FINAL SUPPLEMENTAL ENVIRONMENTAL IMPACT STATEMENT

PROPOSED REVISION TO THE REGULATIONS FOR THE NONESSENTIAL EXPERIMENTAL POPULATION OF THE MEXICAN WOLF

(*Canis lupus baileyi*)

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Mexican Wolf Recovery Program

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EXECUTIVE SUMMARY

This final supplemental environmental impact statement (FSEIS) analyzes our proposed action to modify the population objective, release recommendations, and three take provisions established in the 2015 10(j) rule, *Revision to the Regulations for the Nonessential Experimental Population of the Mexican Wolf* (80 FR 2512, January 16, 2015) (2015 10(j) rule). This FSEIS is supplemental to the November 2014 Final Environmental Impact Statement for the *Proposed Revision to the Regulations for the Nonessential Experimental Population of the Mexican Wolf (Canis lupus baileyi)* (2014 FEIS). The 2014 FEIS is incorporated, where appropriate, by reference into this FSEIS (40 C.F.R. 1502.21) and tiering from it is used to eliminate repetitive discussions of issues previously addressed, exclude from consideration issues already decided, and to focus on the issues ripe for decision in this environmental review (CEQ, Sec. 1502.20 and Sec. 1508.28). We provide updated data and information relevant to our proposed action and alternatives to the extent available since the 2014 FEIS.

PURPOSE AND NEED FOR THE PROPOSED ACTION

The **purpose** of our proposed action is to ensure compliance with the March 31, 2018, remand of our 2015 10(j) rule by the District Court of Arizona (Center for Biological Diversity v. Jewell, No. 4:15-cv-00019-JGZ (D. Ariz.)) (March 31, 2018, Court Order). This is **needed** because the ruling directs the Service to redress the following narrowly defined issues to ensure the experimental population provides for the long-term conservation and recovery of the Mexican wolf: the population size and genetic needs required for long-term persistence of the Mexican wolf; the relationship between expanded take of Mexican wolves and protecting against the loss of genetic diversity; and to make a fresh essentiality determination. In response to the March 31, 2018, Court Order, we now propose to modify the population objective, release recommendations, and three take provisions (take on non-Federal lands, take on Federal land, and take in response to unacceptable impacts to a wild ungulate herd) that we established in the 2015 10(j) rule in a new revised 10(j) experimental population rule. The proposed rule will also include our essentiality determination. The final revised rule will replace the 2015 10(j) rule.

The revisions we are proposing would provide consistency between the designation and management of the MWEPA and the recovery strategy and criteria laid out in the 2017 Mexican Wolf Recovery Plan, First Revision (USFWS 2017a). The revised recovery plan was finalized after the 2015 10(j) rule and now serves as the Service's guide for the recovery of the Mexican wolf. By aligning the new revised 10(j) experimental population rule for the MWEPA with the revised recovery plan, we ensure that the experimental population contributes to the long-term conservation and recovery of the Mexican wolf by alleviating demographic and genetic threats in the United States portion of the Mexican wolf's range.

PROPOSED ACTION AND ALTERNATIVES

We are proposing to revise the following five components of the 2015 10(j) rule to ensure the experimental population designation for the MWEPA serves the long-term conservation and recovery of the Mexican wolf:

- the population objective for the number of Mexican wolves in the MWEPA;
- the number of releases of captive wolves into the MWEPA;

- the provision for take on non-Federal lands in the MWEPA;
- the provision for take on Federal land in the MWEPA;
- the provision for take in response to unacceptable impacts to a wild ungulate herd in the MWEPA.

Alternative One (Proposed Action and Preferred Alternative):

In this alternative, we propose to modify each of the five components identified above from the 2015 10(j) rule. The structure of this alternative allows us to assess the full suite of identified modifications that will align the experimental population designation with our recovery goals for the Mexican wolf to ensure the experimental population contributes to the long-term conservation and recovery of the Mexican wolf. This alternative:

1) Modifies the **population objective** for the MWEPA to the following:

> Based on end-of-year counts, we will manage to achieve and sustain a population average greater than or equal to 320 wolves in Arizona and New Mexico. This average must be achieved over an 8-year period, the population must exceed 320 Mexican wolves each of the last 3 years of the 8-year period, and the annual population growth rate averaged over the 8-year period must demonstrate a stable or increasing population, as calculated by a geometric mean.

