

# **Mexican Wolf Recovery Program: Progress Report #19**

**Reporting Period: January 1 – December 31, 2016**

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



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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, or ESA). 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) Reintroduction – includes aspects of the program implemented by the Service and cooperating States, Tribes, other Federal agencies, and counties that pertain to 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, 2016.

## **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 from the wild in the southwestern United States by 1970, primarily as a result of a decades-long concerted effort to eradicate them due to livestock conflicts. Recovery efforts for the Mexican wolf began when it was listed as an endangered species in 1976. In the late 1970s and early 1980s, the initiation of a binational captive breeding program originating from just seven wolves saved the Mexican wolf from extinction.

The recovery effort for the Mexican wolf focuses on maintenance of the captive breeding population and the reestablishment of wolves in the wild, as recommended by the 1982 Mexican Wolf Recovery Plan. Mexican wolves were first released to the wild in March 1998.

Today, the reintroduced population 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. In Mexico, federal agencies initiated a reintroduction effort in 2011 pursuant to Mexico's federal laws and regulations.

## **PART A: RECOVERY ADMINISTRATION**

### **1. Mexican Wolf Captive Breeding Program**

#### ***a. Mexican Wolf Species Survival Plan (SSP)***

The SSP is a binational captive breeding program between the United States and Mexico for the Mexican wolf. Its mission is to reestablish the Mexican wolf in the wild through captive breeding, public education, and research. SSP members 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 rigorously managed in accordance with a Service-approved standard protocol.

This year, the SSP held its annual binational meeting to plan and coordinate wolf breeding, transfers, and related activities among facilities jointly with the Service's red wolf program. The joint meeting was hosted by Wolf Haven International, the Endangered Wolf Center, and the Wolf Conservation Center and held at Chico Hot Springs in Pray, Montana. The meeting entailed updates on the reintroduced populations in the US and Mexico, discussion on the gamete banking plan for 2017, evaluation and selection of release candidates for both the US and Mexico, and reports on research including advances in gamete banking, potential effects of a variety of contraception methods, and progress toward lifetime reproductive planning for female wolves.

As of July 2016, the SSP captive population includes approximately 251 captive Mexican wolves managed in 51 facilities in the United States and Mexico. This current population size is only slightly above the SSP goal of housing 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 captive population was the sole source population to reestablish the species in the wild, as it was extirpated throughout its range in the United States and Mexico. The SSP captive population is now the source for Mexican wolves released into the wild to improve gene diversity. Thus, without the SSP, recovery of the Mexican wolf would not be possible. Wolves that are considered genetically well represented in the SSP population may be designated for release. Within that pool of wolves, suitable release candidates are determined based on criteria such as genetic makeup, reproductive performance, behavior, and physical suitability. Additional analyses are performed to ensure that the reintroduced population is receiving wolves of appropriate and balanced genetic history. This minimizes any adverse effects to the genetic integrity of the captive population, in the event that wolves released to the wild do not survive. Based on these standards, this year the SSP identified two Mexican wolf pairs to breed at the Service's Sevilleta Wolf Management Facility for potential release in the US in 2017.

### *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 characteristics and behaviors. The Service oversees the management at two of these facilities; 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 for the purpose of minimizing habituation to humans and maximizing 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 sustained on carnivore logs and a zoo-based exotic canine diet formulated for wild canids. Diets of release candidates are supplemented 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.



Photo: Mexican wolves F1362 and fp1494 at the Sevilleta Wolf Management Facility. Photo credit: US Fish and Wildlife Service

### 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 entirely 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 2016 the refuge staff continued to assist Mexican Wolf Recovery Program staff in the maintenance and administration of the wolf pens. Through the course of the year, eleven individual wolves were housed at Sevilleta. At the start of the year, six wolves were housed at Sevilleta. During the year one wolf was received from the MWEPA. Three wolves were transferred out of Sevilleta to participating SSP facilities in the United States. Four births and three deaths (three of the four pups died shortly after birth) occurred at Sevilleta in 2016. At year's end, the facility housed five wolves.

### 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. There are a total 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 2016, 16 individual wolves were housed at the Ladder Ranch. Ten wolves were transferred to the Ladder; one from the MWEPA and nine from SSP facilities in the United States. Twelve wolves were transferred out; one to an SSP facility and 11 to Mexico. Six births and no deaths occurred at the Ladder Ranch in 2016. At year's end, the Ladder Ranch housed four Mexican wolves.

## **2. Recovery Planning**

This year, the Service continued its effort to revise the 1982 Mexican Wolf Recovery Plan. The Service invited participants from New Mexico Department of Game and Fish, Arizona Game and Fish Department, Utah Division of Wildlife Resources, Colorado Parks and Wildlife, federal agencies in Mexico, and independent scientists from the US and Mexico to continue to assist us in gathering and assessing scientific information pertinent to our development of a revised recovery plan. We expect to produce a draft recovery plan for public and peer review in mid 2017, and a final recovery plan by the end of November 2017. The Service previously initiated the revision of the recovery plan, but did not produce an agency-approved draft or final plan.

Additional updates on the revision of the recovery plan will be available during 2017 on our website, <https://www.fws.gov/southwest/es/mexicanwolf/MWRP.cfm>.

## **3. Summary of Litigation**

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

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

Intervenors: Protect American Now; Colorado Farm Bureau; NM Farm and Livestock Bureau; Utah Farm Bureau; Coalition of AZ and NM Counties for Stable and Economic Growth

Allegation: Violation of ESA for failure to prepare a recovery plan

Date NOI Filed: September 10, 2014

Date Complaint Filed: November 11, 2014  
Case Number/Court: 4:14-cv-0472 JGZ (D. Ariz.)  
Status: Agreement approved on October 16, 2016

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: Ongoing

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: State of Arizona  
Defendants: Secretary of the Interior, US Fish and Wildlife Service  
Intervenors: State of Colorado; NM Department of Game and Fish; State of Utah (Plaintiffs)  
Allegation: Violation of ESA for failure to revise recovery plan  
Date NOI Filed: January 20, 2015  
Date Complaint Filed: June 8, 2015  
Case Number/Court: 4:15-cv-00245-JGZ (D. Ariz.)  
Status: Agreement approved on October 16, 2016

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: Ongoing

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: Ongoing



Photo: Mexican wolf M1384 at the Sevilleta Wolf Management Facility. Photo credit US Fish and Wildlife Service

#### 4. Reintroduction Project 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. 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/documents.cfm>

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 2016 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 Reintroduction Project 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/speciesofgreatestconcern/mexicanwolves/>

#### 5. Cooperative Agreements

In 2016, the Service funded cooperative agreements with AGFD, San Carlos Apache Tribe (SCAT), TEF, 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.

| Cooperator                  | USFWS/Mexican Wolf Project Funds Provided in 2016 |
|-----------------------------|---------------------------------------------------|
| AGFD                        | \$ 165,000                                        |
| SCAT                        | \$ 40,000                                         |
| TEF                         | \$ 29,000                                         |
| The Living Desert           | \$ 30,000                                         |
| University of New Mexico    | \$ 10,000                                         |
| University of Idaho         | \$ 10,000                                         |
| White Mountain Apache Tribe | \$ 205,000                                        |

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/documents.cfm>

#### 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 2016. 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/>

| <b>Year</b> | <b>Direct Compensation for Livestock Lost</b> | <b>Payments for Wolf Presence</b> | <b>Total</b> |
|-------------|-----------------------------------------------|-----------------------------------|--------------|
| 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                                   | 2016 Payments TBD                 | TBD          |



Photo: Mexican wolf M1336 at the Sevilleta Wolf Management Facility. Photo credit US Fish and Wildlife Service

## 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.

## **PART B: REINTRODUCTION**

### **Mexican Wolf Experimental Population Area Interagency Field Team Annual Report Reporting Period: January 1 – December 31, 2016**

#### **Prepared by:**

Arizona Game and Fish Department, U.S. Department of Agriculture - Animal and Plant Health Inspection Service - Wildlife Services, U.S. Forest Service, U.S. Fish and Wildlife 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 2016 annual report reflects the 2015 population parameters published in the 2015 annual report addendum (<http://www.fws.gov/southwest/es/mexicanwolf/documents.cfm>).*

### **1. Introduction**

This report summarizes results of Mexican Wolf Interagency Field Team (IFT) activities during 2016. 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 Reintroduction Project is conducted in accordance with a nonessential experimental population Final Rule (USFWS 2015; 2015 10(j) Rule) that expanded the Mexican Wolf Experimental Area (MWEPA) south of Interstate 10 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, Gila, and Sitgreaves 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 2440 mi<sup>2</sup> (6319 km<sup>2</sup>) 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. The wild population minimum count increased from 97 wolves in 2015 to 113 wolves in 2016 principally due to increased pup survival in 2016 relative to 2015. Six initial releases (cross-fostering of neonatal wolf pups into

wild wolf packs) occurred in 2016. At the end of 2016, the wild population totaled a minimum of 113 wolves, and 21 packs; 13 of which produced at least one pup that survived to year-end, and three new pairs. More information on population statistics can be found at

<http://www.fws.gov/southwest/es/mexicanwolf/> and  
[http://www.azgfd.gov/w\\_c/es/wolf\\_reintroduction.shtml](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 purposes.



Photo: Mexican wolves M1347 and F1445 from the Mount Baldy Pack. Photo credit: Mexican Wolf Interagency Field Team

## 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 is derived from information gathered through a variety of methods that are deployed annually by the IFT from November through the year-end helicopter count. The IFT continued to employ comprehensive efforts initiated in 2006 to make the 2016 year-end population estimate more accurate. Management actions implemented included increased 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 (i.e. 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. Survey data were also recorded daily on forms and compiled in a database.

In January and February 2016, aircraft were used to document free-ranging wolves for the end-of-year 2016 population count and to capture wolves to affix radio collars. Including January and February data in the December 31 end-of-year count (and in this 2016 annual report) is appropriate, 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 year-end minimum population 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 the number 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 allowed.

As part of the 2016 population year-end 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 analyzed by the IFT to determine those that most likely represented unknown wolves or packs for purposes of completing the year-end count.

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. 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 2016, the minimum population count was 113 wolves. Pups comprised 44% of this population which is greater than the previous year (24%). Eleven packs were considered breeding pairs in 2016.

At the beginning of 2016, the collared population consisted of 48 wolves among 21 packs and four single/unaffiliated wolves. At year end, fifty-four collared wolves (34 adults, 4 subadults, and 16 pups) among 21 packs, three new pairs and two single wolves were documented which was an increase in the number of collared wolves from 2015.

A total of 58 uncollared wolves were documented in the MWEPA at the end of 2016 (*note: all of the uncollared wolves captured during the January and February 2017 helicopter operation were included as uncollared animals associated with known packs above*). Fifty of the 59 uncollared wolves were associated with 18 packs and two pairs in which individuals were equipped with radio-collars (Table 1).

The IFT documented one uncollared group of wolves in New Mexico and six uncollared single wolves (one in Arizona and five in New Mexico) which were not associated with collared packs. Additional uncollared animals were found on the FAIR in 2016. These areas will be priorities for IFT trapping efforts in 2017.

Fourteen natural pairings of breeding age wolves in the MWEPA population occurred in 2016. The natural pairings of dispersing or single wolves resulted in the designation of two new packs, Baldy and Leopold. Six new pairs formed during 2016; however, only three remained by the end of December (Table 1). Of the pairs no longer together at the end of 2016, two (F1487/M1396 and F1437/M1564) had one animal removed for management purposes, and one naturally separated (M1398/f1553). In addition, breeding animals were naturally replaced in six other packs seven times (Buckalou, Hoodoo, Lava, Luna, Panther Creek, and Prieto). In the Luna pack, AM1158 replaced AM1155 and then later AF1115 was replaced by AF1487.

A total of 7 single wolves equipped with radio-collars (M1161, M1293, M1331, M1338, M1354, F1437, and f1444) were part of the population for a portion of the year. Five of these wolves (M1293, M1338, M1354, F1437, and f1444) were alive at the end of the year. Most of the wolves that were alive at the end of the year ( $n \approx 111$ : see Releases and Translocation section for a description of the uncertainty associated with the number of cross-fostered pups that were alive at the end of the year) were born in the wild.

### b. Reproduction

In 2016, 14 packs exhibited denning behavior which included eight packs in Arizona (Bearwallow, Bluestem, Tse ighan lige (Diamond), Elk Horn, Maverick, Hoodoo, Panther Creek, and Tsay-O-Ah) and six packs in New Mexico (Iron Creek, Sheepherder's Baseball Park Pack (SBP), San Mateo, Luna, Prieto, and Leopold). All of these packs were confirmed to have produced wild-born litters. The IFT also cross-fostered a total of six pups into three wild wolf dens in Arizona (Elk Horn and Panther Creek) and New Mexico (SBP). The IFT documented a minimum of 65 pups born with a minimum of 50 (32 pups in Arizona and 18 pups in New Mexico) surviving in the wild until year-end which showed that at least 77% of the pups documented in early counts survived until the end of the year (Table 1). All packs at the end of 2016 were formed naturally in the wild.



Photo: Mexican wolf pups associated with the Prieto Pack. Photo credit: US Fish and Wildlife Service

### c. Releases and Translocations

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

*Diversionsary Food Cache*: road-killed native prey carcasses or carnivore logs provided to wolves in areas to reduce potential conflicts with livestock.

In 2016, the IFT conducted three cross-foster events involving three packs (Sheepherder's Baseball Park (SBP) in New Mexico and the Elk Horn and Panther Creek packs in Arizona), resulting in the initial release of six neonatal wolf pups. Two pups were introduced into each of the three dens corresponding with whelp dates in April and May. Each den initially contained five wild-born pups; the addition of two cross-fostered pups resulted in each of the dens having a total of seven pups after the operation. All of the cross-foster events were initially considered successful (pups from captivity were introduced into wild dens; the event did not result in the abandonment of the den), and some pups survived in each of the dens until the late fall and early winter. The IFT was unable to deduce that cross-foster pups survived in all cases because the IFT was unsure if pups observed were part of the natal litter or cross-fostered pups (see summary below for each pack). However, two cross-fostered pups were confirmed alive at the end of 2016 and others may have survived in each of the cross-fostered packs. Each of the packs involved in cross-fostering efforts received supplemental food caches to assist in raising additional pups.

Evidence of pup survival for the SBP pack was documented in June, but the IFT was unable to determine the number of pups that were thought to be alive at the time. AF1392 was located dead in September and as a result the IFT lost contact with the pack (note: AM1284's collar had failed earlier in the year). AM1284's collar was replaced in the fall and remote cameras and

tracks indicated at least two pups had survived until late fall. However, the IFT was unable capture the pups or document pups following AM1284 pairing with a new female (f1553) in December. The pups had likely dispersed as a result of the new pairing and were counted as part of the population in 2016.

The Elk Horn pack had four pups (seven pups were originally documented) survive until the end of the year. Two were captured and collared; one of them was confirmed wild-born (mp1474) and another was a confirmed cross-foster (mp1471). We did not determine the status of the other two pups traveling with Elk Horn at the end of 2016.

The Panther Creek pack had six pups (seven pups were originally documented) survive until the November of 2016; fp1485 was found dead in November. Four were captured and collared; all four were confirmed wild-born (mp1483, fp1484, fp1485, and mp1486). Because six pups were documented traveling with Panther Creek and four wild-born pups were accounted for, we can deduce that at least one cross-fostered animal survived until the end of 2016. Although we deduced that one cross-fostered pup survived through the end of 2016, it was not radio-collared and was not observed during the helicopter count and capture effort in 2017 likely due to the unstable Panther Creek pack dynamics that resulted after AM1394 was replaced by M1382.

#### d. Home Ranges and Movements

In 2016, all wolves equipped with radio-collars were monitored by standard radio telemetry from the ground and once every two weeks from the air as opportunity allowed. In addition, 55 wolves were equipped with GPS collars during all or portions of the year to provide more detailed location information. Visual observations, wolf behavior, evidence of a kill site, associated uncollared wolves, and fresh sign were also noted when possible. Location data were entered into the project's database for analysis.

Aerial and satellite locations of wolves were used to develop home ranges (White and Garrott 1990). Until 2014, wolf home range polygons were generated using the minimum convex polygon (MCP) method (White and Garrott 1990). However, kernel methods can provide more accurate home range estimates than minimum convex polygon (MCP) models (Seaman and Powell 1996) and have shown to be 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 2016.

Home ranges were calculated using  $\geq 20$  individual locations on a pack, pair, or single wolf exhibiting territorial behavior over a period of  $\geq$  six months. During 2016, the number of individual locations used ranged from 20 to 466 locations, depending on the number of individual locations obtained throughout the year. To maximize sample independence, individual radio-collared wolf locations were included in home range calculations only if individual wolf locations were spatially or temporally separated from other pack members equipped with radio-collars. This limited pseudo-replication of locations. Individual point selection was accomplished with R (R Core Team 2015). Home range polygons were generated using the 95% fixed kernel method (Seaman and Powell 1996) in the Geospatial Modeling Environment platform in conjunction with ArcGIS 10 (Beyer 2014, ESRI 2011). Home ranges were not calculated for

wolves that had <20 locations, displayed dispersal behavior, or exhibited non- territorial behavior during 2016.

