frieborn was not a breeding pair because an adult male was not documented traveling with the pair in December.

Frieborn Pack in the in the Mexican Wolf Experimental Population Area. Photo credit: Interagency Field Team

Hawks Nest (AM1038 and AF1473)
In January of 2018, Hawks Nest AM1038 had been documented traveling alone within the north central portion of the GNF in New Mexico. F1473, a single dispersing wolf from Arizona, was documented traveling with AM1038 in February. The pair became the Hawks Nest pack in April. They displayed behavior consistent with denning in early April, however, by May the den was considered to have failed. In November AM1038 was located dead, and in December F1473 was also located dead in New Mexico. Both wolves died of illegal causes. The death of both sole pack members marked the end of the long standing Hawks Nest pack. The Hawks Nest pack had one depredation, no captures, two mortalities, no fate unknown, no removals and no translocations. Hawks Nest was not a breeding pair.

Hoodoo (AM1290, AF1333, m1666, m1677, m1681, mp1789)
At the beginning of 2018, Hoodoo consisted of AM1290, AF1333, mp1666, and two uncollared pups. Hoodoo was documented throughout the year in the central portion of the ASNF in Arizona. Male yearlings m1677 and m1681 were captured, collared, and released during the annual helicopter count and capture operation. Hoodoo denned in April and produced a minimum of four pups. In August, m1666 slipped his collar. During fall trapping efforts, mp1789 was caught, collared and released. In November and December m1677, m1681 and mp1789 made dispersal movements in the central portion of the ANSF, but were still considered part of the Hoodoo pack at the end of the year. As of December 31, Hoodoo consisted of AM1290, AF1333, m1677, mp1789 and four uncollared wolves. Hoodoo had no confirmed depredations, three captures, no mortalities, no fate unknowns, no removals, and no translocations. Hoodoo was a breeding pair.

Iron Creek (AF1278, AM1240, M1556, F1670, m1821, mp1710, fp1712, mp1719, mp1720, fp1721, fp1722, mp 1723)
At the beginning of 2018, the Iron Creek pack consisted of a minimum of six animals: AM1240, AF1278, m1555, m1556, f1670 and one uncollared pup. Throughout the year the Iron Creek pack was located within their traditional territory in the northern portion of the Gila Wilderness and the southern portion of the GNF. In January, AF1278 was captured, re-collared and released as part of annual helicopter operations. In late winter and early spring, m1555 and m1556 displayed dispersal behavior. M1556 remained part of the pack throughout the year while M1555 dispersed and became a single animal by Dec 31st. In April, the pack showed behavior consistent with denning and in May two genetically valuable captive pups were cross-fostered by the IFT into the Iron Creek den. A total of six pups remained at the Iron Creek den after the cross-foster event; four wild-born Iron creek pups (mp1719, mp1720, fp1721, fp1722) remained at the Iron Creek den, two captive-born cross-foster pups (mp1710, fp1712) were added to the Iron Creek den and one wild-born pup (m1723) was translocated from the Iron Creek den to the Dark Canyon den. In August, the IFT documented three surviving pups. In September, m1821 and m1556 were captured, re-collared and released. In September and October, fp1721 and mp1710 (respectively) were captured, collared and released; mp1710 is a genetically valuable, captive-born cross-foster pup. F1670 was last documented in August and her status changed to fate unknown, but believed alive in November. As of December 31st, Iron Creek consisted of eight animals: AF1278, AM1240, M1556, F1670, m1821, mp1710, fp1721 and one uncollared pup. Iron Creek had five captures, no confirmed mortalities, one fate unknown, no removals, one translocation, and two depredations. The Iron Creek pack was a breeding pair during 2018.

Lava (AM1285, AF1405, mp1711, fp1713, mp1714, mp1715, mp1716, mp1717, mp1718)
In January, Lava consisted of AM1285 and AF1405. Throughout the year, Lava used their territory in central portions of the GNF. In May, Lava exhibited denning behavior and the IFT successfully cross-fostered two captive born pups (mp1711 and fp1713) from the Endangered Wolf Center into the Lava pack's den. In order to reduce the litter size (Lava had five wild born pups (mp1714, mp1715, mp1716, mp1718) and increase the chance of survival of the genetically valuable pups, the IFT removed one of Lava's wild born pups (mp1717) and placed it into the Dark Canyon den, which had whelped on the same day as the Lava pack. As of December 31, Lava consisted of AM1285, AF1405, and at least two uncollared pups. Lava had one confirmed depredation, no captures, no mortalities, no fate unknown, no removals, and no translocations. The Lava pack was considered a breeding pair in 2018.