2) Modifies the strategy to release captive Mexican wolves into the MWEPA and establishes a **genetic objective**, stating:

> The Service and designated agencies will conduct a sufficient number of releases into the MWEPA from captivity to result in at least 22 released Mexican wolves surviving to breeding age.

3) Temporarily restricts the issuances of permits pursuant to the provision for **take on non-Federal land** by adding the following:

> Until the Service has achieved the genetic objective for the MWEPA by documenting that at least 22 released wolves have survived to breeding age, the Service or a designated agency may issue permits only on a conditional, annual basis according to the following provisions:
>
> (i) Either annual release benchmarks (here, the term "benchmark" means the minimum cumulative number of released wolves surviving to breeding age since January 1, 2016, as documented annually in March) are achieved based on the following schedule:

YEAR	BENCHMARK
2021	7
2022	9
2023	11
2024	13
2025	14
2026	15
2027	16

YEAR	BENCHMARK
2028	18
2029	20
2030	22

; or

(ii) permitted take on non-Federal or Federal land during the previous year (April 1 to March 31) did not include the lethal take of any released wolf or wolves that were or would have counted toward the genetic objective.

After the Service has achieved the genetic objective, the conditional annual basis for issuing permits will no longer be in effect.

4) Temporarily restricts the issuances of permits pursuant to the provision for **take on Federal land** as follows:

Until the Service has achieved the genetic objective for the MWEPA by documenting that at least 22 released wolves have survived to breeding age in the MWEPA, the Service or a designated agency may issue permits only on a conditional, annual basis according to the following provisions:

(i) Either annual release benchmarks (here, the term "benchmark" means the minimum cumulative number of released wolves surviving to breeding age since January 1, 2016, as documented annually in March) are achieved based on the following schedule:

YEAR	BENCHMARK
2021	7
2022	9
2023	11
2024	13
2025	14
2026	15
2027	16
2028	18
2029	20
2030	22

; or

(ii) permitted take on non-Federal or Federal land during the previous year (April 1 to March 31) did not include the lethal take of any released wolf or wolves that were or would have counted toward the genetic objective.

After the Service has achieved the genetic objective, the conditional annual basis for issuing permits will no longer be in effect.

5) Temporarily restricts the provision for **take in response to unacceptable impacts to a wild ungulate herd** as follows:

> No requests for take in response to unacceptable impacts to a wild ungulate herd may be made by the state game and fish agency or accepted by the Service until the genetic objective of at least 22 released wolves surviving to breeding age for the MWEPA has been met.

Alternative Two:

In this alternative, we analyze modifications to two of the five components from Alternative One. The structure of this alternative allows us to assess the effects of the existing 2015 10(j) take provisions within the context of a revised population objective and genetic objective that aligns with the revised recovery plan to evaluate the extent to which revising the take provisions better supports progress toward the genetic objective. This alternative:

1) Modifies the **population objective** for the MWEPA to the following:

> Based on end-of-year counts, we will manage to achieve and sustain a population average greater than or equal to 320 wolves in Arizona and New Mexico. This average must be achieved over an 8-year period, the population must exceed 320 Mexican wolves each of the last 3 years of the 8-year period, and the annual population growth rate averaged over the 8-year period must demonstrate a stable or increasing population, as calculated by a geometric mean.

2) Modifies the strategy to release captive Mexican wolves into the MWEPA and establishes a **genetic objective**, stating:

> The Service and designated agencies will conduct a sufficient number of releases into the MWEPA from captivity to result in at least 22 released Mexican wolves surviving to breeding age.

3) Does not modify the 2015 10(j) rule provisions for **take on non-Federal land**, **take on Federal land**, or **take in response to unacceptable impacts to a wild ungulate herd** by temporarily restricting their use until the genetic objective for the MWEPA is achieved.

Alternative Three (No Action Alternative):

In this No Action alternative, we would not revise the population objective, release recommendations, or provisions for take on non-Federal land, take on Federal land, or take in response to unacceptable impacts to a wild ungulate herd from the 2015 10(j) rule. The 2015 10(j) rule is the basis for our No Action alternative because we are currently implementing it; the 2015 10(j) rule was remanded but not vacated.