During 2016 the IFT calculated home ranges for 20 packs or individuals exhibiting territorial behavior. These home ranges ranged from 78 square miles (203 square kilometers) for the Iron Creek pack to 858 square miles (2221 square kilometers) for the Diamond pack, with an average home range size of 255 square miles (660 square kilometers). Home ranges were not calculated for single animals or packs that did not display territorial behavior or did not have enough usable locations to generate a home range; this included the Bear Wallow and Maverick packs, which are represented with a red dot on the home range map (Figure 3, Table 2).

#### e. Occupied Range

Occupied wolf range was calculated based on the following criteria: (1) a ten mile (16 km) radius around all aerial 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) per the 2015 10(j) Rule, occupied range does not include tribal lands or areas in Zone 3.

Mexican wolves occupied 16,114 mi<sup>2</sup> (41,735 km<sup>2</sup>) of the MWEPA during 2016 (Figure 4). In comparison, Mexican wolves occupied 13,329 mi<sup>2</sup> (34,522 km<sup>2</sup>) of the MWEPA during 2015. However, methods of calculating occupied range varied between 2016 and 2015. While these numbers should be adequate to illustrate a general upward trend in occupied range area, they should not be utilized as absolute differences between years.



Photo: Mexican wolf pups associated with the Elk Horn Pack during cross fostering. Photo credit: Mexican Wolf Interagency Field Team.

#### f. Mortality

Wolf mortalities were identified via telemetry, GPS collars, and public reports. Mortality signals from radio collars were investigated within 12 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. Causes were summarized for all known wolf deaths.

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 (see 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 three primary causes: (1) cattle depredations, (2) nuisance to humans, and (3) other (principally to pair with other wolves or to 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/failed collared wolves that were found dead 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 in equal proportions across the population). 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).

The IFT has documented 138 wolf mortalities in the wild since 1998 (Table 3), 14 of which occurred in 2016 (Table 3). Seven of the fourteen documented wolf mortalities in 2016 were considered illegal, including: m1351, AF1280, AF923, m1440, AF1395, m1454, and AF1392. AF1115 died of natural causes (intraspecific strife). Two wolves (AF1340 and AF1295) died shortly after helicopter capture and were confirmed via necropsy to be capture-related mortalities. Cause of death could not be determined for M1161 and AM1404. Finally fp1442 and fp1485 died from a vehicle strike. Other more frequent 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. Eight wolves from Arizona (AM1183, AM1341, mp1453, M1383, AM1342, f1489, M1330, fp1548) and seven wolves from New Mexico (AM1387, M1051, M1345, m1446, M1354, M1331, and mp1551) were listed as fate unknown (e.g., not observed via sightings, remote cameras, or radio telemetry for > 3 months) during portions of 2016. However, following the IFT’s efforts during the end of year count, only five remained listed at the end of 2016 (M1330, AM1387, M1051, m1446, and M1331).

The IFT monitored 81 individual wolves equipped with radio-collars for a total of 17,190 radio days during 2016. A total of 31 wolves equipped with radio-collars were considered removed ( $n = 1$ ), dead ( $n = 10$ ), or missing ( $n = 20$ ). Uncollared animals or wolves with failed collars that were documented dead (m1351, M1282, AF1280, AF1395, and AM1161) were not included in this analysis (See Table 4 for information on these animals). In addition, the capture related mortalities of AF1295 and AF1340 were right censored from the analysis. Only two (AM1394 and m1446) of the twenty wolves that went missing in 2016 were considered to have gone missing under questionable scenarios without documentation as being alive later in the year. Thus, these two animals were included as failures at the time of last location during 2016. The overall survival rate was 0.792, or a corresponding failure rate of 0.208. The overall failure rate was composed of the human caused mortality rate (0.114;  $n = 6$ ), natural mortality rate (0.019;  $n = 1$ ), unknown/awaiting necropsy mortality rate (0.019;  $n = 1$ ), boundary removal rate (0.00;  $n = 0$ ), missing wolves rate (0.038;  $n = 2$ ), cattle depredation removal rate (0.019;  $n = 1$ ), nuisance removal rate (0.000;  $n = 0$ ), and other removal rate (0.000;  $n = 0$ ).

#### g. Predation

Throughout the year, project personnel investigated ungulate carcasses as they were discovered to determine sex, age, general body condition, and whether the carcass had been scavenged or killed by wolves. In addition, the IFT continued to study Mexican wolf kill rates and prey selection within the MWEPA on non-tribal lands. GPS cluster analysis was conducted using data from downloadable GPS collars to detect predation events during a 30-day time period in winter (February/March) and summer (June/July). A GPS cluster was defined as a group of two or more GPS points in which each point is <100m from its nearest neighbor (Sand et al. 2005, Ruth et al. 2010, Metz et al. 2012). GPS fix rates were set to one point every two hours in winter and every hour in summer to account for the rapid consumption of neonatal elk carcasses in the summer. To further reduce the potential of missing wolf killed prey, 25% of all single GPS points were randomly selected in ArcGIS for investigation (Sand et al. 2005). Identified GPS clusters were investigated within one week of determination, following abandonment by wolves; all points within a cluster were investigated regardless if a carcass was located at a previous GPS point (Ruth et al. 2010). The information gathered will be used to gain a more robust measure of the biomass required per wolf to sustain a viable wolf population, estimate kill rates of Mexican wolves on ungulates in the MWEPA, determine the prey characteristics (e.g. species, sex, age, and nutritional condition) selected by Mexican wolves, and assess kill site characteristics. All domestic livestock carcasses located via cluster analyses were reported to USDA-WS wolf specialists to initiate a depredation investigation.

The IFT combined the 2015 and 2016 predation data for this report. Four packs containing at least one GPS collar were selected for the predation study in 2015, two in New Mexico (Luna and Single M1161) and two in Arizona (Bluestem and Hawks Nest). All four packs were studied during the 2015 winter period; however, due to collar failures in late winter, only Bluestem and Hawks Nest were studied in Arizona during the 2015 summer period. Six packs were selected for the predation study in 2016, three in New Mexico (Luna, Mangas, and Sheepherder's Baseball Park pack (SBP)), two in Arizona (Bluestem and Marble), and one pack (Buckalou) that bordered Arizona and New Mexico. Four packs (Luna, Mangas, Bluestem, and Marble) were studied during the 2016 winter period, and three (SBP, Bluestem, and Buckalou)

during the 2016 summer period. Pack sizes during study periods varied from a minimum of one single adult to nine animals (adults, sub-adults and pups).

During the winter and summer study periods of 2015 and 2016 (a total of 245 days; total study days for all packs across all study periods), we investigated 302 single GPS point locations and 581 GPS cluster locations from seven wolf packs and one individual wolf. We located 119 prey carcasses including 110 elk, eight mule deer, and one Coues white-tailed deer. Of the carcasses investigated, 23 were considered confirmed wolf kills, 78 were considered probable wolf kills, 7 were considered possible wolf kills, and 11 had an unknown cause of death. Elk comprised 92% and deer comprised the remaining 8% of carcasses investigated. Of the elk kills investigated, 51% were elk calves, 9% were yearlings, 10% were adult cows, 16% were adult bulls, and 14% were unknown age or sex. Kill rates and consumption rates were used to estimate the total number of prey killed/wolf/day and total kg biomass/wolf/day, respectively. Our combined results for both years indicate that a single Mexican wolf may impact ungulate populations equivalent to killing 16.45 cow elk, scavenging on 1.21 cow elk, killing 3.93 mule deer does, and 0.50 white-tailed doe deer annually, which equates to 7.19 kg/wolf/day. These data are slightly higher than the average, but within the range of similar studies conducted on northern gray wolves.

#### *h. Wolf Depredation*

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 prevent 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 2015, the mean number of cattle confirmed killed by wolves per year is 16, which extrapolates to 30.3 cattle killed per year per 100 Mexican wolves.

*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 SOP 11.0.

During 2016, USDA-WS and other members of the IFT completed a total of 78 investigations involving 81 animals reported as having potential Mexican wolf involvement. Of these 78 investigations, 76 involved cattle ( $n = 79$ ), one involved a horse ( $n = 1$ ), and one involved a dog ( $n = 1$ ). Average IFT response time between the reporting of an incident to the initiation of an on-site investigation was < 24 hours.

Of the 78 investigations completed in 2016, 56 (72%) were determined to be wolf-related (confirmed or probable determination; Table 5). Forty-nine cattle deaths were confirmed as wolf

depredations; two cattle deaths were probable wolf depredations; four injured cattle were confirmed as being wolf related; and zero cattle injuries had probable wolf involvement. One horse was also confirmed as wolf related in 2016. Sixty-one percent ( $n = 34$ ) of the 56 investigations determined to be wolf related occurred in New Mexico and 39% ( $n = 22$ ) occurred in Arizona (Table 6). Eighteen percent ( $n = 22$ ) of the total investigations were determined to be unknown or non-wolf related. These mortality causes included: unknown, black bear, coyote, and natural causes. Seven percent ( $n = 4$ ) of the 56 investigations determined to be wolf related were found and reported by the IFT (Table 6). Livestock owners applied for 41 confirmed cattle deaths, two probable cattle deaths, two injured cattle, and one confirmed horse death (46 out of 56; 82%) and received \$73,826 in compensation for the depredations from the Mexican Wolf/Livestock Council. Of the 45 cattle that were compensated for, 28 were calves (62%), 16 were cows (36%), and one was a bull (2%).

In total, 29 of the 50 (58%) confirmed depredations, resulting in the death of livestock, involved uncollared wolves, or wolves with failed collars, that were not associated with collared packs (Table 6). Two wolves, M1396 (Luna pack) and M1564 (Poll Knoll pair) were removed in 2016 for repeated depredations.

The depredation rate for 2016 extrapolates to 43.4 confirmed killed cattle/100 wolves using the number of confirmed killed cattle ( $n = 49$ ; Table 6) compared to the final population count ( $n = 113$ ). The 2016 rate is above the previous 18 year (1998-2015) recovery program mean of 30.3 confirmed killed cattle/100 wolves/year, but below the 2015 rate of 50.5 confirmed killed cattle/100 wolves.

#### i. Management Actions

The IFT hazed wolves on foot or by vehicle in cases where wolves localized near areas of human activity, or if wolves were found feeding on, chasing, or killing livestock. When necessary, the IFT used rubber bullets, cracker shells, and fladry to encourage 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 establish themselves outside the MWEPA are captured and brought back into the MWEPA or temporarily held in captivity, per the 2015 10(j) Rule. No wolves were removed as a result of this provision during 2016.

In 2016, 52 different wolves were captured and/or removed a total of 56 times. Thirty wolves were captured, collared for the first time, processed, and released on site for routine population monitoring purposes by the IFT (Table 7). Twenty-two wolves were captured, re-collared, processed and released on site, or simply released on site with the current collar (Table 7). Two wolves, AF1295 and AF1340, died shortly after helicopter capture efforts from capture myopathy and injury associated with a dart placement, respectively. In addition, two wolves were captured and removed from the wild pursuant to USFWS approved removal orders. M1396 from the Luna pack and M1564 from the Poll Knoll pair were removed for repeated livestock depredations (Table 6). Trapping was also conducted on the FAIR; however, wolf numbers on the FAIR are not provided at the request of the WMAT.

In 2016, the IFT investigated 14 reported instances of nuisance behavior (Table 8). The investigations were classified as in response to reports of potential wolves: near human dwellings/near people (n=10), or chasing/harassing or near livestock (n=4). Of the ten instances of potential wolves near human dwellings/people, one involved an interaction with a dog, one a cat, and four with chickens. Of the 14 reports, the IFT determined that three were likely or known to involve Mexican wolves (Table 8). Trail cameras, tracking, telemetry, howling, and trapping were used by IFT members during investigations to gather evidence of wolf involvement on reported nuisance problems. Hazing was used to move wolves away from residences and livestock.



Photo: Mexican Wolf Experimental Population Area. Photo credit: US Fish and Wildlife Service.

#### *j. Proactive Management Activities*

The IFT utilized various proactive management activities in an attempt to reduce wolf-livestock conflicts in the MWEPA during 2016. Proactive management approaches and tools available to the IFT include:

*Permittee Flight Calls:* Permittees with grazing allotments with occupied wolf range in Arizona and New Mexico that contact the IFT and request regular wolf location information are called every other week after scheduled telemetry flights and provided general wolf locations that occurred on or near their allotment from the flight. The same information is used to update the public location maps.

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

*Hay and Supplements*: feed and mineral supplements purchased for livestock producers who opt to hold livestock on private property during livestock calving season or wolf denning periods.

*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 that may correspond to den and rendezvous sites.

*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*: 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 wolf depredations.

*Diversionsary Food Cache*: road-killed native prey carcasses or carnivore logs provided to wolves in areas to reduce potential conflicts with livestock.

*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).

The IFT, working with Non-Governmental Organizations (NGO), used proactive management to assist in reducing wolf-livestock conflicts in the MWEPA (Table 9). The Reintroduction Project and NGOs spent approximately \$128,375 on proactive management activities affecting an estimated 8 grazing allotments in Arizona and 11 in New Mexico. The IFT, agency contract employees, and NGO contract employees spent approximately 12,640 hours implementing proactive management activities during 2016. In addition, the Mexican Wolf/Livestock Council distributed \$83,300 in 2016 to 32 applicants in Arizona (12) and New Mexico (20) 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 2015 for the payment for wolf presence program.

The agencies and NGOs purchased hay and supplements during the calving season for two ranchers in Arizona and New Mexico to help prevent depredation of 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, Clifton, Springerville, Quemado, Wilderness, and Reserve Ranger Districts and stakeholders in Arizona and New Mexico to address potential conflicts between livestock and wolves. In several of these 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 ranchers changed pasture rotations and moved livestock into alternate pastures during the denning season, where possible. The suggested livestock movements were voluntary for the ranchers.

During 2016, the Reintroduction Project and NGOs contracted 16 range riders (7 in Arizona, and 9 in New Mexico) to assist 14 stakeholders (5 in Arizona, 9 in New Mexico) in monitoring wolves in proximity to cattle. Range riders monitored approximately 19 allotments within 14 wolf pack home ranges, one single wolf 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. Twelve confirmed depredation incidents and one probable depredation occurred on monitored allotments while ranger riders were under contract (Table 9). However, 12 out of 13 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 are unknown.

The IFT issued radio telemetry equipment to stakeholders (10 in Arizona, 13 in New Mexico) in areas where wolf-livestock conflicts were prevalent. Most of these equipment loans were in association with range riders. The IFT trained stakeholders to use the telemetry equipment to monitor wolves in the vicinity of cattle or residences, and instructed them on non-injurious hazing techniques.

Diversions food caches are utilized to reduce potential conflicts between wolves and livestock, primarily in areas where depredations have occurred in the past. Diversions food caches were established for seven packs during 2016. In New Mexico, diversions food caches were established to reduce depredations within the territories of Iron Creek, Luna, Prieto, and San Mateo packs. In Arizona diversions food caches were established within the territories of Bluestem, Diamond/Poll Knoll pair, and Hoodoo packs. In addition, the supplemental food caches established for Elk Horn, Panther Creek and Shepherd's Baseball Park, in association with cross-fostering events in these packs, served the additional purpose of preventing depredations in the area.

#### k. Non-IFT Wolf Sighting Reports

In 2016, the IFT received a total of 72 wolf sighting reports from the public. The IFT determined 63 reports were non-wolf sightings (coyote, dogs, etc.), six reports were known wolves and three reports were likely uncollared/unknown wolves. The public is encouraged to report Mexican wolf sightings to help the IFT locate undocumented packs and track movements of wolves within and around the MWEPA, and are provided the 1-888-495-WOLF (9653) number to report Mexican wolf sightings.

The IFT analyzed areas without established wolf packs, uncollared wolf sign and sighting reports from the public to target 16 areas in Arizona and New Mexico (Figure 2) in an effort to document and/or radio collar unknown wolves in and around the MWEPA. Seven uncollared wolves in New Mexico and four uncollared or failed collared wolves in Arizona were documented in 2016 as a result of this effort (Figure 2, Table 10). As a result of these efforts nine wolves were included in the annual population count (Table 1).

### 1. Public Outreach

The IFT outreach efforts affirm the project's 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 stakeholders, concerned citizens, and government and non-government organizations. Outreach was facilitated through monthly updates, on-line Mexican wolf location maps, permittee flight calls, field contacts, handouts, informational display booths, web page updates, fielding information requests, visiting with parties filing sighting reports, responding to emails from the public and phone contacts. Mexican wolf project personnel provided formal presentations at local livestock producer meetings and conducted one public meeting in 2016 to develop proposed Mexican wolf initial release and translocation sites within the MWEPA.

During 2016, the IFT posted Mexican wolf reintroduction project updates within the MWEPA once each month at places such as USFS offices, US post offices, community centers, libraries, and some local businesses as well as on the AGFD Mexican wolf web site at [http://www.azgfd.gov/w\\_c/es/wolf\\_reintroduction.shtml](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 parties could sign up to receive the update electronically by visiting the AGFD web site at <http://azgfd.gov/signup>. The IFT faxed monthly project updates to primary cooperating agencies, stakeholders and interested citizens.

The IFT also produced a wolf location map bi-weekly to inform cooperators and the public of areas occupied by wolves. The map was posted on at <http://arccg.is/0iGSGH> or <http://www.fws.gov/southwest/es/mexicanwolf/RWL.cfms>.