Leopold pack (AM1293, AF1346)

At the beginning of 2018, the Leopold pack consisted of AM1293, AF1346 and m1561. Throughout the year the Leopold pack was located within their traditional territory in the northern portion of the Gila Wilderness. In April, m1561 dispersed from the Leopold pack. m1561 moved to the northwest until it was removed for being outside of the 10(j) area, south of the Grand Canyon in Arizona on May 13. m1561 was translocated within the Leopold territory the following day, but ultimately dispersed again and joined the SBP pack. Leopold displayed behavior consistent with denning in the spring of 2018; however no pups were documented in late spring or summer. As of December 31, Leopold consisted of AM1293 and AF1346. Leopold had one capture, no confirmed mortalities, no fate unknowns, no removals, one translocation, and no depredations. The Leopold pack was not a breeding pair in 2018.

Luna pack (AF1487, AM1158)

In January of 2018, the Luna pack consisted of a minimum of four wolves: AM1158, AF1487, fp1684 (captured and collared during the annual helicopter count and capture), and one uncollared pup. The IFT documented denning behavior in April, and a minimum of four pups were documented with the Luna pack in June. In late October, the radio collar on f1684 had failed, and in November a private trapper had captured her while she had dispersed within the eastern portion of the GNF, and the IFT re-collared and released her. By the end of December, the Luna pack was considered a breeding pair, and consisted of a minimum of seven animals: AF1487, AM1158, one un-collared sub-adult, and four un-collared pups. The Luna pack had two captures, no mortalities, no fate unknowns, no removals, no translocations, and one depredation.

Mangas pack (AM1296, AF1439, f1664)

In January of 2018, the Mangas pack consisted of five wolves: AM1296, AF1439, fp1664 and two uncollared pups. Mangas maintained their territory in the northwest portion of the GNF throughout 2018. In January, fp1664 was captured by a private trapper in the northwest portion of the GNF. The IFT processed and collared fp1664, provided veterinary care for a foot injury and released her. During the annual helicopter count and capture operations, fp1664 was re-captured to provide additional veterinary treatment for the foot injury and released in February. In January, AM1296 was captured, re-collared and released during annual helicopter operations. The pair exhibited denning behavior during the spring and one pup was documented in the summer. In May, f1705 was captured, collared and released. In October, f1664 died, the cause of death was illegal take. As of December 1, f1705 had dispersed from the pack and the Mangas pack consisted of four wolves: AM1296, AF1439, an uncollared juvenile and an uncollared pup. The Mangas pack had three captures, one confirmed mortality, no fate unknowns, one removal, one translocation and four depredations. The Mangas pack was a breeding pair in 2018.

Maverick (AM1183, AF1291, fp1828)

In January, Maverick consisted of AM1183 and AF1291. In October, fp1828 was captured, collared, and released. Maverick was documented using the southeast portion of the FAIR and the east-central portion of the ASNF. As of December 31, Maverick consisted of AM1183, AF1291, and fp1828. Maverick had no confirmed depredations, one capture, no mortalities, no fate unknowns, no removals, and no translocations. Maverick was a breeding pair.

Morgart's pack (AM1155)

In January of 2018, AM1155 was alone and traveling throughout central and north central portions of the GNF. The IFT failed to locate AM1155 in March due to a failed radio collar, and by June was considered

fate unknown. This marked the end of Morgart's pack. The Morgart's pack had one confirmed depredation and one probable depredation, no captures, no mortalities, one fate unknown, no removals, and no translocations. Morgart's pack was not a breeding pair.

New Pair AZ #1 (F1489)
At the beginning of 2018, F1489, formerly of the Bluestem pack, was documented making dispersal movements in the central ASNF. F1489 was documented traveling with another wolf in the summer at two depredations. This new pair had two confirmed depredations, no captures, no mortalities, no fate unknowns, no removals, and no translocations.

New Pair AZ #2 (f1686)
In May, f1686 began making dispersal movements in the central portion of the ANSF. f1686 made wide ranging movements but ultimately was documented with an uncollared wolf and designated as a new pair during the annual count. This new pair had no confirmed depredations, no captures, no mortalities, no fate unknowns, no removals, and no translocations.