SUMMARY OF ENVIRONMENTAL IMPACTS

In this FSEIS we analyze the environmental consequences of our proposed action to revise the population objective, release recommendations, and three take provisions from the 2015 10(j) rule. We compare our proposed action to a second alternative in which we would revise the population objective and release recommendations but not revise the take provisions, and a No Action Alternative in which we would not revise the 2015 10(j) rule experimental population designation. We analyze the impacts of our proposed action and alternatives to several resource areas, including land use, human health and public safety, biological resources, economic activity, and environmental justice. Within our analysis we identify available mitigation measures where relevant.

We found that Alternative One would lead to no significant adverse impacts to land use or human health and public safety, less than significant direct adverse impacts to wild ungulates and big game hunting, significant beneficial impacts to Mexican wolves, less than significant direct adverse impact on the regional/state ranching economy although potentially significant or less than significant direct adverse impacts on individual ranch operators, and mitigated disproportionate adverse impacts to individual ranch operators within communities of environmental justice concern. Mitigation of adverse economic impacts is currently available through the use of proactive management techniques to reduce the likelihood of depredation and through compensation programs that provide financial compensation for livestock lost to wolf depredation. However, compensation programs do not fully cover all economic impacts. In addition, management actions (such as pro-active measures to reduce the likelihood of depredations) that are currently being implemented will continue to minimize impacts, and provisions of the 2015 10(j) rule that can be used to avoid and minimize impacts, such as forms of harassment, will be carried forward in the revised 10(j) rule.

We found that Alternative Two would result in no significant adverse impacts to land use or human health and public safety, no significant impacts to wild ungulates or big game hunting with mitigation, significant beneficial impacts to Mexican wolves, less than significant direct adverse impact on the regional/state ranching economy although potentially significant or less than significant direct adverse impacts on individual ranch operators, and mitigated disproportionate adverse impacts to individual ranch operators within communities of environmental justice concern. In Alternative Two, the ability of state game and fish agencies to request wolf removal for an unacceptable impact to a wild ungulate herd serves as mitigation for adverse impacts to wild ungulates from wolf predation, as well as mitigation for adverse impacts to big game hunting. Mitigation for adverse economic impacts is consistent with Alternative One.

For Alternative Three, we would expect no significant adverse impacts to land use, wild ungulates, big game hunting, or human health and public safety; significant beneficial impacts to Mexican wolves; less than significant direct adverse impact on the regional/state ranching economy although potentially significant or less than significant direct adverse impacts on individual ranch operators, and mitigated disproportionate adverse impacts to individual ranch operators within communities of environmental justice concern. Under this alternative, mitigation for adverse economic impacts in consistent with Alternative One.

In summary, Alternative One and Two will achieve our purpose and need, with Alternative One resulting in more timely conservation benefits to the Mexican wolf but Alternative Two providing management flexibility that may be beneficial for some stakeholders in resolving conflicts with Mexican wolves. Alternative Three, our No Action Alternative, does not adequately achieve our purpose and need because it does not redress the narrow issues defined by the court-ordered remand although some impacts are minimized compared to the other two alternatives and conservation benefits to the Mexican wolf are still present. We did not identify other actions that, when combined with our proposed action or alternatives, would lead to cumulatively significant adverse impacts to any resource area.

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1. INTRODUCTION: PURPOSE AND NEED FOR ACTION

1.1 Introduction

The Mexican wolf (*Canis lupus baileyi*) is listed as an endangered species protected by the Endangered Species Act of 1973, as amended (ESA, the Act) (Figure 1-1. Mexican Wolf). In the United States, the U.S. Fish and Wildlife Service (USFWS, Service, or we) is the Federal agency responsible for the recovery of the Mexican wolf. A central focus of our recovery effort for the Mexican wolf has been the reintroduction of the Mexican wolf to the wild from captivity due to the extirpation of the Mexican wolf in the wild prior to ESA protection. We conduct the reintroduction of the Mexican wolf under section 10(j) of the Act and our regulations at 50 CFR 17.81. Under these authorities, the Service may designate a population of endangered or threatened species that has been or will be released into suitable habitat outside the species' current natural range as an experimental population.