Project personnel made contact with campers, hunters, and other members of the public within the MWEPA and provided them with information about the wolf 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 utilized these contacts to collect information on wolf sightings, tracks and scat from the public.

Mexican wolf project personnel provided a total of 24 presentations and status reports to approximately 1,000 people in federal and state agencies, conservation groups, rural communities, schools, wildlife workshops, and various other public, private, tribal institutions throughout Arizona, New Mexico and White Mountain Apache Tribal lands. Ninety-two percent of the presentations were for the MWEPA target audience. In addition, biweekly contacts were

made to cooperating agencies and stakeholders to inform stakeholders of wolf locations Mexican wolf reintroduction project updates were emailed to an average of 18,287 people a month. The AZGFD Mexican wolf website was visited 17,174 times during 2016. The AGFD interactive map was viewed an average of 132 times a month. Comparable numbers were unavailable for the USFWS web site. Outreach presentations can be scheduled by contacting the IFT at 1-888-495-WOLF (9653).

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



Photo: Mexican wolf pups associated with the Iron Creek Pack. Photo credit: US Fish and Wildlife Service.

### 3. Summary and Discussion

The IFT documented a minimum of 113 Mexican wolves in 2016 (Figure 5; Table 1), and a minimum of 11 breeding pairs (Table 1). The minimum total number of pups alive at the end of the year was higher ( $n = 50$ ; Table 1) than the previous year ( $n = 22$ ) and pup survival (% of pups alive of the total produced) was 77% at the end of the year. The number of known mortalities remained stable 13 in 2015 and 2016 (Table 3). These population parameters were improvements over 2015 and the population appeared to perform more consistent with the time period from 2009 to 2014 than the lull in growth observed in 2015 (Figure 6). In addition, nine natural pairings resulted in new pairs, packs and breeder replacement that collectively have the significant potential to contribute to reproduction in 2016.

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 0.208 in 2016. This failure rate would predict an increasing population which was the case in 2016. The increase in the population was likely due to a combination of factors rather than just failure rate, which decreased from 0.287 to 0.208 in 2015 and 2016, respectively. For instance, the number of pups recruited increased from 23 to 50 in 2015 and 2016, respectively. The failure rate remains low largely due to minimal ( $n = 1$ ) management removals of radio-collared wolves from the population. While the minimal number of management removals has remained low in the recent past, the majority of the population losses in 2016 were either due to human-caused mortalities or missing animals rather than management removals. It is difficult to determine the effect on the population from missing animals because individuals could still be alive. Six mortalities were human-caused (four of which are known or likely illegal mortalities), one was killed by other wolves, and one was unknown. Efforts to reduce the level of mortality, while replacing the individual animals lost through initial releases and translocations will continue to be a priority. The IFT will also continue to document the uncollared wolf component of the population.

The 2016 confirmed killed cattle rate extrapolates to approximately 43 depredations/100 wolves and is higher than the previous 18 year recovery program mean of 30.3 confirmed killed cattle per 100 wolves, but below the 2015 rate of 50.5 confirmed killed cattle/100 wolves. It is important to note the standard for extrapolating the annual confirmed killed cattle rate/100 wolves uses the end of year wolf population count, which does not include wolves that died or were removed during 2016. Thus, the confirmed killed cattle rate per 100 wolves, as a matter of practice, underestimated the denominator, which inflates the total rate. Nevertheless, the depredation rate in 2016 and 2015 is still cause for concern. Our goal is to maintain the depredation rate at or below the long-term average. The IFT will continue to implement a variety of proactive and reactive methods to reduce the depredation rate in 2017.

This year was the first time that Mexican wolf pups born in the captive breeding program were cross-fostered into the wild. In 2014, the IFT fostered two pups from one wild litter to another. Both of the pups (M1347, F1346) survived to two years of age and paired in the wild. F1346 successfully produced and raised pups as part of the Leopold pack during 2016. Of the six pups

that were cross-fostered from captivity during 2016, the IFT documented that a minimum of two survived (mp1471 and an uncollared pup) to the end of the year, and all of the packs into which pups were cross-fostered successfully raised pups (either natal or cross-fostered). Collectively, these results indicate that: (1) cross-fostering and the human disturbance at the den site did not result in abandonment of the den in all four cases, (2) a minimum of four of the eight cross-fostered pups survived to the end of the year, (3) both of the animals that were old enough to disperse and form packs of their own did so during 2016, and (4) one of the cross-fostered pups has successfully contributed genetically to the population (bred and raised pups) which is the ultimate goal of cross-fostering efforts. Collectively, these results are encouraging and suggest that the project should continue to aggressively utilize cross-fostering as a strategy to increase genetic diversity of Mexican wolves in the wild.

Two wolves died following capture during helicopter operations in 2016. AF1295 was darted and processed on January 23, released back into the wild and died four days later. AF1340 was captured on January 28, and died within minutes of being darted. Necropsies confirmed that AF1340 died as result of trauma (likely a result of impact from the dart) and AF1295 appeared to have died from capture myopathy. In each case capture operations were shut down and evaluation of the operation was conducted to determine whether capture operations should continue or be halted. In each case, the team determined that capture operations should continue but were very cognizant of the unprecedented series of events. Prior to these two deaths, no wolves have died during past annual count and capture operations, which have been occurring since 2005 – successfully capturing and releasing 110 wolves. Anytime a wild animal is captured there is inherent risk of injury or death to the animal being pursued, captured, or handled. Wildlife professionals must evaluate the project goals versus the inherent risk of handling animals in the wild and implement measures to reduce the risk if possible. In this case, the two deaths were unrelated issues (trauma from dart placement and capture myopathy) with risks that are inherent in the operation but had not occurred previously during annual count and capture operations. However, the goals of capture operations are to attach radio collars, which enable the IFT to gather biological information, such as dispersal, territories, habitat use, and breeding. The radio collars also enable the IFT to manage the wolves to address any conflicts with human activities, such as livestock depredations. While immobilized, the IFT also obtains blood from each wolf for DNA analysis and to screen for disease, determines body condition, and gives vaccinations. Thus, the goals continue to outweigh the risks and the IFT will continue to capture wolves.

A low mortality rate and a high number of pups that survived to December 31 allowed the population to grow at approximately 16% in 2016. Thus, the population exceeded the management objective for 2016. The Reintroduction Project management objective for 2017 is a 10% increase in the minimum wolf population counts and/or the addition of at least two packs that produce a minimum of one pup that survives to December 31, while minimizing negative impacts of wolves and building social tolerance of Mexican wolves among stakeholders within the MWEPA. Changes to the Mexican wolf reintroduction project are outlined in the 2015 10(j) Rule [http://www.fws.gov/southwest/es/mexicanwolf/pdf/Mx\\_wolf\\_10j\\_final\\_rule\\_to\\_OFR.pdf](http://www.fws.gov/southwest/es/mexicanwolf/pdf/Mx_wolf_10j_final_rule_to_OFR.pdf). The IFT will continue the implementation of this rule while evaluating its effectiveness during 2017.

#### 4. Literature Cited

- Beyer, Hawthorne. 2014. Geospatial Modeling Environment.  
<http://www.spataleecology.com/gme>. Accessed March 2014.
- ESRI (Environmental Systems Research Institute). 2011. ArcGIS Desktop. Version 10.3.  
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.
- 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.
- 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. Federal Register. Pp .
- 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, 2016.

| Pack                    | Wolf ID                                                                                                    | Reproduction <sup>a</sup> | Pups at Year End <sup>b</sup> | No. Collared | No. Uncollared | Min pack Size <sup>c</sup> |
|-------------------------|------------------------------------------------------------------------------------------------------------|---------------------------|-------------------------------|--------------|----------------|----------------------------|
| Baldy, AZ               | M1347, F1445 <sup>i</sup>                                                                                  | 0                         | 0                             | 1            | 1              | 2                          |
| Bearwallow, AZ*         | AM1338, AF1335, fp1548 <sup>k</sup>                                                                        | 2                         | 2                             | 2            | 2              | 4                          |
| Bluestem, AZ*           | AF1042 <sup>j</sup> , AM1341 <sup>j</sup> , F1489 <sup>j</sup> , fp1562, fp1563                            | 6                         | 6                             | 2            | 7              | 9                          |
| Buckalou, AZ            | M1161 <sup>e</sup> , M1404 <sup>e</sup> , F1405 <sup>i</sup>                                               | 0                         | 0                             | 0            | 0              | 0                          |
| Coronado, NM            | M1051 <sup>f</sup>                                                                                         | 0                         | 0                             | 0            | 0              | 0                          |
| Dark Canyon, NM         | AF923 <sup>e</sup> , AM992                                                                                 | 0                         | 0                             | 1            | 0              | 1                          |
| Elk Horn, AZ*           | AF1294, AM1342 <sup>j</sup> , mp1471, mp1474                                                               | 7                         | 4                             | 3            | 3              | 6                          |
| Hawks Nest, AZ          | AM1038, AF1280 <sup>e</sup> , M1383 <sup>j</sup> , mp1453 <sup>j</sup>                                     | 0                         | 0                             | 1            | 2              | 3                          |
| Hoodoo, AZ*             | AM1290, AF1395 <sup>e</sup> , AF1333, fp1549, fp1550                                                       | 6                         | 6                             | 4            | 4              | 8                          |
| Iron Creek, NM*         | AM1240, AF1278, mp1555 <sup>k</sup> , mp1556                                                               | 5                         | 3                             | 3            | 2              | 5                          |
| Lava, NM                | AF1295 <sup>e</sup> , AM1285 <sup>j</sup> , m1446 <sup>f</sup> , F1405                                     | 0                         | 0                             | 1            | 1              | 2                          |
| Leopold, NM*            | AM1293, mp1561                                                                                             | 3                         | 3                             | 2            | 3              | 5                          |
| Luna, NM*               | AF1115 <sup>e</sup> , AM1155 <sup>l</sup> , M1396 <sup>h</sup> , AM1158 <sup>l</sup> , AF1487, mp1554      | 5                         | 3                             | 2            | 3              | 5                          |
| Mangas, NM              | M1296, F1439                                                                                               | 0                         | 0                             | 2            | 0              | 2                          |
| Marble, AZ              | AF1340 <sup>e</sup> , AM1330 <sup>f</sup> , mp1440 <sup>e</sup> , fp1442 <sup>e</sup>                      | 0                         | 0                             | 0            | 0              | 0                          |
| Maverick, AZ            | AM1183 <sup>l</sup> , AM1291                                                                               | 2                         | 0                             | 1            | 1              | 2                          |
| Morgart's, NM           | M1155 <sup>l</sup>                                                                                         | 0                         | 0                             | 1            | 0              | 1                          |
| New Pair, AZ            | M1447, F1443                                                                                               | 0                         | 0                             | 2            | 0              | 2                          |
| New Pair, AZ            | F1488                                                                                                      | 0                         | 0                             | 1            | 1              | 2                          |
| New Pair, AZ            | M1441                                                                                                      | 0                         | 0                             | 1            | 1              | 2                          |
| Panther Creek, AZ*      | AF1339, AM1394 <sup>g</sup> , M1382 <sup>i</sup> , mp1482, fp1484, fp1485 <sup>e</sup> , mp1486            | 7                         | 6                             | 5            | 3              | 8                          |
| Pole Knoll Pair, AZ     | F1437 <sup>j</sup> , M1564 <sup>h</sup>                                                                    | 0                         | 0                             | 0            | 1              | 1                          |
| Prieto, NM*             | AF1251 <sup>j</sup> , AM1387 <sup>l</sup> , M1386, M1398 <sup>i</sup> , M1455, f1456, M1552, f1553, fp1565 | 4                         | 4                             | 7            | 4              | 11                         |
| San Mateo, NM*          | AM1345 <sup>l</sup> , AF1399, fp1551 <sup>k</sup> (f1553 was counted with the Prieto pack)                 | 3                         | 3                             | 1            | 4              | 5                          |
| SBP, NM*                | AM1284, AF1392 <sup>e</sup>                                                                                | 7                         | 2                             | 1            | 2              | 3                          |
| Willow Springs, NM      | F1397                                                                                                      | 0                         | 0                             | 1            | 0              | 1                          |
| Radio collared wolf, NM | f1444                                                                                                      | 0                         | 0                             | 1            | 0              | 1                          |
| Radio collared wolf, NM | M1331 <sup>f</sup>                                                                                         | 0                         | 0                             | 0            | 0              | 0                          |
| Radio collared wolf, NM | M1354                                                                                                      | 0                         | 0                             | 1            | 0              | 1                          |
| OW Ranch, AZ            | Uncollared wolves                                                                                          | 0                         | 0                             | 0            | 1              | 1                          |
| Boiler Peak, NM         | Uncollared wolves                                                                                          | 0                         | 0                             | 0            | 1              | 1                          |

| <b>Pack</b>               | <b>Wolf ID</b>                 | <b>Reproduction<sup>a</sup></b> | <b>Pups at Year End<sup>b</sup></b> | <b>No. Collared</b> | <b>No. Uncollared</b> | <b>Min pack Size<sup>c</sup></b> |
|---------------------------|--------------------------------|---------------------------------|-------------------------------------|---------------------|-----------------------|----------------------------------|
| Datil Mountains , NM      | Uncollared wolves              | 0                               | 0                                   | 0                   | 1                     | 1                                |
| Long lake, NM             | Uncollared wolves              | 0                               | 0                                   | 0                   | 2                     | 2                                |
| Indian Peaks, NM          | Uncollared wolves              | 0                               | 0                                   | 0                   | 1                     | 1                                |
| Pueblo Creek, NM          | Uncollared wolves              | 0                               | 0                                   | 0                   | 1                     | 1                                |
| San Mateo Mountains, NM   | Uncollared wolves              | 0                               | 0                                   | 0                   | 1                     | 1                                |
| FAIR                      | Collared and uncollared wolves | N/A <sup>d</sup>                | N/A <sup>d</sup>                    | N/A <sup>d</sup>    | N/A <sup>d</sup>      | N/A <sup>d</sup>                 |
| SCAR                      | Uncollared wolves              | N/A <sup>d</sup>                | N/A <sup>d</sup>                    | N/A <sup>d</sup>    | N/A <sup>d</sup>      | N/A <sup>d</sup>                 |
| <b>Totals<sup>m</sup></b> |                                | 65                              | 50                                  | 54                  | 59                    | 113                              |

<sup>a</sup> Reproduction-maximum number of pups documented in 2016.

<sup>b</sup> Pups at year end documented surviving until December 31, 2016.

<sup>c</sup> Min pack size-total number of wolves (collared, uncollared, pups) documented at year end.

<sup>d</sup> Wolf numbers on FAIR and SCAR are not displayed at the request of the tribes.

<sup>e</sup> Died during 2016.

<sup>f</sup> Fate unknown during 2016.

<sup>g</sup> Radio collared wolf not missing for 3 months, but not located nor believed alive by IFT through December 31, 2016.

<sup>h</sup> Removed from wild for management purposes during 2016.

<sup>i</sup> Dispersed and joined existing pack.

<sup>j</sup> Radio collar no longer functions; but, documented alive through December 31, 2016 and counted in "No. Uncollared" column.

<sup>k</sup> Radio collar slipped off of the wolf; but, documented alive through December 31, 2016 and counted in "No. Uncollared" column.

<sup>l</sup> Breeding wolf displaced from pack by other wolves; retains original pack name.

<sup>m</sup> Totals include wolves occurring on FAIR and SCAR.

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

Table 2. Home range sizes of free-ranging Mexican wolf packs in Arizona and New Mexico, January 1 – December 31, 2016.

| <b>Pack</b>                | <b>Home range size<br/>mi<sup>2</sup> (km<sup>2</sup>)</b> | <b>Number of<br/>individual locations</b> | <b>State</b> |
|----------------------------|------------------------------------------------------------|-------------------------------------------|--------------|
| Baldy                      | 299 (773)                                                  | 179                                       | AZ           |
| Bluestem                   | 230 (596)                                                  | 260                                       | AZ           |
| Buckaloo                   | 378 (980)                                                  | 266                                       | AZ           |
| Dark Canyon                | 322 (833)                                                  | 466                                       | NM           |
| Diamond                    | 858 (2221)                                                 | 210                                       | AZ           |
| Elkhorn                    | 79 (205)                                                   | 245                                       | AZ           |
| Hawks Nest                 | 107 (276)                                                  | 203                                       | AZ           |
| Hoodoo                     | 186 (481)                                                  | 332                                       | AZ           |
| Iron Creek                 | 78 (203)                                                   | 301                                       | NM           |
| Lava                       | 315 (815)                                                  | 155                                       | NM           |
| Leopold                    | 133 (344)                                                  | 36                                        | NM           |
| Luna                       | 133 (343)                                                  | 292                                       | NM           |
| Mangas                     | 341 (882)                                                  | 453                                       | NM           |
| Marble                     | 189 (490)                                                  | 62                                        | AZ           |
| Panther Creek              | 126 (326)                                                  | 210                                       | AZ           |
| Prieto                     | 212 (548)                                                  | 268                                       | NM           |
| San Mateo                  | 458 (1187)                                                 | 58                                        | NM           |
| SBP                        | 177 (459)                                                  | 229                                       | NM           |
| Tsay-O-Ah                  | 253 (656)                                                  | 118                                       | AZ           |
| Willow Springs             | 222 (575)                                                  | 20                                        | NM           |
| <b>Average<sup>a</sup></b> | 254.8 (659.65)                                             | 199.8636                                  |              |

<sup>a</sup> Averages were calculated using packs with enough locations to calculate home ranges ( $\geq 20$  locations).