New Pair AZ #3 (M1574)
In January, M1574 was with the Panther Creek pack. M1574 dispersed from the Panther Creek pack in 2017. During the annual count M1574 was observed with an uncollared wolf and designated as a New Pair. This new pair had no confirmed depredations, no captures, no mortalities, no fate unknowns, no removals, and no translocations.

New Pair AZ #4 (f1674)
For the majority of 2018, f1674 traveled with her natal pack, Tsay-O-Ah pack, showing occasional signs of dispersal. During the 2019 annual aerial count and capture, she was documented outside of her natal pack territory with an uncollared wolf. It was determined that she was likely traveling with this animal at the end of 2018 and therefore justified qualifying them as a new pair – to be named in 2019, after pairing criteria is met. This pair had no confirmed depredations, no captures, no mortalities, no fate unknowns, no removals, and no translocations. The new pair was not a breeding pair.

New Pair NM #1 (M1824, F1578)
During October of 2018, an un-collared wolf (M1824) was captured, collared, and released on the FAIR. M1824 eventually traveled to the north central portion of the GNF in December, and paired with F1578, which had recently dispersed from her natal pack (San Mateo). This new pair had no confirmed depredations, one capture, no mortalities, no fate unknowns, no removals, and no translocations.

New Pair NM #2 (M1555)
For the majority of 2018, M1555 remained with the Iron Creek pack with occasional movements away from the pack. During the annual count, M1555 was documented with an uncollared wolf away from the Iron Creek pack and designated as a new pair. This pair had no confirmed depredations, no captures, no mortalities, no fate unknowns, no removals, and no translocations.

New Pair NM #3 (f1705)
f1705 remained with the Mangas pack for the majority of the year with occasional movements away from the pack. During the annual count, f1705 was documented with an uncollared wolf away from the Mangas pack

and designated as a new pair. This pair had no confirmed depredations, no captures, no mortalities, no fate unknowns, no removals, and no translocations.

Panther Creek (AF1339, AM1382, f1683)

At the beginning of 2018, Panther Creek consisted of AM1382, AF1339, and M1574. M1382, originally from the Bluestem pack, was documented traveling with AF1339 of Panther Creek in 2017. AF1339 was captured, collared, and temporarily removed to captivity for breeding due to her close relatedness to AM1382 (a full sibling) during the annual count and capture operation. She was returned to the wild in February. AF1339 and AM1382 continued to travel together, but M1574 began travelling independently from the pack in April. In May, AF1339 was found dead. Cause of death was illegal take. After that, AM1382 was documented traveling alone until December when AM1382 was documented travelling with f1683, a disperser from the Bear Wallow pack. As of December 31, Panther Creek consisted of AM1382 and f1683. Panther Creek had no confirmed depredations, two captures, one mortality, no fate unknown, no removals, and no translocations. Panther Creek was not considered a breeding pair in 2018.

Pine Spring (AF1562, AM1394, fp1794, fp1825)

At the beginning of 2018, Pine Spring consisted of AM1394 and AF1562. AM1394 was captured, re-collared, and released during the annual helicopter count and capture. Pine Spring denned in April and produced a minimum of five pups. During fall trapping efforts, two pups, fp1794 and fp1825 were caught, collared and released. As of December 31, Pine Spring consisted of AM1394, AF1562, fp1794, fp1825 and three uncollared pups. Pine Spring had one confirmed depredation, three captures, no mortalities, no fate unknowns, no removals and no translocations. Pine Spring was a breeding pair.

Prieto (AF1251, AM1398, F1565, m1669, f1826, m1827)

Prieto pack pups in the Mexican Wolf Experimental Population Area. Photo credit: Interagency Field Team

At the beginning of 2018, Prieto consisted of a minimum of six animals: AF1251, AM1398, f1565, mp1669 and two uncollared pups. The 2017 annual population count previously reported only one uncollared pup, but captures in 2018 indicate two uncollared pups from 2017 survived. Throughout the year, the Prieto pack was located in the north-central portion of the GNF. In January, mp1678 was captured, collared and released during annual helicopter operations. The Prieto pack displayed behavior consistent with denning and a minimum of two pups were documented in April. Three pups were documented in June and it was later determined that both AF1251 and F1565 had denned and a minimum of five pups had been produced. In October, f1826 and m1827 were captured, collared and released. In November, f1826 died of natural causes. In December, m1678 dispersed from the pack. In December, the IFT was notified that two wolves had potentially escaped with traps on their feet. A helicopter capture was immediately attempted. Both F1565 and m1669 were captured and placed under veterinary care. Unfortunately, F1565 died the first night under medical care while m1669 was removed to captivity and eventually required amputation of the leg. As of December 31, the Prieto pack consisted of five animals: AF1251, AM1398, m1827 and two uncollared pups. Prieto had nine confirmed depredations, four captures, two mortalities, no fate unknowns, one removal and no translocations. The Prieto pack was a breeding pair in 2018.