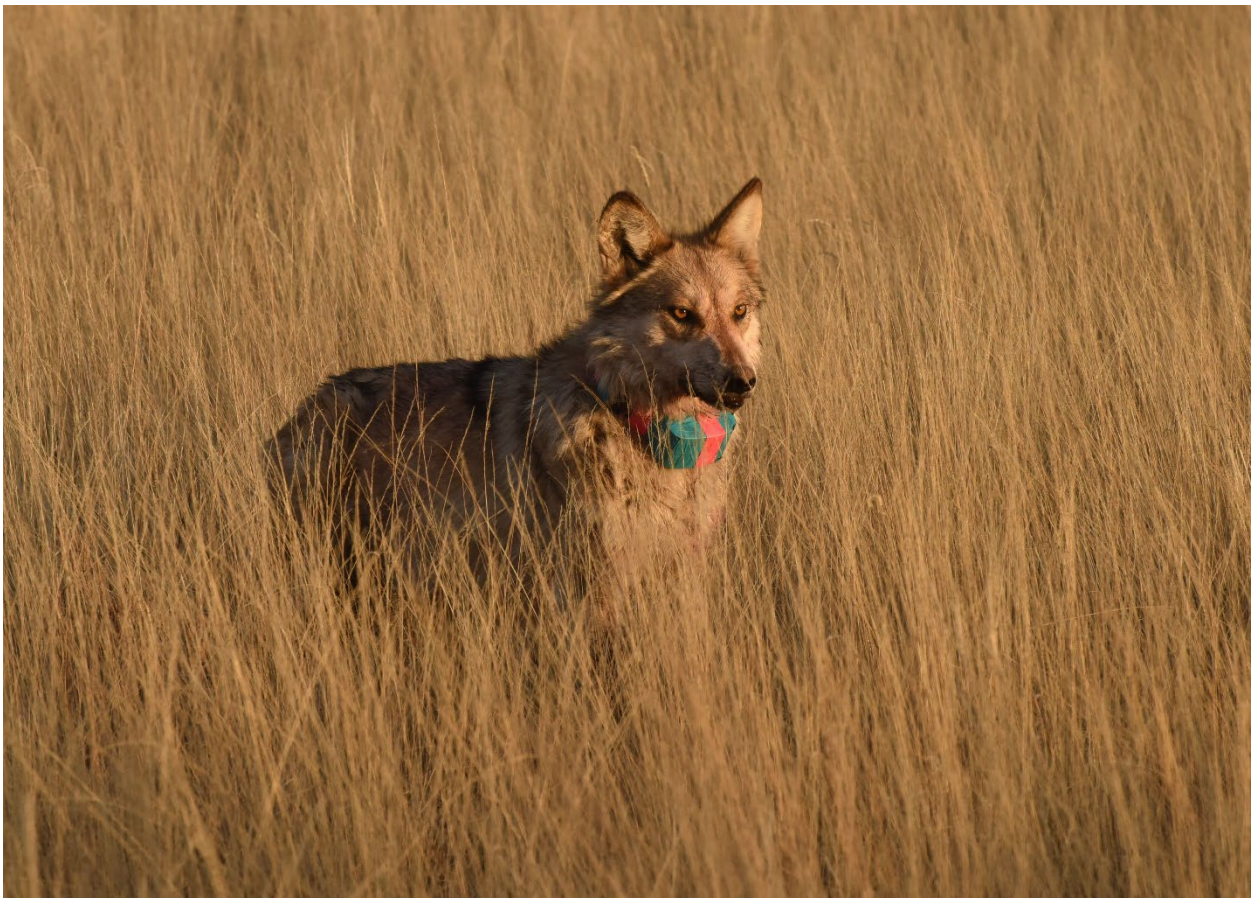


Figure 1-1. Mexican Wolf. USFWS photo.

1.2 Purpose and Need

The **purpose** of our proposed action is to ensure compliance with the March 31, 2018, remand of our 2015 10(j) rule by the District Court of Arizona (Center for Biological Diversity v. Jewell, No. 4:15-cv-00019-JGZ (D. Ariz.)) (March 31, 2018, Court Order). This is **needed** because the ruling directs the Service to redress the following narrowly defined issues to ensure the experimental

population provides for the long-term conservation and recovery of the Mexican wolf: the population size and genetic needs required for long-term persistence of the Mexican wolf; the relationship between expanded take of Mexican wolves and protecting against the loss of genetic diversity; and to make a fresh essentiality determination. In response to the March 31, 2018, Court Order, we now propose to modify the population objective, release recommendations, and three take provisions (take on non-Federal lands, take on Federal land, and take in response to unacceptable impacts to a wild ungulate herd) that we established in the 2015 10(j) rule in a new revised 10(j) experimental population rule. The proposed rule will also include our essentiality determination. The final revised rule will replace the 2015 10(j) rule.