Table 3. Wild Mexican wolf mortalities documented in Arizona and New Mexico, 1998-2016.

| <b>Year</b>  | <b>Illegal Mortality<sup>a</sup></b> | <b>Vehicle collision</b> | <b>Natural<sup>b</sup></b> | <b>Other<sup>c</sup></b> | <b>Unknown</b> | <b>Awaiting necropsy</b> | <b>Annual Total</b> |
|--------------|--------------------------------------|--------------------------|----------------------------|--------------------------|----------------|--------------------------|---------------------|
| <b>1998</b>  | <b>4</b>                             | <b>0</b>                 | <b>0</b>                   | <b>1</b>                 | <b>0</b>       | <b>0</b>                 | <b>5</b>            |
| 1999         | 0                                    | 1                        | 2                          | 0                        | 0              | 0                        | 3                   |
| 2000         | 2                                    | 2                        | 1                          | 0                        | 0              | 0                        | 5                   |
| 2001         | 4                                    | 1                        | 2                          | 1                        | 1              | 0                        | 9                   |
| 2002         | 3                                    | 0                        | 0                          | 0                        | 0              | 0                        | 3                   |
| 2003         | 7                                    | 4                        | 0                          | 0                        | 1              | 0                        | 12                  |
| 2004         | 1                                    | 1                        | 1                          | 0                        | 0              | 0                        | 3                   |
| 2005         | 3                                    | 0                        | 0                          | 0                        | 1              | 0                        | 4                   |
| 2006         | 1                                    | 1                        | 1                          | 1                        | 2              | 0                        | 6                   |
| 2007         | 2                                    | 0                        | 1                          | 0                        | 1              | 0                        | 4                   |
| 2008         | 7                                    | 2                        | 2                          | 0                        | 2              | 0                        | 13                  |
| 2009         | 4                                    | 0                        | 4                          | 0                        | 0              | 0                        | 8                   |
| 2010         | 5                                    | 0                        | 1                          | 0                        | 0              | 0                        | 6                   |
| 2011         | 3                                    | 2                        | 3                          | 0                        | 0              | 0                        | 8                   |
| 2012         | 4                                    | 0                        | 0                          | 0                        | 0              | 0                        | 4                   |
| 2013         | 5                                    | 0                        | 0                          | 2                        | 0              | 0                        | 7                   |
| 2014         | 7                                    | 1                        | 3                          | 0                        | 0              | 0                        | 11                  |
| 2015         | 8                                    | 0                        | 2                          | 2                        | 1              | 0                        | 13                  |
| 2016         | 7                                    | 2                        | 1                          | 2                        | 2              | 0                        | 14                  |
| <b>Total</b> | <b>77</b>                            | <b>17</b>                | <b>24</b>                  | <b>9</b>                 | <b>11</b>      | <b>0</b>                 | <b>138</b>          |

<sup>a</sup>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.

<sup>b</sup>Natural causes of death may include, but are not limited to predation, starvation, interspecific strife, lightening, and disease.

<sup>c</sup>Other causes of death include capture-related mortalities, legal shootings and legal trap related mortalities by the public.

Table 4. Mexican wolf mortalities documented in Arizona and New Mexico during January 1 - December 31, 2016.

| <b>Wolf ID</b> | <b>Pack</b>              | <b>Age (years)</b> | <b>Date Found</b> | <b>Cause of Death</b>                                                                                                   |
|----------------|--------------------------|--------------------|-------------------|-------------------------------------------------------------------------------------------------------------------------|
| m1351          | Coronado                 | 1                  | January 4         | Illegal Mortality                                                                                                       |
| M1282          | Single                   | 3-4                | January 13        | Collar found, under investigation, body not found and the animal went missing in 2014. Not included in 2016 mortalities |
| AF1295         | Lava                     | 3                  | January 27        | Capture related                                                                                                         |
| AF1340         | Marble                   | 2                  | January 28        | Capture related                                                                                                         |
| AF1280         | Hawks Nest               | 3                  | February 12       | Illegal mortality                                                                                                       |
| fp1442         | Marble                   | <1                 | March 30          | Vehicle                                                                                                                 |
| AF923          | Dark Canyon              | 11                 | May 26            | Illegal mortality                                                                                                       |
| m1440          | Marble                   | 1                  | June 12           | Illegal Mortality                                                                                                       |
| AF1395         | Hoodoo                   | 2                  | June 27           | Illegal Mortality                                                                                                       |
| AM1404         | Buckalou                 | 2                  | July 14           | Unknown (open)                                                                                                          |
| AF1115         | Luna                     | 9                  | July 27           | Natural (Intraspecific Mortality)                                                                                       |
| m1454          | Tse ighan lige (Diamond) | 1                  | August 3          | Illegal Mortality                                                                                                       |
| AM1161         | Buckalou                 | 8                  | June 13           | Unknown                                                                                                                 |
| AF1392         | SBP                      | 2                  | September 6       | Illegal Mortality                                                                                                       |
| fp1485         | Panther Creek            | <1                 | November 28       | Vehicle                                                                                                                 |

Table 5. Mexican wolf depredations of livestock documented in Arizona and New Mexico during January 1 – December 31, 2016.

|        | <b>Confirmed</b> | <b>Probable</b> | <b>Total</b> |
|--------|------------------|-----------------|--------------|
| Fatal  | 50               | 2               | 52           |
| Injury | 4                | 0               | 4            |

Table 6. Investigations of confirmed and probable depredations and injuries caused by Mexican wolves to livestock and dogs during 2016 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.

|    | <b>Wolves in Area</b> | <b>Investigation Date</b> | <b>Located By IFT</b> | <b>Species</b> | <b>State</b> | <b># Killed/ # Injured</b> | <b>Call</b> | <b>Wolves Responsible</b>                                        | <b>Depredation Incident</b>                    | <b>No. of Incidents</b> | <b>Management Action</b>                                       |
|----|-----------------------|---------------------------|-----------------------|----------------|--------------|----------------------------|-------------|------------------------------------------------------------------|------------------------------------------------|-------------------------|----------------------------------------------------------------|
| 1  | Uncollared            | 1/17/16                   | No                    | Cattle         | NM           | 1 Killed                   | Confirmed   | Uncollared                                                       | Yes                                            | 1                       | Increased Monitoring                                           |
| 2  | Diamond               | 2/8/16                    | No                    | Cattle         | AZ           | 1 Killed                   | Confirmed   | Uncollared Diamond Animals or Uncollared Pair                    | Yes                                            | 1                       | Increased Monitoring                                           |
| 3  | Diamond               | 2/9/16                    | Yes                   | Cattle         | AZ           | 1 Killed                   | Confirmed   | Diamond                                                          | Yes                                            | 2                       | Increased Monitoring and Hazing.                               |
| 4  | Luna                  | 2/21/16                   | No                    | Cattle         | NM           | 1 Killed                   | Confirmed   | Luna (AF1115 and M1396)                                          | Yes                                            | 1                       | Increased Monitoring                                           |
| 5  | Luna                  | 2/24/16                   | Yes                   | Cattle         | NM           | 1 Killed                   | Confirmed   | Luna (AF1115 and M1396)                                          | Yes                                            | 2                       | Increased Monitoring and Hazing, Diversionary Feeding          |
| 6  | Luna                  | 3/12/16                   | No                    | Cattle         | NM           | 1 Killed                   | Confirmed   | Luna (AF1115 and M1396)                                          | Yes                                            | 3                       | Removal Order issued for M1396 (captured on 5/24).             |
| 7  | Marble                | 3/14/16                   | No                    | Cattle         | NM           | 1 Killed                   | Confirmed   | Marble pups (mp1440 and fp1442) and associated uncollared animal | Yes                                            | 1                       | Increased Monitoring                                           |
| 8  | M1398                 | 5/2/16                    | Yes                   | Cattle         | NM           | 1 Killed                   | Confirmed   | M1398                                                            | Yes                                            | 1                       | Increased Monitoring/Hazing                                    |
| 9  | m1454                 | 5/11/16                   | No                    | Cattle         | AZ           | 1 Killed                   | Confirmed   | m1454                                                            | Yes                                            | 2                       | Hazing                                                         |
| 10 | Luna                  | 5/13/16                   | No                    | Cattle         | NM           | 1 Killed                   | Confirmed   | Luna (AF1115 and M1396)                                          | Yes                                            | 4                       | Continue Removal Action from 3-12 (Carcass several months old) |
| 11 | Luna                  | 5/13/16                   | No                    | Cattle         | NM           | 1 Killed                   | Confirmed   | M1396                                                            | Yes                                            | 5                       | Continue Removal Action from 3-12 (Carcass several months old) |
| 12 | Luna                  | 5/13/16                   | No                    | Cattle         | NM           | 1 Killed                   | Confirmed   | Luna                                                             | Yes                                            | 6                       | Continue Removal Action from 3-12                              |
| 13 | Luna                  | 5/13/16                   | No                    | Cattle         | NM           | 1 Killed                   | Confirmed   | Luna                                                             | No (Located in same area as depredation above) | 6                       | Continue Removal Action from 3-12                              |
| 14 | Uncollared            | 5/20/16                   | No                    | Cattle         | NM           | 1 Killed                   | Confirmed   | Uncollared                                                       | Yes                                            | 1                       | Increased Monitoring for Uncollared Sign                       |
| 15 | Uncollared            | 5/22/16                   | No                    | Cattle         | AZ           | 1 Killed                   | Confirmed   | Uncollared                                                       | Yes                                            | 1                       | Increased Monitoring for Uncollared Sign                       |
| 16 | Uncollared            | 5/28/16                   | No                    | Cattle         | NM           | 1 Killed                   | Confirmed   | Uncollared                                                       | Yes (same area as depredation on 5/20)         | 2                       | Increased Monitoring for Uncollared Sign                       |

|    | <b>Wolves in Area</b> | <b>Investigation Date</b> | <b>Located By IFT</b> | <b>Species</b> | <b>State</b> | <b># Killed/ # Injured</b>                               | <b>Call</b> | <b>Wolves Responsible</b>                                    | <b>Depredation Incident</b>                                                                     | <b>No. of Incidents</b> | <b>Management Action</b>                                                                                                                |
|----|-----------------------|---------------------------|-----------------------|----------------|--------------|----------------------------------------------------------|-------------|--------------------------------------------------------------|-------------------------------------------------------------------------------------------------|-------------------------|-----------------------------------------------------------------------------------------------------------------------------------------|
| 17 | Uncollared            | 5/29/16                   | No                    | Cattle         | AZ           | 1 Killed                                                 | Confirmed   | Uncollared (1-2)                                             | Yes                                                                                             | 1                       | Traps set to collar wolves (Unsuccessful)                                                                                               |
| 18 | Uncollared            | 5/29/16                   | No                    | Cattle         | NM           | 1 Killed                                                 | Confirmed   | Uncollared                                                   | Yes                                                                                             | 1                       | Increased Monitoring for Uncollared Sign                                                                                                |
| 19 | Uncollared            | 5/31/16                   | No                    | Cattle         | AZ           | 1 Killed                                                 | Confirmed   | Uncollared                                                   | Yes (same area as depredation on 5/22)                                                          | 2                       | Increased Monitoring/Cattle moved out of area according to schedule                                                                     |
| 20 | Uncollared            | 6/1/16                    | No                    | Cattle         | NM           | 1 Killed                                                 | Confirmed   | Uncollared                                                   | Yes (same area as depredation on 5/28)                                                          | 3                       | Increased monitoring/remote cameras                                                                                                     |
| 21 | M1398                 | 6/5/16                    | No                    | Cattle         | NM           | 1 Killed                                                 | Confirmed   | M1398                                                        | Yes                                                                                             | 2                       | Hazing                                                                                                                                  |
| 22 | Luna                  | 6/11/16                   | No                    | Cattle         | NM           | 1 Killed                                                 | Confirmed   | Luna                                                         | Yes (note: one depredation incident was placed on M1396 alone, That animal was removed on 5/24) | 6                       | Continued utilization of full suite of non-lethal deterrents (diversionary food cache, hazing, etc.) to prevent additional depredations |
| 23 | Uncollared            | 6/15/16                   | No                    | Cattle         | AZ           | 1 Killed                                                 | Confirmed   | Uncollared                                                   | Yes (same area as depredation on 5/31)                                                          | 3                       | Increased monitoring and trail camera utilization                                                                                       |
| 24 | Uncollared            | 6/16/16                   | No                    | Cattle         | NM           | 1 Killed                                                 | Confirmed   | Uncollared                                                   | Yes (same area as depredation on 6/1)                                                           | 4                       | Increased Monitoring and searching for trapping opportunities in area.                                                                  |
| 25 | Buckalou              | 6/20/16                   | No                    | Cattle         | NM           | 1 Killed                                                 | Confirmed   | Buckalou                                                     | Yes                                                                                             | 1                       | Increased Monitoring                                                                                                                    |
| 26 | Buckalou              | 6/20/16                   | No                    | Cattle         | NM           | 1 Killed                                                 | Probable    | Buckalou                                                     | No                                                                                              | 1                       | Increased Monitoring                                                                                                                    |
| 27 | Uncollared            | 6/22/16                   | No                    | Cattle         | AZ           | 1 Killed                                                 | Confirmed   | Uncollared/failed collars (likely F1437 and uncollared male) | Yes                                                                                             | 1                       | Increased monitoring and trail camera utilization                                                                                       |
| 28 | Uncollared            | 6/23/16                   | No                    | Cattle         | NM           | 1 Killed (initially injured, but later died of injuries) | Confirmed   | Uncollared                                                   | Yes (same area as depredation on 6/16)                                                          | 5                       | Increased Monitoring and searching for trapping opportunities in area.                                                                  |
| 29 | Uncollared            | 6/24/16                   | No                    | Cattle         | NM           | 1 Killed                                                 | Confirmed   | Uncollared                                                   | Yes (same area as depredation on 5/29)                                                          | 2                       | Increased Monitoring and searching for trapping opportunities in area.                                                                  |
| 30 | Uncollared            | 6/24/16                   | No                    | Cattle         | NM           | 1 Killed                                                 | Confirmed   | Uncollared                                                   | Yes (same area as depredation on 6/23)                                                          | 6                       | Increased Monitoring and searching for trapping opportunities in area.                                                                  |
| 31 | M1404                 | 7/2/16                    | No                    | Cattle         | NM           | 1 Killed                                                 | Confirmed   | M1404                                                        | Yes                                                                                             | 1                       | Intensive Monitoring                                                                                                                    |

|    | <b>Wolves in Area</b> | <b>Investigation Date</b> | <b>Located By IFT</b> | <b>Species</b> | <b>State</b> | <b># Killed/ # Injured</b>                                             | <b>Call</b> | <b>Wolves Responsible</b>                                    | <b>Depredation Incident</b>                          | <b>No. of Incidents</b> | <b>Management Action</b>                                                                                                  |
|----|-----------------------|---------------------------|-----------------------|----------------|--------------|------------------------------------------------------------------------|-------------|--------------------------------------------------------------|------------------------------------------------------|-------------------------|---------------------------------------------------------------------------------------------------------------------------|
| 32 | M1404                 | 7/2/16                    | No                    | Cattle         | NM           | 1 Injured                                                              | Confirmed   | M1404                                                        | No                                                   | 1                       | Intensive Monitoring                                                                                                      |
| 33 | Uncollared            | 7/5/16                    | No                    | Cattle         | AZ           | 1 Killed                                                               | Confirmed   | Uncollared/failed collars (likely F1437 and uncollared male) | Yes (same area as depredation on 6/22)               | 2                       | Intensive Monitoring and searching for trapping opportunities in the area.                                                |
| 34 | Uncollared            | 7/11/16                   | No                    | Cattle         | AZ           | 1 Killed                                                               | Confirmed   | Uncollared/failed collars (likely F1437 and uncollared male) | Yes (same area as depredation on 7/5)                | 3                       | Intensive Monitoring, Diversionary Feeding, Searching for trapping opportunities.                                         |
| 35 | Uncollared            | 7/16/16                   | No                    | Cattle         | NM           | 1 Injured                                                              | Confirmed   | Uncollared                                                   | No (see depredation on 6/24 for number of incidents) | 6                       | Increased Monitoring and searching for trapping opportunities in area.                                                    |
| 36 | Uncollared            | 7/19/16                   | No                    | Horse          | NM           | 1 Killed (Initially injured, but had to be euthanized due to injuries) | Confirmed   | Uncollared                                                   | Yes (same general area as depredation on 6/24)       | 3                       | Increased Monitoring, Unsuccessful trapping in area                                                                       |
| 37 | Uncollared            | 7/26/16                   | No                    | Cattle         | NM           | 1 Injured                                                              | Confirmed   | Uncollared                                                   | No (see depredation on 6/24 for number of incidents) | 6                       | Increased monitoring and searching for trapping opportunities in area.                                                    |
| 38 | Uncollared            | 8/2/16                    | No                    | Cattle         | AZ           | 1 Killed                                                               | Confirmed   | Uncollared/Failed collars                                    | Yes (same area as depredation on 7/11)               | 4                       | Unsuccessful trapping initiated in the area.                                                                              |
| 39 | Uncollared            | 8/9/16                    | No                    | Cattle         | NM           | 1 Killed                                                               | Confirmed   | Uncollared                                                   | Yes (same general area as depredation on 7/19)       | 4                       | Unsuccessful trapping initiated in a broad area for uncollared wolves associated with these and other depredations in NM. |
| 40 | Uncollared            | 8/12/16                   | No                    | Cattle         | AZ           | 1 Killed                                                               | Confirmed   | Uncollared/failed collars (likely F1437 and uncollared male) | Yes (same area as depredations on 8/2)               | 5                       | Intensive Monitoring, Diversionary Feeding, Searching for trapping opportunities.                                         |
| 41 | Uncollared            | 8/23/16                   | No                    | Cattle         | AZ           | 1 Killed                                                               | Confirmed   | Uncollared                                                   | Yes                                                  | 1                       | Increased Monitoring                                                                                                      |
| 42 | Uncollared            | 8/25/16                   | No                    | Cattle         | AZ           | 1 Killed                                                               | Confirmed   | Uncollared/failed collars (likely F1437 and uncollared male) | Yes (same area as depredation on 8/12)               | 6                       | Unsuccessful Trapping Efforts                                                                                             |
| 43 | Bluestem              | 9/4/16                    | No                    | Cattle         | AZ           | 1 Killed                                                               | Confirmed   | Bluestem                                                     | Yes                                                  | 1                       | Increased Monitoring                                                                                                      |
| 44 | Bluestem              | 9/5/16                    | No                    | Cattle         | AZ           | 1 Killed                                                               | Confirmed   | Bluestem                                                     | Yes                                                  | 2                       | Increased Monitoring/Hazing                                                                                               |
| 45 | Uncollared            | 9/6/16                    | No                    | Cattle         | AZ           | 1 Killed                                                               | Confirmed   | Uncollared/failed collars (likely F1437 and male)            | Yes (same area as depredation on 8/25)               | 7                       | Unsuccessful Trapping; Increased Monitoring.                                                                              |
| 46 | Elk Horn              | 9/13/16                   | No                    | Cattle         | AZ           | 1 Killed                                                               | Confirmed   | Elk Horn                                                     | Yes                                                  | 1                       | Trapping;                                                                                                                 |