Prime Canyon (AM1471, AF1488, mp1790, fp1791, fp1823)

At the beginning of 2018, Prime Canyon consisted of M1471 and F1488. Prime Canyon denned in April and produced a minimum of six pups. During fall trapping efforts, three pups, mp1790, fp1791 and fp1823 were caught, collared and released. As of December 31, Prime Canyon consisted of AM1471, AF1488, mp1790, fp1791, fp1823 and two uncollared pups. Prime Canyon had one confirmed depredation, three captures, no mortalities, no fate unknowns, no removals, and no translocations. Prime Canyon was considered a breeding pair.

Saffel (AM1441, AF1567, m1661, m1680, fp1792, mp1793)

At the beginning of 2018, Saffel consisted of AM1441, AF1567, mp1661 and three uncollared pups. Male pup 1680 and AM1441 were captured, collared, and released during the annual helicopter count and capture operation. Saffel denned in April and produced a minimum of six pups. During fall trapping efforts, two pups, fp1792 and mp1793 were caught, collared and released. In September, mp1793 was found dead. Cause of death confirmed to be canine distemper. In October, m1680 made dispersal movements from the pack's territory into New Mexico. In November m1680 was found dead in New Mexico. Cause of death is under investigation. Yearling m1661 made dispersal movements in the southern portion of the ANSF and New Mexico. In December, m1661 was found dead in Arizona. Cause of death was determined to be a vehicle strike. As of December 31, Saffel consisted of AM1441, AF1567, fp1792 and four uncollared wolves. Saffel had no confirmed depredations, four captures, two mortalities, no fate unknowns, no removals and no translocations. Saffel was a breeding pair.

San Mateo pack (AM1345, AF1399, fp1822)

In January of 2018, the San Mateo pack consisted of five wolves: AF1399, AM1345, fp1578 and two un-collared pups. The IFT documented denning behavior of the San Mateo pack in April and counted a minimum of six pups. During September, the IFT successfully captured and collared fp1822 and re-collared AF1399. During December, f1578 dispersed and paired with M1824 in the north central portion of the GNF. By the end of December, the San Mateo pack consisted of nine wolves: AF1399, AM1345 (failed collar but documented alive and with the pack), fp1822, one un-collared sub-adult, and four un-collared pups. San Mateo had one confirmed depredation, two captures, no mortalities, no fate unknowns, no removals and no translocations. San Mateo was a breeding pair in 2018.

Sheepherder's Baseball Park ([SBP] AF1553, AM1284, M1561, M1678, mp1667, fp1682)
At the beginning of 2018 SBP pack consisted of four wolves, AM1284, AF1553, mp1667, and fp1682 (captured during the annual helicopter count and capture). In early April, AM1284, mp1667, and fp1682 were not documented by the IFT and all three became fate unknown in July. In the spring of 2018, AF1553 displayed signs of denning and with AF1553 as the sole member of the pack, the IFT established a supplemental food cache to increase the survival of the new SBP pups. In June, M1561 had dispersed (following translocation) from his natal pack (Leopold) and paired with AF1553 and helped rear her pups. During July, the IFT documented a minimum of three pups with the SBP pack. In September M1561 was located dead, and in December m1678 (dispersed male wolf from the Prieto pack) paired with AF1553.At the end of December the SBP pack consisted of four animals which included M1678, AF1553, and two uncollared pups. SBP had no confirmed depredations, one capture, one mortality, three fate unknowns, no removals and no translocations. The SBP pack was considered a breeding pair in 2018.

Sierra Blanca (M1571, F1550)
At the beginning of 2018, M1571 formerly of the Diamond pack and F1550 of the Hoodoo pack were documented travelling together. In April, they established a territory in the east central portion of the ASNF and became known as the Sierra Blanca pack. As of December 31, Sierra Blanca consisted of M1571 and F1550. Sierra Blanca had no confirmed depredations, no captures, no mortalities, no fate unknowns, no removals and no translocations. Sierra Blanca was not considered a breeding pair in 2018.