We began reintroducing captive-bred Mexican wolves into the Mexican Wolf Experimental Population Area (MWEPA) in Arizona and New Mexico in 1998 pursuant to our January 12, 1998, rule (63 FR 1752). We revised the 1998 experimental population designation for the MWEPA on January 16, 2015, to improve the effectiveness of the reintroduction effort (80 FR 2512) (2015 10(j) rule). Our revised designation expanded the geographic boundaries of the MWEPA established in 1998 and increased the area available for Mexican wolf occupancy, initial release from captivity, and translocations. We also increased the population objective of the MWEPA from a minimum of 100 wild wolves to 300-325 Mexican wolves to ensure the population would be robust against threats related to small population size. To improve the gene diversity of the population and reduce genetic threats, we recommended strategic releases of Mexican wolves from captivity to achieve 1 to 2 effective migrants per generation entering the MWEPA. We also designated management zones within the MWEPA to provide for the release of Mexican wolves into specific areas. We revised the regulations for the take of Mexican wolves on federal and non-federal land within the MWEPA to clarify allowable forms of take and increase our management options to address the needs of local communities facing an expanding Mexican wolf population. Other revisions provided conservation benefits, clarity, and flexibility for the management of the MWEPA.

In the 2015 10(j) rule we stated that revision of the Service's 1982 Mexican Wolf Recovery Plan was needed to provide context for the role of the MWEPA in the recovery of the Mexican wolf, and that the experimental population designation may be revised again in the future to accommodate a revised recovery plan (80 FR 2527). The objectives of the 1982 Mexican Wolf Recovery Plan were to halt the extinction of the Mexican wolf and explore whether we could reestablish Mexican wolves in the wild from captivity. Together with our partners, we had achieved those objectives and acknowledged in the 2015 10(j) rule that a revised recovery plan was needed to guide the future of the program. In 2017, the U.S. Fish and Wildlife Service finalized the 2017 Mexican Wolf Recovery Plan, First Revision (revised recovery plan) in coordination with Federal agencies in Mexico and State, Federal, and Tribal agencies in the United States.

The revised recovery plan provides a strategy, criteria, and actions to recover the Mexican wolf and solidifies the significant role of the MWEPA in the recovery of the Mexican wolf (USFWS 2017a). The revised recovery plan clarifies the specific contribution needed from the MWEPA for the range-wide recovery of the Mexican wolf by establishing demographic, genetic, and regulatory recovery criteria for a population of Mexican wolves in the United States. The revised recovery plan also calls for a second population of Mexican wolves in Mexico and provides criteria for that population (USFWS 2017a).

Our proposed action will align the designation and management of Mexican wolves in the MWEPA with the recovery strategy and criteria in the revised recovery plan. Specifically, establishing population and genetic objectives for the MWEPA that directly contribute to demographic and genetic recovery (delisting) criteria, while also ensuring that take provisions do not hinder our progress to improve the genetic status of the population, will alleviate demographic and genetic threats to the Mexican wolf and ensure that the MWEPA contributes to long term conservation and recovery (see Chapter 2.1. Alternative Selection Criteria).

We based the proposed population and genetic objectives for the MWEPA on the recovery criteria in the revised recovery plan because we consider the population viability modeling associated with the criteria to represent the best available science for determining a realistic path to recover the Mexican wolf within the context of the landscape and communities in the MWEPA (see discussion 2.3.1 Alternative One – Proposed Action and Preferred Alternative).

1.3 Current Status of the Mexican Wolf Population in the MWEPA

The status of the Mexican wolf population in the MWEPA has improved under the 2015 10(j) rule. The minimum population count in 2020 of 186 wolves, including 20 breeding pairs (wolves that produced pups and at least one pup survived until the end of the year), continues a trend of steady population growth over the last six years (Figure 1-2). Mexican wolves have expanded their range under the 2015 10(j) rule, from 7,255 mi^2 (18,790 km^2) in 2014 to 19,495 mi^2 (50,492 km^2) in 2020. Based on this numeric and geographic expansion, we consider the MWEPA population to be stable and growing steadily, which is consistent with the ongoing demographic recovery needs of the Mexican wolf. Illegal killing of Mexican wolves continues to occur in the MWEPA, but population growth has been robust in recent years despite these losses. We continue to investigate illegal killings, increase the presence of law enforcement, and conduct community outreach and education to address this problem.