|    | Wolves in Area    | Investigation Date | Located By IFT | Species | State | # Killed/ # Injured | Call      | Wolves Responsible                                           | Depredation Incident                   | No. of Incidents | Management Action                                                                                      |
|----|-------------------|--------------------|----------------|---------|-------|---------------------|-----------|--------------------------------------------------------------|----------------------------------------|------------------|--------------------------------------------------------------------------------------------------------|
|    |                   |                    |                |         |       |                     |           |                                                              |                                        |                  | Increased Monitoring, Hazing                                                                           |
| 47 | Luna, SBP, Prieto | 9/25/16            | No             | Cattle  | NM    | 1 Killed            | Confirmed | SBP or Uncollared                                            | Yes                                    | 1                | Increased Monitoring Trapping for SBP                                                                  |
| 48 | Mangas            | 9/26/16            | No             | Cattle  | NM    | 1 Killed            | Confirmed | Mangas                                                       | Yes                                    | 1                | Increased Monitoring                                                                                   |
| 49 | Uncollared        | 9/29/16            | No             | Cattle  | AZ    | 1 Killed            | Confirmed | Uncollared/failed collars (likely F1437 and uncollared male) | Yes (same area as depredation on 9/6)  | 8                | Unsuccessful Trapping; Increased Monitoring                                                            |
| 50 | Uncollared        | 10/5/16            | No             | Cattle  | AZ    | 1 Killed            | Confirmed | Uncollared                                                   | Yes (same area as 5/29 depredation)    | 2                | Increased Monitoring for sign and trapping opportunities                                               |
| 51 | Mangas            | 10/8/16            | No             | Cattle  | NM    | 1 Injured           | Confirmed | Mangas                                                       | No                                     | 1                | Increased Monitoring, Hazing                                                                           |
| 52 | Uncollared        | 10/13/16           | No             | Cattle  | NM    | 1 Killed            | Confirmed | Uncollared                                                   | Yes                                    | 1                | Searched area for trapping opportunities                                                               |
| 53 | Uncollared        | 10/13/16           | No             | Cattle  | NM    | 1 Killed            | Probable  | Uncollared                                                   | No                                     | 1                | Searched area for trapping opportunities                                                               |
| 54 | Uncollared        | 10/15/16           | Yes            | Cattle  | AZ    | 1 Killed            | Confirmed | F1437 and uncollared male observed in area                   | Yes (same area as depredation on 9/29) | 9                | Removal Order Issued for 1437 or uncollared male (M1564 captured and removed to captivity on 11/17/16) |
| 55 | Uncollared        | 10/25/16           | No             | Cattle  | NM    | 1 Killed            | Confirmed | Uncollared                                                   | Yes (same area as depredation on 8/9)  | 5                | Searched area for trapping opportunities                                                               |
| 56 | Uncollared        | 12/17/16           | No             | Cattle  | AZ    | 1 Killed            | Confirmed | Uncollared (3 wolves observed)                               | Yes (same area as depredation on 6/15) | 4                | Diversionsary Feeding, Hazing, Increased Monitoring                                                    |

Table 7. Mexican wolves captured in Arizona and New Mexico from January 1 – December 31, 2016.

|    | <b>Pack</b>   | <b>Wolf ID</b> | <b>Capture Date</b> | <b>Reason for Capture</b>                                                                                                             |
|----|---------------|----------------|---------------------|---------------------------------------------------------------------------------------------------------------------------------------|
| 1  | Mangas        | 1296           | January 20          | Helicopter capture. Routine monitoring purposes. Captured, re-collared, and released on site.                                         |
| 2  | Lava          | 1295           | January 23          | Helicopter capture. Routine monitoring purposes. Captured, re-collared, and released on site. Suffered a capture-related mortality.   |
| 3  | Hawks Nest    | 1453           | January 25          | Helicopter capture. Routine monitoring purposes. Captured, collared, and released on site.                                            |
| 4  | Hawks Nest    | 1383           | January 25          | Helicopter capture. Routine monitoring purposes. Captured, re-collared, and released on site.                                         |
| 5  | Elk Horn      | 1342           | January 25          | Helicopter capture. Routine monitoring purposes. Captured, re-collared, and released on site.                                         |
| 6  | Bluestem      | 1341           | January 25          | Helicopter capture. Routine monitoring purposes. Captured, re-collared, and released on site.                                         |
| 7  | Dark Canyon   | 1354           | January 26          | Helicopter capture. Routine monitoring purposes. Captured, re-collared, and released on site.                                         |
| 8  | San Mateo     | 1345           | January 26          | Helicopter capture. Routine monitoring purposes. Captured, re-collared, and released on site.                                         |
| 9  | Luna          | 1155           | January 26          | Helicopter capture. Routine monitoring purposes. Captured, re-collared, and released on site.                                         |
| 10 | Luna          | 1115           | January 26          | Helicopter capture. Routine monitoring purposes. Captured, re-collared, and released on site.                                         |
| 11 | Diamond       | 1454           | January 28          | Helicopter capture. Routine monitoring purposes. Captured, collared, and released on site.                                            |
| 12 | Marble        | 1442           | January 28          | Helicopter capture. Routine monitoring purposes. Captured, re-collared, and released on site.                                         |
| 13 | Marble        | 1340           | January 28          | Helicopter capture. Routine monitoring purposes. Captured and suffered a capture-related mortality prior to re-collaring and release. |
| 14 | Marble        | 1330           | January 28          | Helicopter capture. Routine monitoring purposes. Captured, re-collared, and released on site.                                         |
| 15 | Diamond       | 1249           | January 28          | Helicopter capture. Routine monitoring purposes. Captured, re-collared, and released on site.                                         |
| 16 | Prieto        | 1455           | February 4          | Helicopter capture. Routine monitoring purposes. Captured, collared, and released on site.                                            |
| 17 | Single        | 1284           | February 4          | Helicopter capture. Routine monitoring purposes. Captured, re-collared, and released on site.                                         |
| 18 | Prieto        | 1456           | April 9             | Routine monitoring purposes. Captured, collared and released on site.                                                                 |
| 19 | Luna          | 1487           | May 10              | Routine monitoring purposes. Captured, collared and released on site.                                                                 |
| 20 | Bluestem      | 1488           | May 21              | Routine monitoring purposes. Captured, collared and released on site.                                                                 |
| 21 | Luna          | 1487           | April 21            | Routine monitoring purposes. Re-captured and released on site.                                                                        |
| 22 | Bluestem      | 1489           | May 23              | Routine monitoring purposes. Captured, collared and released on site.                                                                 |
| 23 | Luna          | 1396           | May 24              | Captured and removed to captivity due to depredations                                                                                 |
| 24 | San Mateo     | 1399           | June 4              | Routine monitoring purposes. Captured, re-collared and released on site.                                                              |
| 25 | Elk Horn      | 1474           | August 26           | Routine monitoring purposes. Captured, collared and released on site.                                                                 |
| 26 | Bear Wallow   | 1548           | August 29           | Routine monitoring purposes. Captured, collared and released on site.                                                                 |
| 27 | Hoodoo        | 1549           | August 30           | Routine monitoring purposes. Captured, collared and released on site.                                                                 |
| 28 | Hoodoo        | 1550           | September 1         | Routine monitoring purposes. Captured, collared and released on site.                                                                 |
| 29 | San Mateo     | 1551           | September 3         | Routine monitoring purposes. Captured, collared and released on site.                                                                 |
| 30 | Panther Creek | 1486           | September 7         | Routine monitoring purposes. Captured, collared and released on site.                                                                 |
| 31 | Prieto        | 1552           | September 14        | Routine monitoring purposes. Captured, collared and released on site.                                                                 |
| 32 | Prieto        | 1553           | September 15        | Routine monitoring purposes. Captured, collared and released on site.                                                                 |
| 33 | Luna          | 1398           | September 16        | Routine monitoring purposes. Captured, re-collared and released on site.                                                              |
| 34 | Elk Horn      | 1471           | September 18        | Routine monitoring purposes. Captured, collared and released on site.                                                                 |

|    | <b>Pack</b>     | <b>Wolf ID</b> | <b>Capture Date</b> | <b>Reason for Capture</b>                                                                       |
|----|-----------------|----------------|---------------------|-------------------------------------------------------------------------------------------------|
| 35 | Luna            | 1554           | September 28        | Routine monitoring purposes. Captured, collared and released on site.                           |
| 36 | Iron Creek      | 1555           | September 29        | Routine monitoring purposes. Captured, collared and released on site.                           |
| 37 | Iron Creek      | 1556           | September 30        | Routine monitoring purposes. Captured, collared and released on site.                           |
| 38 | Iron Creek      | 1278           | September 30        | Routine monitoring purposes. Captured, re-collared and released on site.                        |
| 39 | Iron Creek      | 1240           | September 30        | Routine monitoring purposes. Captured, re-collared and released on site.                        |
| 40 | Diamond         | 1557           | October 7           | Routine monitoring purposes. Captured, collared and released on site.                           |
| 41 | Diamond         | 1558           | October 8           | Routine monitoring purposes. Captured, collared and released on site.                           |
| 42 | Diamond         | 1559           | October 8           | Routine monitoring purposes. Captured, collared and released on site.                           |
| 43 | Diamond         | 1560           | October 9           | Routine monitoring purposes. Captured, collared and released on site.                           |
| 44 | Panther Creek   | 1483           | October 22          | Routine monitoring purposes. Captured, collared and released on site.                           |
| 45 | Mangas          | 1439           | October 24          | Captured by private trapper. Re-collared and released on site.                                  |
| 46 | Panther Creek   | 1484           | October 25          | Routine monitoring purposes. Captured, collared and released on site.                           |
| 47 | Prieto          | 1456           | October 28          | Routine monitoring purposes. Captured, re-collared and released on site.                        |
| 48 | Panther Creek   | 1485           | October 26          | Routine monitoring purposes. Captured, collared and released on site.                           |
| 49 | Single          | 1354           | November 1          | Routine monitoring purposes. Captured, re-collared and released on site.                        |
| 50 | Leopold         | 1561           | November 2          | Routine monitoring purposes. Captured, collared and released on site.                           |
| 51 | SBP             | 1284           | November 2          | Routine monitoring purposes. Captured, re-collared and released on site.                        |
| 52 | Bluestem        | 1562           | November 4          | Routine monitoring purposes. Captured, collared and released on site.                           |
| 53 | Bluestem        | 1563           | November 5          | Routine monitoring purposes. Captured, collared and released on site.                           |
| 54 | Poll Knoll pair | 1564           | November 7          | Captured and removed to captivity due to previous depredations associated with a removal order. |
| 55 | Lava            | 1405           | November 13         | Routine monitoring purposes. Captured, re-collared and released on site.                        |
| 56 | Prieto          | 1565           | November 15         | Routine monitoring purposes. Captured, collared and released on site.                           |

Table 8. IFT management actions resulting from reported cases of potential Mexican wolf nuisance activities in Arizona and New Mexico during 2016.

| Date         | Wolf ID      | General Location | Type of Activity                                                     | IFT Response                                                                                         | Management Result                                   |
|--------------|--------------|------------------|----------------------------------------------------------------------|------------------------------------------------------------------------------------------------------|-----------------------------------------------------|
| January 22   | Diamond pack | Vernon, AZ       | Wolf seen near livestock on private land                             | IFT talked to reporting party and told to call IFT and AZGFD dispatch number if animal returned.     | IFT monitored the area, no further reports.         |
| February 15  | Unknown      | Jerome, AZ       | Possible wolf seen on private land, harassing chickens.              | IFT talked to reporting party and told to take photos of animal if it returned.<br>Possibly coyotes. | IFT monitored the area, no further sign or reports. |
| April 25     | Hoodoo pack  | Nutrioso, AZ     | Two wolves on/near private residence, near chickens.                 | IFT investigated and talked to the reporting party. Wolves had left the area.                        | None, animals left area.                            |
| April 28     | M1454        | Vernon, AZ       | Wolf seen harassing cattle.                                          | IFT investigated and hazed wolf out of area.                                                         | IFT monitored the area.                             |
| May 31       | Unknown      | Pinetop, AZ      | Possible wolf seen near residence.                                   | IFT investigated and found no wolves in area. Possibly domestic dog.                                 | None, animals left area.                            |
| June 14      | Unknown      | Luna, NM         | Two possible wolves on private land near livestock.                  | IFT investigated and found no wolves in area. Possibly domestic dogs.                                | None, animals left area.                            |
| July 7       | Unknown      | Eagar, AZ        | Possible wolf seen at/near private residence.                        | IFT talked to reporting party and told to call IFT and AZGFD dispatch number if animal returned.     | IFT monitored the area, no further reports.         |
| August 4     | Unknown      | Alpine, AZ       | Possible wolf near private residence, interaction with domestic dog. | IFT investigated and found no sign of wolves, only coyote tracks.                                    | None, animal had left area.                         |
| September 15 | Unknown      | Eagar, AZ        | Possible wolf feeding on livestock.                                  | IFT investigated and found no wolves in area. Possibly domestic dogs.                                | IFT monitored the area, no further reports.         |
| October 3    | Unknown      | Eagar, AZ        | Possible wolf harassing chickens.                                    | IFT investigated and found no wolves in area. Possibly domestic dogs.                                | IFT monitored the area, no further reports.         |
| October 30   | Unknown      | Scottsdale, AZ   | Possible wolf eating domestic cat at private residence.              | IFT spoke to reporting party and informed there are no known wolves in area.                         | None, animal had left area.                         |
| November 13  | Unknown      | Tijeras, NM      | Possible wolf seen at private residence.                             | IFT spoke to reporting party and informed there are no known wolves in area.                         | None, animal had left area.                         |
| November 25  | Unknown      | Rio Verde, AZ    | Possible wolf seen at retirement community and golf course.          | IFT spoke to reporting party and informed there are no known wolves in area.                         | None, possible domestic dog.                        |
| December 5   | Unknown      | New River, AZ    | Possible wolf seen harassing chickens                                | IFT spoke to reporting party, and told to call AZGFD dispatch number if animal returned.             | None, possible domestic dog.                        |

Table 9. IFT proactive management activities in Arizona and New Mexico during 2016.