Squirrel Springs (AF1788, AM1349)
In June of 2018 a series of depredations occurred in an uncollared wolf area in the central portion of the GNF. The IFT initiated trapping efforts and successfully captured, collared, and released breeding AF1788. The IFT documented AF1788 traveling with an un-collared male, but was unable to document pups. The IFT intensively hazed the pair out of cattle throughout the summer to reduce any further depredations. In December, a private trapper captured an adult male, which the IFT collared and released. The IFT later determined this wolf, AM1349, was a previously fate unknown wolf from 2014 of the Coronado pack. At the end of 2018 the Squirrel Springs pack consisted of AF1788 and AM1349. Squirrel Springs had six confirmed depredations, two captures, no mortalities, no fate unknowns, no removals and no translocations. Squirrel Springs was not a breeding pair in 2018.

Tsay-O-Ah (AF1283, AM1343, and M1559)
In January, Tsay-O-Ah consisted of AM1343, AF1283, and f1674. In January, AF1283 and AM1343 were captured, recollared and released during the annual aerial count and capture. In August AM1343 died. In September, M1559 – formerly of the Tu dil hil Pack, was first observed with Tsay-O-Ah. f1674 dispersed from the pack and by end of year was considered part of a new pair. Tsay-O-Ah was documented using the east-central/southeastern portions of the FAIR and was occasionally documented in the east-central portion of the ASNF. Tsay-O-Ah had no confirmed depredations, two captures, one mortality, no fate unknowns, no removals, and no translocations. Tsay-O-Ah was a breeding pair.

Tu dil hil (F1679)
In January, M1559 was first documented on trail camera with an uncollared. Subsequently, this uncollared (F1679) was captured, collared and released during the annual aerial count and capture. The pair was named Tu dil hil pack and documented traveling together until September, when M1559 was documented

traveling with the Tsay-O-Ah pack. F1679 retained the pack name, as she was documented maintaining the same territory that the pack did. Tu dil hil was documented using the southeastern portion of the FAIR and was occasionally documented on the SCAR. Tu dil hil had no confirmed depredations, one capture, no mortalities, no fate unknowns, no removals, and no translocations. Tu dil hil was not a breeding pair.

6. INDIVIDUAL WOLF SUMMARIES

M1572
At the beginning of 2018, M1572, formerly of the Diamond pack, was documented making wide dispersal movements in the Coconino National Forest, and through the western and central portions of the ASNF to the eastern portion of the FAIR. In February, the IFT confirmed the mortality of M1572. The cause of death is under investigation.

m1673
At the beginning of 2018, m1673, formerly of the Bear Wallow pack, was documented making dispersal movements in New Mexico and the south central portion of the ASNF. In September, m1673 was documented traveling with Copper Creek AF1444 on a trail camera within the Western portion of the Gila National Forest (GNF) and became part of the Copper Creek pack in October.

f1484
At the beginning of 2018, f1484 was documented making dispersal movements in the east central portion of the ASNF. The IFT confirmed the mortality of f1484 in February. Cause of death is unknown.

M1455
During February, M1455 was located on a remote trail camera placed in the central portion of the GNF. Due to a failed radio collar he became fate unknown by May.

M1486
From January through the end of October M1486 was continuously documented alone as he traveled throughout the central and northern portion of the CNF. He was located dead in November.

F1684
During October of 2018, the radio collar on Luna F1684 failed. In November, a private trapper captured F1684 in the eastern portion of the GNF, and the IFT re-collared and released her. She traveled back within her natal pack territory and was located alone at the end of the year.

M1569
During January and February M1569 traveled throughout the central and northern portion of the Cibola National Forest. He was located dead in March.

Single M1552
M1552 was located traveling within the CNF in January of 2018, but became fate unknown by April of 2018.

7. PERSONNEL

The IFT acknowledges the assistance of all agency personnel and volunteers who provided data and support services for the operational field portion of the Mexican wolf reintroduction project during this reporting period. Individuals listed in Appendix C collected data or provided other information for this report.

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Dave Cagle, Wildlife Program Manager
Rick Langley, Game Specialist
Bill David, Chief Pilot
Pete Applegate, Pilot
Steve Sunde, Pilot
Steve Dubois, Pilot
Preston Hunts, Pilot

New Mexico Department of Game and Fish
Agency cooperation ceased July 1, 2011; however, District officers remain involved in law enforcement issues.

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Rudolph Fajardo, District Supervisor
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Matt Ellis, Wildlife Biological Science Technician
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