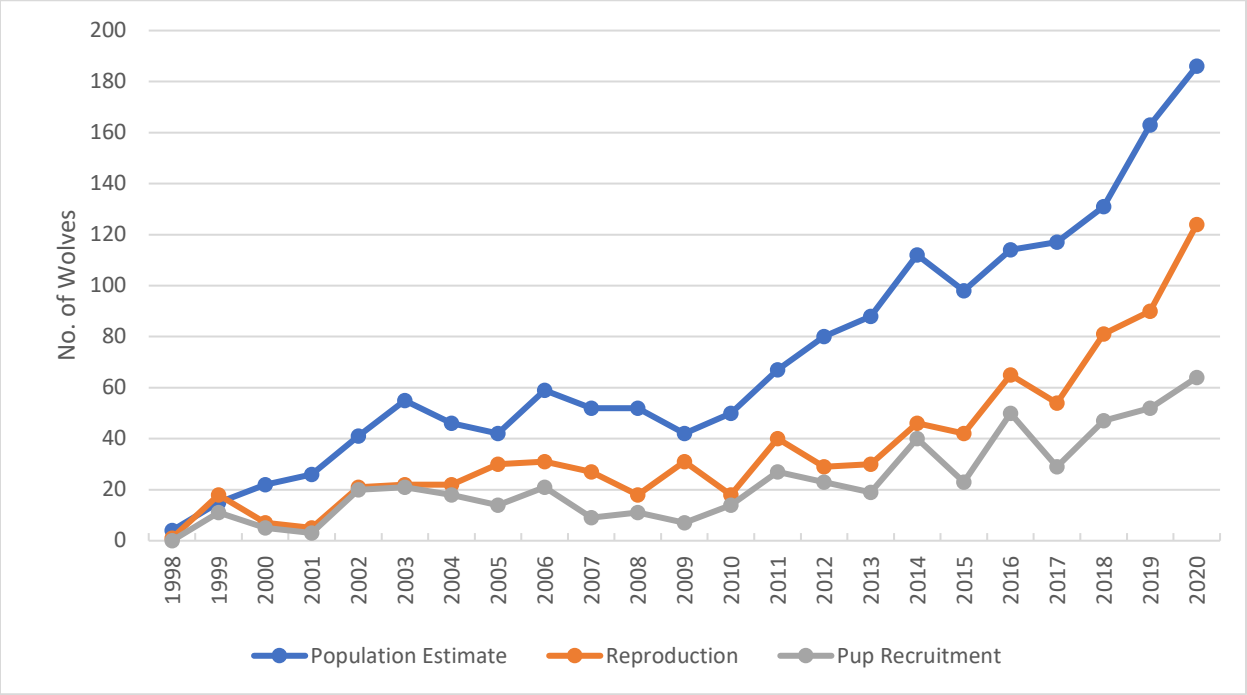


Figure 1-2. Mexican Wolf Minimum Population Estimate, Reproduction, and Recruitment Documented in the MWEPA, 1998 - 2020. Note: Population Estimate is the minimum population count during the annual winter count (December-February); Reproduction is the total number of pups documented to have been produced that year; Pup Recruitment is the minimum number of young of the year pups that survived to the winter count.

Gene diversity in the MWEPA population remains low and has the potential to result in inbreeding depression and other genetic threats that need to be alleviated to recover the Mexican wolf (USFWS 2017a). We can reduce the risk of genetic threats to the MWEPA population by increasing gene diversity through the release of captive Mexican wolves to the wild. Mexican wolves in the captive population have gene diversity that is not represented in the MWEPA population. When released wolves breed with wild wolves, their genes are incorporated into the MWEPA population and gene diversity in the MWEPA increases. In recent years we have focused on cross-fostering as a release technique, in which we place captive-born pups into wild dens in the MWEPA to be raised in the wild (Figure 1-3). We first tested the cross-fostering technique in 2014 and have subsequently conducted cross-foster events in each year since except for 2015. In total, we have cross-fostered 78 pups between 2014 and 2021, including placing 72 pups from captive dens into wild dens, and 6 pups from one wild den to another wild den (USFWS files). We are cognizant that releases from captivity can improve gene diversity more quickly when the recipient population is smaller. The growth of the MWEPA population in recent years necessitates a strong focus on improving gene diversity in the near term because it will be more difficult to improve gene diversity and alleviate genetic threats at larger population sizes (USFWS 2017a).