| <b>Proactive Management</b> | <b>Purpose</b>                                | <b>Time Period</b>        | <b>Location</b>            | <b>Packs Associated with Proactive Management</b> | <b>Management Result</b>                                                                            |
|-----------------------------|-----------------------------------------------|---------------------------|----------------------------|---------------------------------------------------|-----------------------------------------------------------------------------------------------------|
| Hay                         | Reduce livestock depredations.                | Calving Season            | Blue River, AZ             | Bluestem, Panther Creek                           | No known depredations                                                                               |
| Range Rider                 | Reduce depredations on free-ranging livestock | June – Oct<br>5 months    | Escudilla/Beaver Creek, AZ | Elk Horn, Bluestem, Panther Creek                 | 1 confirmed depredation                                                                             |
| Range Rider                 | Reduce depredations on free-ranging livestock | July - August<br>2 months | North Escudilla, AZ        | Elk Horn                                          | No known depredations                                                                               |
| Range Rider                 | Reduce depredations on free-ranging livestock | Feb – June<br>5 months    | Strayhorse, AZ             | Bear Wallow, Panther Creek                        | No known depredations                                                                               |
| Range Rider                 | Reduce depredations on free-ranging livestock | June – Oct<br>5 months    | Crosby Crossing, AZ        | Hawks Nest, Hoodoo                                | No known depredations                                                                               |
| Range Rider                 | Reduce depredations on free-ranging livestock | June – Oct<br>5 months    | Harris Lake, AZ            | Diamond, Uncollared/failed collar pair            | 7 confirmed depredations, all associated with uncollared or failed collared wolves.                 |
| Range Rider                 | Reduce depredations on free-ranging livestock | June – Oct<br>5 months    | Sheep Springs, AZ          | Diamond, Uncollared/failed collar pair            | Same depredations as documented above.                                                              |
| Range Rider                 | Reduce depredations on free-ranging livestock | June – Oct<br>5 months    | Greer, AZ                  | Hawks Nest/Diamond                                | No known depredations                                                                               |
| Range Rider                 | Reduce depredations on free-ranging livestock | Mar - April<br>2 months   | Cow Springs, NM            | Mangas, Uncollared Wolves                         | No known depredations                                                                               |
| Range Rider                 | Reduce depredations on free-ranging livestock | Feb - Oct<br>9 months     | Centerfire Bog, NM         | Mangas, Fox Mountain, Uncollared wolves           | 1 confirmed cattle depredation and 1 confirmed horse depredation associated with uncollared wolves. |
| Range Rider                 | Reduce depredations on free-ranging livestock | June – Oct<br>5 months    | Canyon Del Buey, NM        | San Mateo, Willow Springs                         | No known depredations                                                                               |
| Range Rider                 | Reduce depredations on free-ranging livestock | June – Oct<br>5 months    | Cox Canyon, NM             | Luna, Prieto                                      | No known depredations                                                                               |
| Range Rider                 | Reduce depredations on free-ranging livestock | April - Aug<br>5 months   | Toriette, NM               | Mangas, Uncollared wolves                         | 1 confirmed depredation associated with uncollared wolves                                           |
| Range Rider                 | Reduce depredations on free-ranging livestock | August - Nov<br>4 months  | Rainy Mesa, NM             | Luna, Prieto, Dark Canyon, SBP                    | No known depredations                                                                               |
| Range Rider                 | Reduce depredations on free-ranging livestock | Sept - Dec<br>4 months    | Gallo Mountain, NM         | San Mateo, Uncollared wolves                      | 1 confirmed and 1 probable depredation associated with Uncollared wolves                            |
| Range Rider                 | Reduce depredations on free-ranging livestock | July - Sept<br>3 months   | Gasoline Lake, NM          | Mangas, Uncollared wolves                         | No known depredations                                                                               |
| Range Rider                 | Reduce depredations on free-ranging livestock | July - Sept<br>3 months   | Eagle Peak, NM             | Luna, Prieto, SBP                                 | No known depredations                                                                               |

Table 10. Areas search and uncollared wolves documented by the IFT during 2016.

| <b>Area ID</b> | <b>General Area</b>                                | <b>Effort</b>                                                                  | <b>State</b> | <b>Number Documented</b> |
|----------------|----------------------------------------------------|--------------------------------------------------------------------------------|--------------|--------------------------|
| A              | Reynolds Creek south of Young                      | Deployed cameras to monitor for wolves                                         | AZ           | 0                        |
| B              | Chevelon Canyon complex area north of Forest Lakes | Deployed cameras to monitor for wolves                                         | AZ           | 0                        |
| C              | Canyon Creek/OW Point area                         | Wolf photographed by member of public                                          | AZ           | 1                        |
| D              | Clay Springs area                                  | Deployed cameras, sign searched roads and trails to monitor for wolves         | AZ           | 1                        |
| E              | Pole Knoll                                         | Deployed cameras and food caches, sign search roads and trails, set traps      | AZ           | 2                        |
| F              | Centerfire/Hardcastle                              | Deployed remote cameras and searched roads and trails for wolf sign, set traps | NM           | 0                        |
| G              | San Francisco Mountains                            | Deployed remote cameras and searched roads and trails for wolf sign            | NM           | 0                        |
| H              | Pueblo Creek                                       | Deployed remote cameras and searched roads and trails for wolf sign            | NM           | 1                        |
| I              | Sand Flats                                         | Deployed remote cameras and searched roads and trails for wolf sign            | NM           | 0                        |
| J              | Indian Peaks                                       | Deployed remote cameras and searched roads and trails for wolf sign            | NM           | 1                        |
| K              | Boiler Peak                                        | Deployed remote cameras and searched roads and trails for wolf sign            | NM           | 1                        |
| L              | North San Mateo Mountains                          | Deployed remote cameras and searched roads and trails for wolf sign            | NM           | 1                        |
| M              | South San Mateo Mountains                          | Deployed remote cameras and searched roads and trails for wolf sign            | NM           | 0                        |
| N              | Datil Mountains                                    | Deployed remote cameras and searched roads and trails for wolf sign            | NM           | 1                        |
| O              | Long Lake                                          | Deployed remote cameras and searched roads and trails for wolf sign            | NM           | 2                        |
| P              | Tribal lands                                       | Deployed remote cameras and searched roads and trails for wolf sign            | NM           | 0                        |

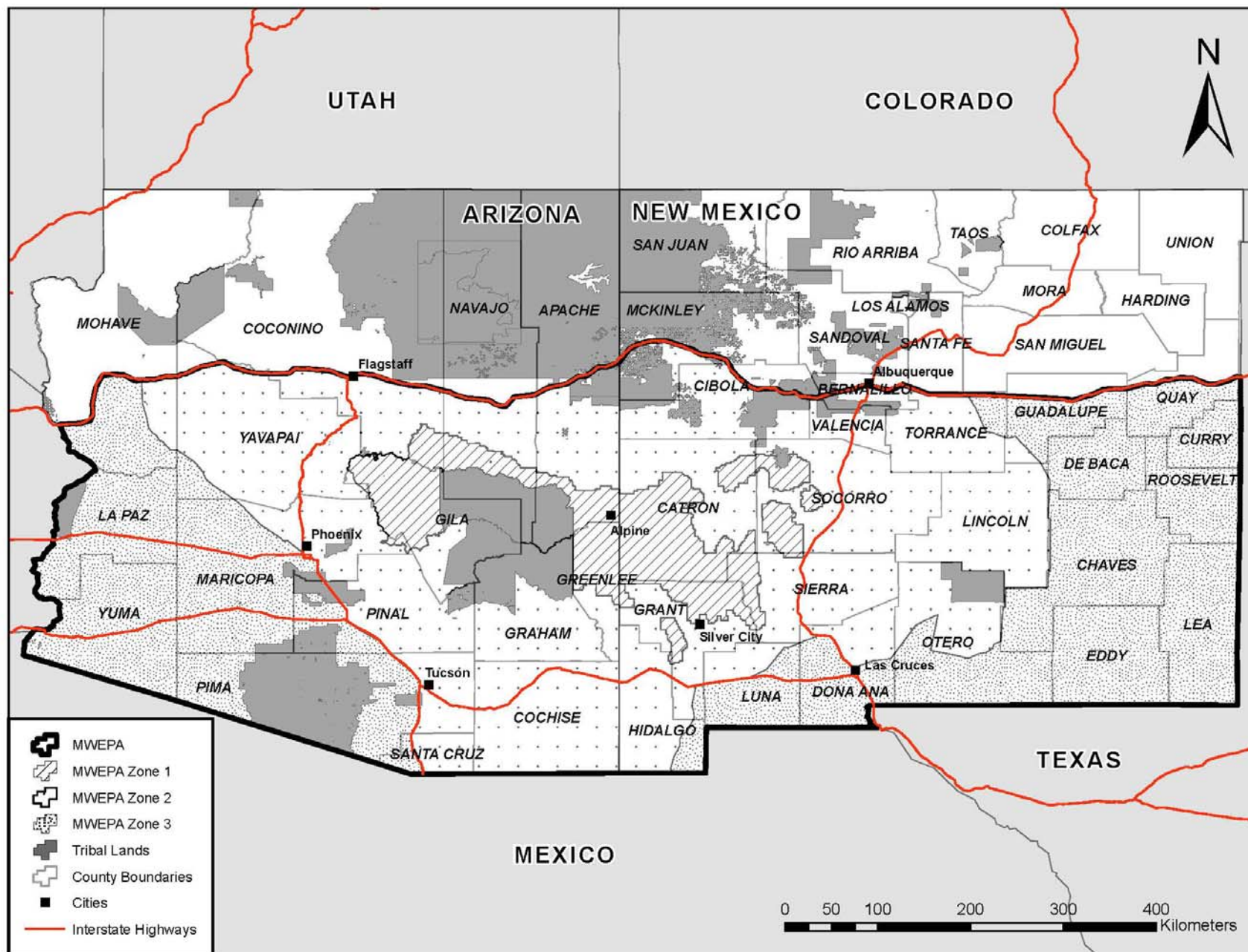


Figure 1. The Mexican Wolf Experimental Population Area (MWEPA) and Zones 1-3 in Arizona and New Mexico as described in the 2016 Final Rule found at [http://www.fws.gov/southwest/es/mexicanwolf/pdf/Mx\\_wolf\\_10j\\_final\\_rule\\_to\\_OFR.pdf](http://www.fws.gov/southwest/es/mexicanwolf/pdf/Mx_wolf_10j_final_rule_to_OFR.pdf).

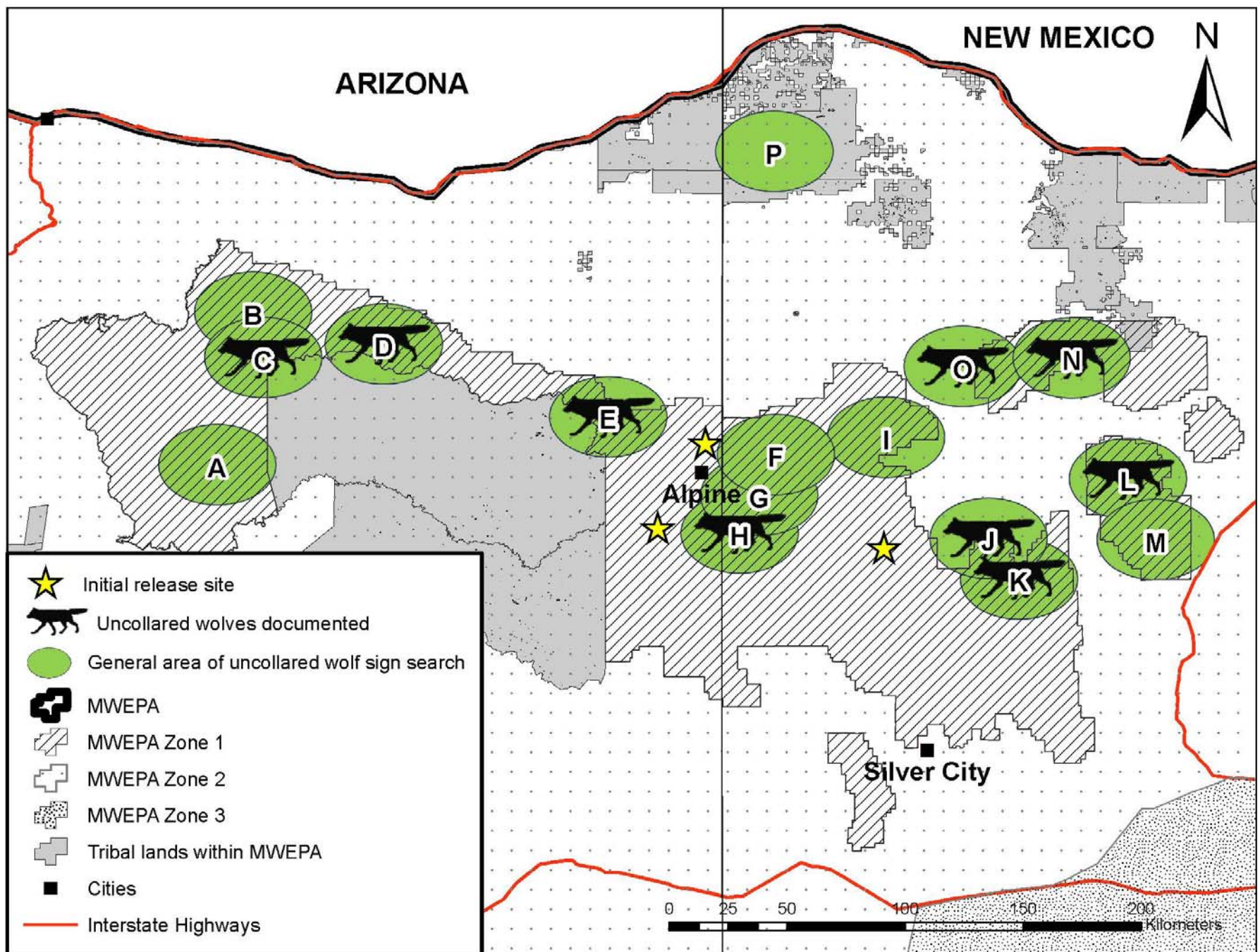


Figure 2. Areas searched for uncollared wolf sign (with uncollared wolves documented and counted in the 2016 wolf population designated) within the Mexican Wolf Experimental Population Area (MWEPA). Search areas correspond with map letters found in Table 10. One initial release site was used during 2016 in Arizona and New Mexico within the MWEPA.

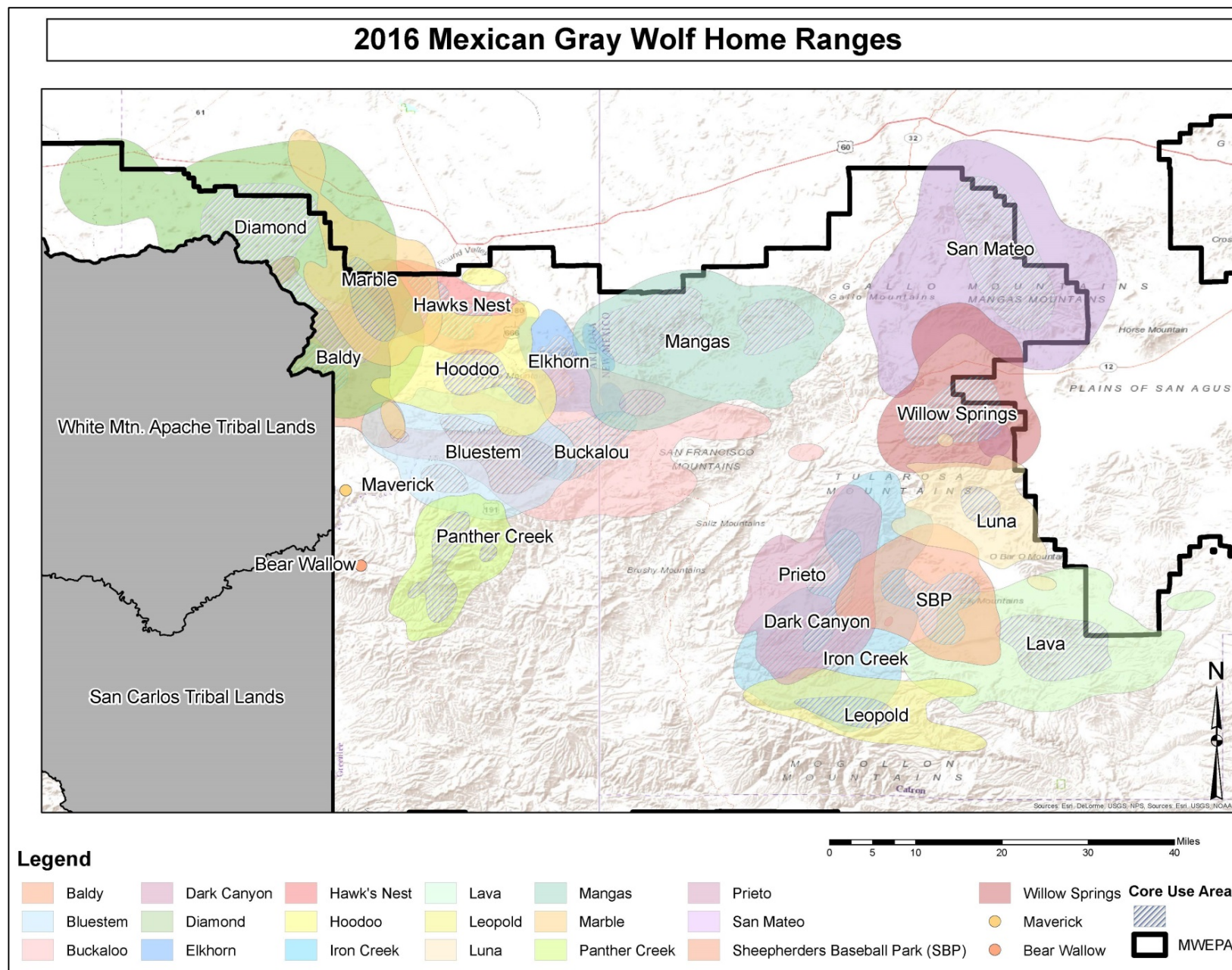


Figure 3. Mexican wolf home ranges for 2016 in Arizona and New Mexico within the Mexican Wolf Experimental Population Area (MWEPA). The shaded polygons on the map represent wolves having a minimum of 20 and a maximum of 466 independent radio locations and exhibiting movement characteristics consistent with a home range during 2016. The Bear Wallow and Maverick packs are represented with dots because there were not enough locations in 2016 to calculate home ranges for these packs.

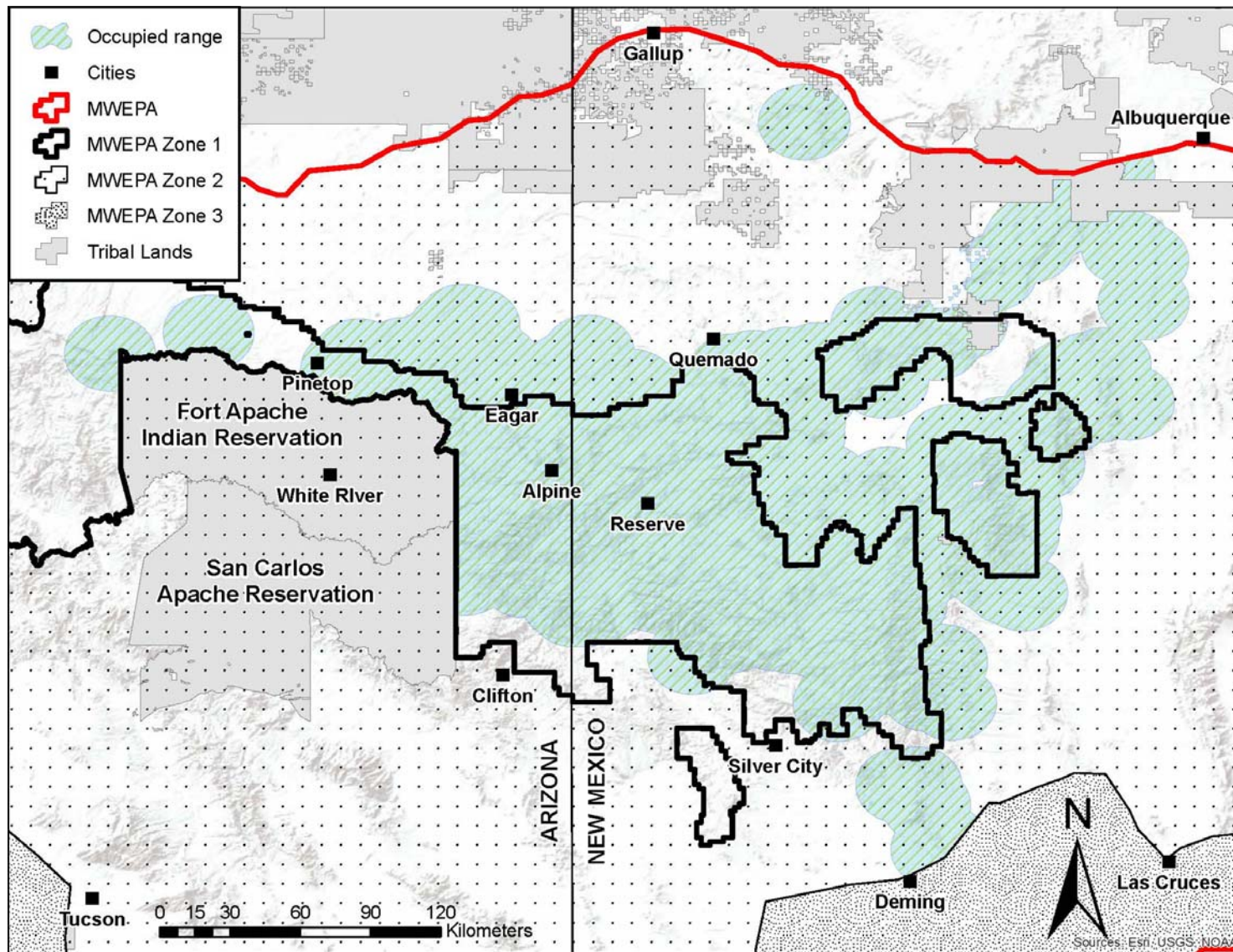


Figure 4. Mexican wolf occupied range in Arizona and New Mexico (2016) within the Mexican Wolf Experimental Population Area (MWEPA).

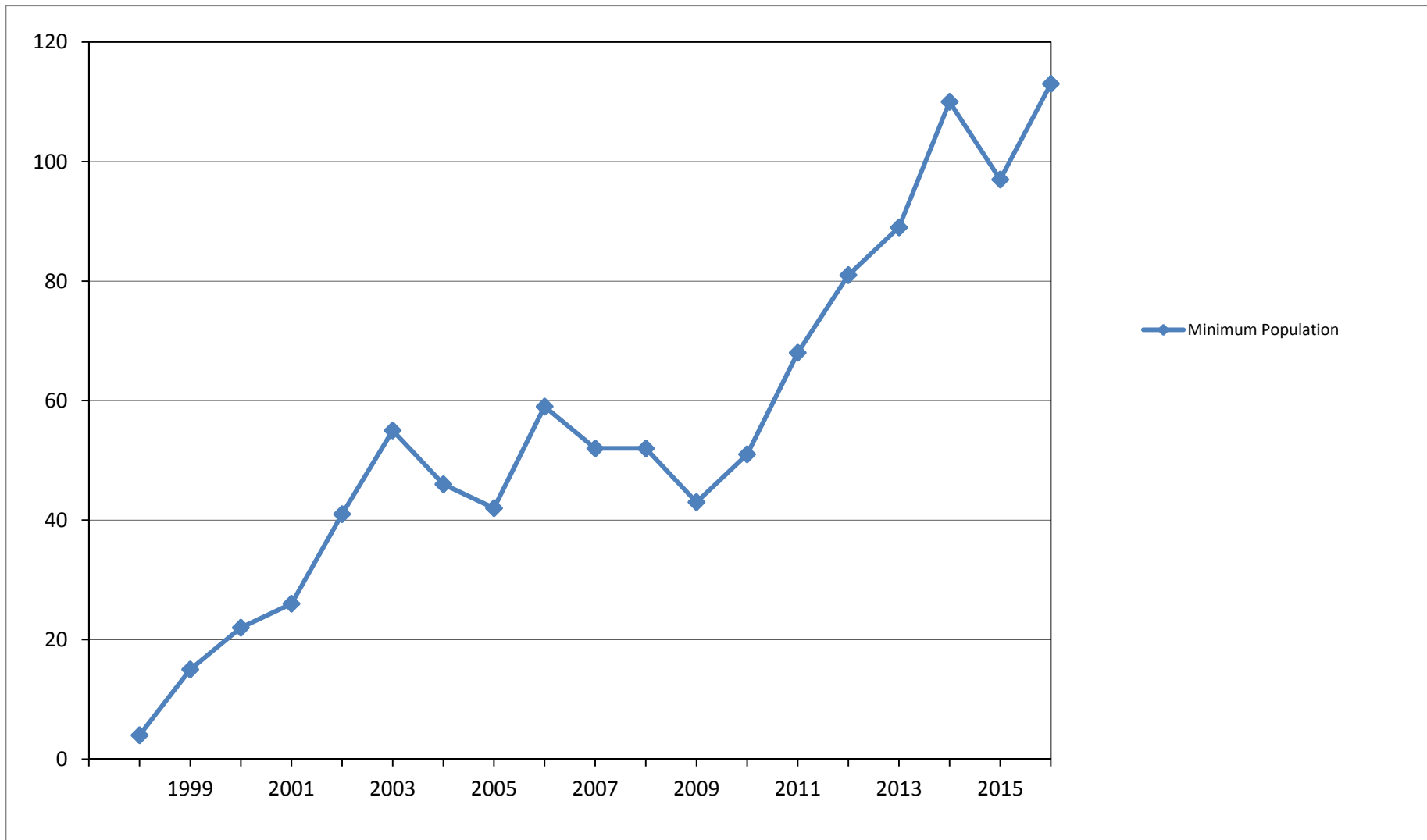


Figure 5. Mexican wolf minimum population estimates from 1998 through 2016 in Arizona and New Mexico.

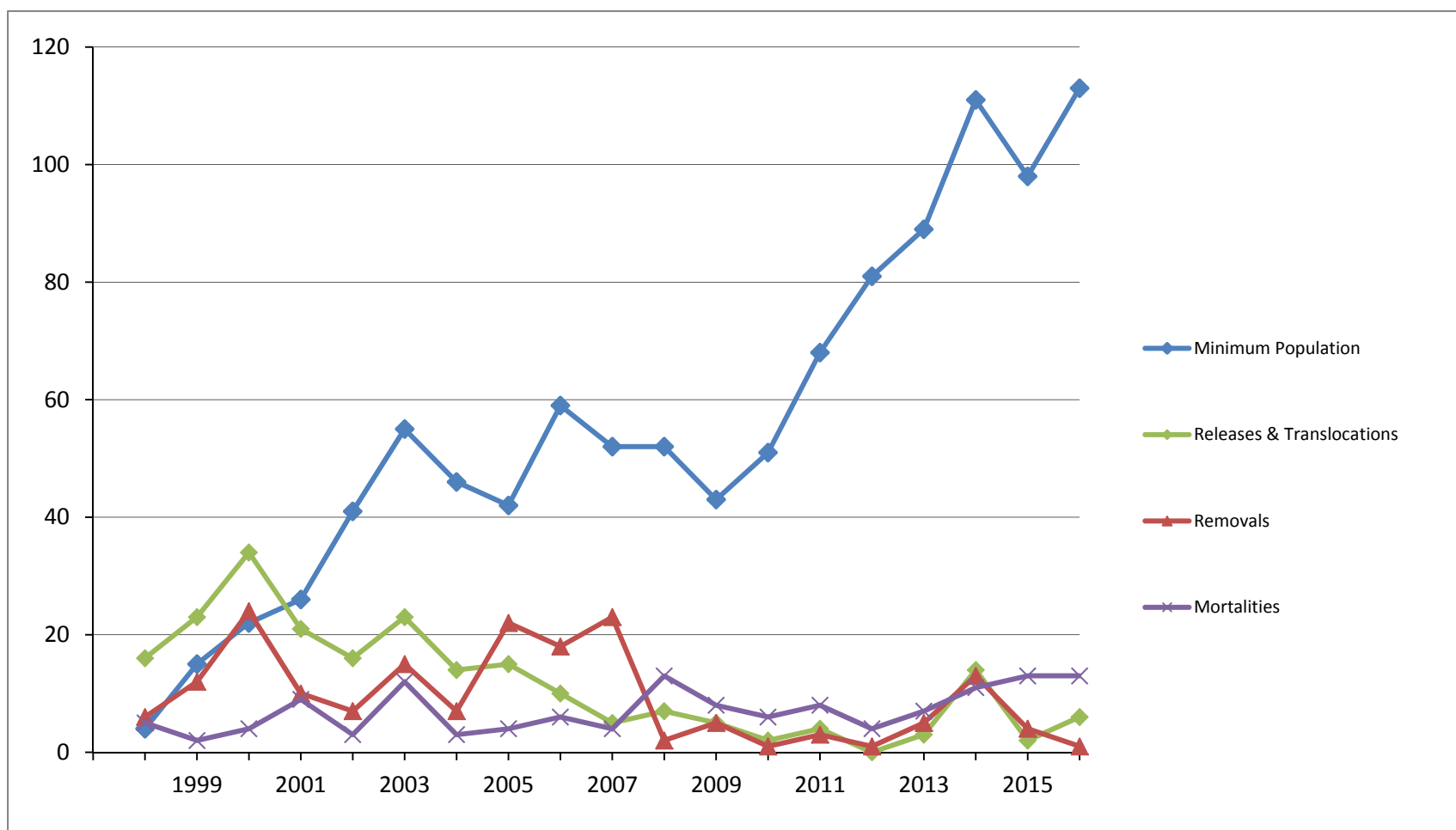


Figure 6. Mexican wolf minimum population estimates and associated population parameters (1998-2016). Releases and translocations included: initial releases (wolves released with no wild experience), translocations (wolves re-released from captivity back into the wild, and free-ranging wolves that were 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. 2016 Pack and Single Wolf Summaries**

### **5. Pack Summaries**

#### ***Baldy (M1347 and F1445)***

In January, m1347 (cross-fostered as a neonatal pup into the Dark Canyon pack in 2014) was considered fate unknown and f1445 was part of the Tsay-O-Ah pack. In June, M1347 and F1445 were documented traveling together. They established a territory on the FAIR and the north-central region of the ASNF and became known as the Baldy pack. As of December 31, Baldy consisted of two animals, M1347 and F1445. Baldy had no depredations, no captures, no mortalities, no fate unknowns, no removals, and no translocations. The Baldy pack formed after the breeding season and did not den or produce pups; therefore, Baldy was not a breeding pair.

#### ***Bluestem (AF1042, AM1341, M1382, m1404, f1443, f1488, f1489, fp1562, and fp1563)***

In January, Bluestem consisted of eight animals (AF1042, AM1341, M1382, m1404, f1443, and three uncollared pups). Bluestem continued to use their traditional territory in the central portion of the ASNF. During the annual helicopter count and capture operation, AM1341 was captured and re-collared, but the collar failed shortly after deployment. At the end of January, m1404 was documented traveling with f1405 of the Buckalou pack and did not return to Bluestem. In May, two yearling females were captured, collared, and released (f1488 and f1489). The pack showed evidence of denning in the spring and two pups were confirmed in June. During this time, M1382 began making broad dispersal movements, but returned sporadically to the pack's traditional territory. In late August and early September, two livestock depredations were attributed to the Bluestem pack and a diversionary food cache was maintained to prevent further incidents. In November, two female pups were captured, collared, and released (fp1562 and fp1563). Wolf f1443 left the pack in November and paired with m1447 of the Diamond pack near the border between Arizona and New Mexico. Wolf f1488 had also dispersed from Bluestem by the end of the year. As of December 31, Bluestem consisted of AF1042, AM1341, f1489, fp1562, fp1563, and at least four uncollared pups/yearlings. Bluestem had two depredations, five captures, no mortalities, no fate unknowns, no removals, and no translocations. Bluestem was a breeding pair.

#### ***Bear Wallow (AF1335, AM1338, and fp1548)***

Throughout 2016, Bear Wallow was located within their traditional territory in the east-central portion of the ASNF and the northeast portion of the SCAR. Denning behavior was documented for this pair, but not confirmed until a female pup (fp1548) was captured in August. In September, fp1548 slipped her collar and was considered fate unknown by the end of the year. As of December 31, Bear Wallow consisted of AF1335, AM1338, and two uncollared pups. Bear Wallow had no confirmed depredations, one capture, no mortalities, one fate unknown, no removals, and no translocations. Bear Wallow was a breeding pair.

#### ***Buckalou (M1161, f1405, and m1404)***

By the end of January, m1404 was documented traveling with f1405 of the Buckalou pack in the central portion of the ASNF and GNF around the border between Arizona and New Mexico. M1161 had a failed collar and was no longer traveling with f1405. As of April, m1404 was

officially counted as part of the Buckalou pack and M1161 was fate unknown. In June, M1161 was found dead in Arizona. In July, m1404 was found dead in New Mexico. In October, f1405 dispersed to the east-central portion of the GNF in New Mexico and was later documented traveling with M1285 and considered as part of the Lava pack. f1405 was captured on November 13 with the Lava pack for routine monitoring purposes and released on site. Buckalou had no confirmed depredations, one capture, two mortalities, no fate unknowns, no removals, and no translocations. Buckalou was not a pack at the end of 2016.

#### ***Coronado (M1051)***

In January, Coronado consisted of one animal: M1051. The last time M1051 was documented was in January 2016 via remote camera. M1051 is considered fate unknown. The Coronado pack Coronado had no depredations, no captures, no mortalities, one fate unknown, no removals, and no translocations. The Coronado pack is considered defunct unless M1051 is recaptured.

#### ***Dark Canyon (AM992, AF923, M1293, m1354, m1347, fp1444)***

In January, Dark Canyon consisted of seven animals: AM992, AF923, M1293, m1354, m1347, fp1444, and an uncollared animal. During the annual helicopter survey, m1354 was recollared and M1293 was observed separate from the pack and alone; the IFT later determined M1293 had found a mate and formed the Leopold pack. m1354 and m1347 dispersed from the pack, m1354 remained a single animal and m1347 formed the Baldy pack in Arizona. During 2016, m1354s collar failed, but the IFT recollared it in the fall. In the spring, AF923 was located dead. Following AF923s death, AM992 and f1444 started traveling separate from one another. f1444 dispersed became a single wolf. AM992 continued to travel both within and outside of its traditional territory in the west-central portion of the Gila National Forest (GNF). At the end of 2016, the Dark Canyon pack consisted of AM992. Dark Canyon had no confirmed depredations, no captures, one mortality, no fate unknowns, no removals, and no translocations. The Dark Canyon pack did not produce offspring in 2016.

#### ***Elk Horn (AF1294, AM1342, mp1471, and mp1474)***

In January, Elk Horn consisted of AF1294 and AM1342. The pack's territory is in the northeastern portion of the ASNF in Arizona and the northwestern portion of the GNF in New Mexico. AM1342 was captured and re-collared during the annual helicopter survey, but that collar failed shortly after deployment. Elk Horn denned in late April and two neonatal pups from captivity (mp1471 and fp1472) were cross-fostered into the natal den which originally contained five pups (for a new total of seven in the den). The Elk Horn pack had four pups documented with them until the end of the year. Two were captured and collared; one of them was confirmed wild-born (mp1474) and another was a confirmed cross-foster (mp1471). We did not determine the status of the other two pups traveling with Elk Horn at the end of 2016. As of December 31, Elk Horn consisted of AF1294, AM1342, mp1471, mp1474, and two uncollared pups. Elk Horn had one confirmed depredation, three captures, no mortalities, no fate unknowns, no removals, and no translocations. Elk Horn was a breeding pair.

#### ***Hawks Nest (AM1038, AF1280, m1383, and mp1453)***

In January, Hawks Nest consisted of AM1038, AF1280, m1383, and two uncollared pups. The pack occupied their traditional territory in the ASNF. During the annual helicopter count and

capture operation, m1383 and a male pup (mp1453) were captured and collared. AF1280 was found dead in Arizona in February. Hawks Nest showed no evidence of denning and no pups were documented during 2016. Both m1383's and m1453's collars failed in May, but they were documented traveling with AM1038 throughout the year. Toward the end of the year, AM1038 made broad dispersal movements to the northern portion of the ASNF and was documented traveling alone. As of December 31, Hawks Nest consisted of AM1038, m1383, and m1453. Hawks Nest had no confirmed depredations, two captures, one mortality, no fate unknowns, no removals, and no translocations. Hawks Nest was not a breeding pair.

***Hoodoo (AM1290, AF1333, m1441, fp1549, and fp1550)***

In January, Hoodoo consisted of AM1290, AF1333, and m1441. Hoodoo was documented throughout the year in the central portion of the ASNF in Arizona. Hoodoo denned in April and produced a minimum of six pups. In June, the previous Hoodoo breeding female, AF1395, was found dead in Arizona. Two female pups, fp1549 and fp1550, were captured and collared in September. At the end of the year, m1441 started making dispersal movements apart from the pack. As of December 31, Hoodoo consisted of AM1290, AF1333, m1441, fp1549, fp1550, and four uncollared pups. Hoodoo had no confirmed depredations, two captures, one mortality, no fate unknowns, no removals, and no translocations. Hoodoo was a breeding pair.

***Iron Creek (AF1278 and AM1240)***

In January, Iron Creek consisted of five animals minimum: AM1240, AF1278, and at least three uncollared pups. Throughout the year, Iron Creek was located in the north-central portion of the GNF. Five pups were documented in May; three pups were consistently documented after July. AM1240 and AF1278 were recaptured and collared in September. Two pups, mp1555 and mp1556, were also captured and collared in September. In October, mp1555 slipped his collar and the collar was retrieved. By the end of December, Iron Creek consisted of a minimum of five animals, including AM 1240, AF1278, mp1556 and two uncollared pups, one which is believed to be mp1555. Iron Creek had four captures, no mortalities, no fate unknowns, no removals, no translocations, and no depredations. Iron Creek was a breeding pair.

***Lava (AM1285, AF1295, mp1446, and F1405)***

In January, Lava consisted of AM1285, AF1295, and mp1446. In January, AF1295 was captured during the annual population count, and subsequently died from capture related complications. Lava used their territory in central portions of the GNF, until we could no longer track the pack due collar failure. In the spring, m1446 became fate unknown. In October, F1405 of the Buckalou pack paired and later became a member of the Lava pack allowing us again to track this packs movements. As of December 31, Lava consisted of two animals (AM1285 and F1405). Lava had no confirmed depredations, one capture, one mortality, one fate unknown, no removals, and no translocations. The Lava pack was not considered a breeding pair in 2016.

***Leopold pack (AM1293 and mp1561)***

In January, AM1293 was documented traveling alone. However, restricted movements in the spring and summer indicated that AM1293 was likely part of a denning pack. On November 7, mp1561 was captured and collared. This confirmed that the pack had denned and produced pups inside the Gila Wilderness. Genetic results indicated that F1346 had produced mp1561 with AM1293. F1346 was uncollared, but had been part of a cross-foster effort into the Dark Canyon

pack during 2014 (see 2014 annual report). This marked the first time a cross fostered animal had successfully reproduced in the wild. Three pups ultimately confirmed with this pack.

In addition to the unique status of AF1346, the Leopold pack also received a unique name. Although the Gila Wilderness has been important for Mexican wolves, previous wolf packs that utilized the wilderness were either translocated or formed as a result of dispersing wolves from a translocation. The IFT verified that this pack is the first documented naturally forming pack in the Gila Wilderness. The “Leopold Pack” name was reserved early in the recovery process for the first naturally forming pack in the Gila Wilderness. Naming the pack after Aldo Leopold recognizes his efforts to establish the Gila Wilderness as the first designated wilderness in the world and his efforts to conserve wolves. Over one hundred years ago, Aldo Leopold made the most famous wolf hunt in American history. The hunt was a turning point for Leopold, setting him on the path to become one of America’s foremost conservationists. “In those days we had never heard of passing up a chance to kill a wolf,” Leopold later said. “I thought that because fewer wolves meant more deer, that no more wolves would mean a hunters’ paradise.” But after seeing “the fierce green fire” in the wolf’s eyes die out, he wrote, “I sensed that neither the wolf nor the mountain agreed with such a view.”

By the end of December, the Leopold pack consisted of a minimum of five animals, including AM1293, AF1346 (uncollared but confirmed as the alpha female through genetic analysis), mp1561 and two uncollared pups. Leopold had one capture, no mortalities, no fate unknowns, no removals, no translocations, and no depredations. The Leopold pack was considered a breeding pair.

#### ***Luna pack (AF1487, AM1158, M1396, and mp1554)***

In January of 2016, the Luna pack consisted of three wolves: AF1115, AM1155, and one uncollared sub-adult. During February, members of the Fox Mountain pack (AM1158 and M1396) took over the Luna pack which resulted in the displacement of the former breeding male, AM1155. The IFT documented denning behavior from AF1115 and M1396 in April. There were several depredations that were assigned to the Luna pack (specifically M1396) from February-May, which resulted in the removal order of M1396 to be placed into captivity. Trapping activities began in early May to remove M1396. During trapping efforts, an un-collared lactating female (F1487) was captured and radio-collared. Based on radio telemetry signals, the IFT confirmed that F1487 and M1396 was a denning pair, and AF1115 and AM1158 was also a denning pair from the same pack. The IFT captured and removed M1396 to captivity in late May, and quickly set up a supplemental food cache for F1487 and her pups. In June, shortly after the removal of M1396, the IFT documented F1487 with AF1115 and AM1158, and assumed she had moved her pups to their den area. A minimum of five pups were documented with the Luna pack in June. During July, the IFT documented the mortality of AF1115, however, the IFT continued to document pups with F1487 and AM1158. During September, the IFT successfully captured and collared mp1554. By the end of December, the Luna pack was considered a breeding pair, and consisted of a minimum of five animals, which included AF1487, AM1158, mp1554, and two un-collared pups. The Luna pack had three captures, one mortality, no fate unknowns, one removal, no translocations, and eight depredations.

***Mangas pack (M1296 and F1439)***

In January of 2016, the Mangas pack consisted of two wolves: M1296 and F1439. This pair consistently utilized the northwestern portion of the Gila National Forest throughout 2016. The pair did not exhibit denning behavior during the spring. During October, a private coyote trapper had captured F1439 and immediately contacted the IFT. The IFT responded and re-collared F1439 and released her on site. By the end of December, the Mangas pack remained the M1296 and F1439 pair. The Mangas pack had one capture, no mortalities, no fate unknowns, no removals, no translocations, and two depredations. The Mangas pack was not a breeding pair during 2016.

***Marble (AF1340, AM1330, mp1440, and fp1442)***

In January, Marble consisted of AF1340, mp1440, fp1442, an alpha male wolf with a failed collar, and one uncollared pup. During the annual helicopter count and capture operation, AF1340, AM1330, and fp1442 were captured and processed. AF1340 died during processing. The alpha male with the failed collar was re-collared and determined to be AM1330 (fate unknown until that point). Wolf fp1442 was re-collared and released. The Marble pups depredated livestock once in March. During February and March, Marble was studied in the annual winter predation study period. In April, AM1330 dispersed to the FAIR and the north-central portion of the ASNF and was documented traveling alone. Shortly thereafter, his collar failed and he was considered fate unknown by the end of July. Wolf fp1442 was found dead in Arizona in March; m1440 had made broad dispersal movements into New Mexico and was found dead there in June. Marble had one confirmed depredation, three captures, three mortalities, one fate unknown, no removals, and no translocations. Marble was not a pack at the end of 2016.

***Maverick (AM1183 and AF1291)***

In January, Maverick consisted of AM1183, AF1291, and two uncollared wolves. Throughout the year, Maverick was located within their traditional territory on the FAIR and the central portion of the ASNF. Maverick displayed denning behavior, but neither a den nor pups were confirmed for this pack during 2016. At the end of the year, only AM1183 and AF1291 were documented with Maverick. Maverick had no confirmed depredations, captures, mortalities, fate unknowns, removals, or translocations. Maverick was not a breeding pair.

***Morgart's pack (AM1155)***

In January of 2016, AM1155 was the breeding male of the Luna pack. During February, AM1155 was displaced from the Luna pack and became a single wolf, taking the name of Morgart's pack, which was his pack name before he had joined the Luna pack years prior. By the end of December, AM1155 was documented traveling alone within New Mexico. Morgart's pack had no confirmed depredations, captures, mortalities, fate unknowns, removals, or translocations. Morgart's pack was not a breeding pair.

***Panther Creek (AF1339, AM1394, mp1483, fp1484, fp1485, and mp1486)***

In January, AF1339 and AM1394 occupied their traditional territory in the south-central region of the ASNF. Panther Creek denned in early May and two neonatal pups from captivity (fp1480 and fp1481) were cross-fostered into the natal den which originally contained five pups (for a

new total of seven in the den). The Panther Creek pack had six pups documented with them until the end of the year; fp1485 was found dead in November. Four were captured and collared; all four were confirmed wild-born (mp1483, fp1484, fp1485, and mp1486). Because six pups were documented traveling with Panther Creek and four wild-born pups were accounted for, we can deduce that at least one cross-fostered animal survived until the end of 2016 (although they were not captured or collared). AM1394's collar failed and he was last documented alive in November, but M1382 of the Bluestem pack began traveling with AF1339 by the end of the year. As of December 31, Panther Creek consisted of AM1394, AF1339, mp1483, fp1484, mp1486, and two uncollared pups. Panther Creek had no confirmed depredations, five captures, one mortality, no fate unknowns, no removals, and no translocations. Panther Creek was a breeding pair.

***Prieto (AF1251, AM1387, f1392, m1386, M1398, m1455, f1456, M1552, f1553, and mp1565)***

In January, Prieto consisted of nine animals: AF1251, AM1387, f1392, m1386, and 5 pups. Throughout the year, the Prieto pack was located in the north-central portion of the GNF. mp1455 was collared during the annual helicopter capture. F1392 dispersed and formed the SBP pack. In April, f1456 was collared. A minimum of four pups were documented in early-June. A diversionary food cache was maintained to reduce the potential for livestock depredations. M1552, f1553, and fp1565 were collared and F1456 was recaptured during fall trapping efforts. Although remote camera information indicated AM1387 was still with the Prieto pack until late October, genetic results indicated that single wolf M1331 was the sire of mp1565. In late-fall/early-Winter, dispersal behavior was observed for f1553, M1386, f1456 and M1552. f1553 paired with M1398 for 1-2 months, but M1398 later paired with AF1251, confirming that AM1387 was no longer with the pack. In December, f1553 was documented traveling with AM1284 of the SBP pack. By the end of the year, Prieto consisted of a minimum of eleven animals which included: AF1251, M1398, M1386, m1455, f1456, M1552, f1553, mp1565, and three uncollared pups. Prieto had no confirmed depredations, six captures, no mortalities, one fate unknown, no removals, and no translocations. Prieto was a breeding pair in 2016.

***San Mateo pack (AF1399, AM1345, fp1551)***

In January of 2016, the San Mateo pack consisted of two wolves: AF1399 and AM1345. The IFT documented denning behavior of the San Mateo pack in April. During June, the IFT implemented trapping efforts to re-collar one of the breeders, and successfully captured and re-collared AF1399. In September, the IFT confirmed a minimum of three pups traveling with the pair. During this time, the IFT successfully captured and collared fp1551. Shortly after the capture of fp1551, the collar had slipped off the wolf. By the end of December, the San Mateo pack consisted of five wolves, which included AF1399, AM1345, and three un-collared pups. The San Mateo pack had one confirmed depredations, one capture, no mortalities, one fate unknown, no removals, and no translocations. San Mateo was a breeding pair in 2016.

***SBP (AM1284, AF1392, f1553)***

In early 2016, Single M1284 and f1392 of the Prieto pack paired and formed the SBP pack. In mid-April, 5 pups were documented and 2 captive pups were cross fostered into the den. A supplemental food cache was maintained to aid in the rearing of pups following the addition of pups into this litter. In June, evidence of pup survival was documented during predation study; a

study to identify kill rates of native prey by Mexican wolves. AF1392 was located dead in September and the IFT lost contact with the pack; AM1284s collar had failed earlier in the year. AM1284 was re-collared in the fall and remote cameras and tracks indicated at least 2 pups had survived. In December, f1553 was documented traveling with AM1284. As of December 31, the SBP pack consisted of AM1284, f1553 and 2 uncollared pups. SBP had no confirmed depredations, one mortality, no fate unknowns, no removals, and no translocations. SPB was a breeding pair in 2016 because f1553 paired with AM1284 at the end of the season.

***Tsay-O-Ah (F1283, M1343, and fp1445)***

Tsay-O-Ah occupied a territory located on the FAIR. Tsay-O-Ah had no confirmed depredations, captures, mortalities, fate unknowns, removals, or translocations. Tsay-O-Ah is a breeding pair.

***Tse ighan lige (Diamond) (AM1249, F1437, m1447, mp1454, f1557, mp1558, mp1559, and fp1560)***

Diamond primarily occupied a territory on the FAIR. AM1249 and mp1454 were captured and collared during the annual helicopter survey. F1437's collar failed in March and evidence suggests she left the Diamond pack around April. Wolf m1454 was found dead in Arizona in August. Four Diamond wolves (f1557, mp1558, mp1559, and fp1560) were captured in October. Wolf m1447 left the Diamond pack in November and paired with f1443 of the Bluestem pack. Diamond had three confirmed depredations (two attributed to the pack and one attributed to m1454), two captures, one mortality, no removals, and no translocations. The Diamond pack was a breeding pair.

***Willow Springs pack (F1397)***

In January of 2016, the Willow Springs pack consisted of three wolves: F1397, AM1158, and M1396. AM1158 and M1396 were formerly of the Fox Mountain pack, and had joined F1397 in January. During February, the IFT documented F1397 alone, and confirmed AM1158 and M1396 had joined the Luna Pack. Denning behavior for F1397 was not exhibited in the spring, and by the end of December, F1397 was documented traveling alone in the north central portion of the Gila National Forest.

## **6. Individual Wolf Summaries**

***M1331***

Wolf M1331 traveled mainly between the ASNF and the GNF. Genetics results from fp1565 of the Prieto pack indicate M1331 bred with AF1251, but the IFT never documented it joining the pack. M1331s collar failed and was considered fate unknown by December 31.

***F1437, m1564 (Pole Knoll pair)***

F1437, originally collared with the Diamond pack, dispersed from the pack around April and her collar failed at the same time. She was found alive in June and was documented traveling with an uncollared subadult male wolf. F1437 was involved in at least two depredation events; circumstantial evidence suggested that F1437 and her mate were involved in up to seven additional depredations in the same area. Per a removal order in response to repeated depredation on livestock, the uncollared male subadult wolf traveling with F1437 was captured, designated

m1564, and removed to captivity in November. F1437 was not documented during the rest of 2016.

## **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.

### Arizona Game and Fish Department

Jeff Dolphin, Field Team Leader/Field Supervisor

Paul Greer, Field Team Leader

Ed Davis, Wolf Biologist

Julia Smith, Wolf Biologist/Field Supervisor

Brent Wolf, Wolf Biologist

Mike Godwin, Wildlife Manager Supervisor

Joel Weiss, Wildlife Manager

Aaron Hartzell, Wildlife Manager

Jason Capps, Wildlife Manager

Shawn Wagner, Wildlife Manager

Bob Birkeland, Wildlife Manager/Supervisor

Dave Cagle, Wildlife Program Manager

Rick Langley, Big 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.*

### USDA-APHIS Wildlife Services

Sterling Simpson, Field Team Leader/Wolf Management Specialist

Morgan Whipple, Wolf Management Specialist

Chris Carrillo, District Supervisor

Rudolph Fajardo, District Supervisor

Mike Kelly, Wildlife Biological Science Technician

Matt Ellis, Wildlife Biological Science Technician

Clint Ruppert, Wildlife Biological Science Technician

### U.S. Forest Service

Vicente Ordonez – Forest Service Liaison to the Wolf Project

U.S. Fish and Wildlife Service

Sherry Barrett, Mexican Wolf Recovery Coordinator  
Maggie Dwire, Assistant Mexican Wolf Recovery Coordinator  
John Oakleaf, Interagency Field Projects Coordinator  
Elizabeth Jozwiak, Wildlife Biologist  
Melissa Kreutzian, Fish and Wildlife Biologist  
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Susan Dicks, Fish and Wildlife Biologist  
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