Figure 1-3. Cross-fostered Mexican Wolf Pups in the MWEPA. (Source: USFWS photo)

1.4. Incorporation by Reference of the 2014 Final Environmental Impact Statement

We analyzed the environmental effects of the 2015 10(j) rule in the 2014 Final Environmental Impact Statement for the *Proposed Revision to the Regulations for the Nonessential Experimental Population of the Mexican Wolf (Canis lupus baileyi)* (2014 FEIS) pursuant to the National Environmental Policy Act of 1969, as amended (NEPA). We signed a Record of Decision for the 2014 FEIS in January 2015 (USFWS 2015). The 2015 10(j) rule went into effect on February 17, 2015.

This final supplemental environmental impact statement (FSEIS) analyzes our proposed action to revise several features of the 2015 10(j) rule pursuant to court order. The 2014 FEIS is incorporated, where appropriate, by reference into this FSEIS (40 C.F.R. 1502.21). The FSEIS is a supplement to the 2014 FEIS, and therefore as an ongoing action begun before September 14, 2020, is prepared consistent with the 1978, as amended, National Environmental Policy Act regulations at 40 CFR 1500-1508. See also 40 CFR 1506.13(2020). We tiered from the 2014 FEIS to eliminate repetitive discussions of issues previously addressed, exclude from consideration issues already decided, and to focus on the issues ripe for decision in this environmental review (CEQ, Sec. 1502.20 and Sec. 1508.28). Where appropriate and pertinent to our proposed action and alternatives, we provide and analyze updated data and new information that has become available since the 2014 FEIS. We published a notice of intent to develop this supplemental environmental impact statement on April 15, 2020 (73 FR 20967).

We incorporate by reference (40 C.F.R. 1502.21) Chapter 1: Introduction, Purpose, and Need for Action and its subsections from the 2014 FEIS into Chapter 1. Introduction: Purpose and Need for Action of this FSEIS to provide the background for our current proposed action. The purpose and need in this FEIS has changed from the 2014 FEIS because of the court order. Chapter 1.1 of the 2014 FEIS provides the regulatory background of the Mexican wolf recovery program under the ESA, a description of previous environmental review pursuant to NEPA, a brief biological and ecological description of the Mexican wolf, and an overview of Mexican wolf recovery and reintroduction efforts in the United States and Mexico, including the binational captive breeding program. Chapter 1 of the 2014 FEIS (specifically sections 1.2 Purpose and Need and 1.3 Summary) provides the rationale for our 2015 10(j) rule that this document supplements, including explanation of the need to expand the geographic boundaries of the MWEPA, increase the area available for initial release, increase the population size and gene diversity of the population, and modify take provisions. We caveat the inclusion of Chapter 1.2.2 Our Need: Population Growth, Distribution and Recruitment of the 2014 FEIS to note that the revised recovery plan now provides range-wide recovery criteria and updated scientific information and data that were unavailable during the development of the 2014 FEIS (USFWS 2014) and 2015 10(j) rule.

2. DESCRIPTION OF THE PROPOSED ACTION AND ALTERNATIVES

2.1 Alternative Selection Criteria

We selected alternatives for the FSEIS based on the March 31, 2018, Court Order, and our expectation that the experimental population designation for the MWEPA should enable us to achieve the recovery criteria in the revised recovery plan for the United States (USFWS 2017a), thereby providing for the long-term conservation and recovery of the Mexican wolf. We were also mindful of the interagency partnerships, experience, and information we have gained since the reintroduction effort began in 1998, and more specifically lessons learned from implementing the 2015 10(j) rule. In addition, we considered input from the public, cooperating agencies, partners, tribes, stakeholder groups, agencies, and local governments received during scoping (85 FR 20967; April 15, 2020) and on the proposed 10(j) rule (86 FR 59953; October 29, 2021) and DSEIS (86 FR 60029; October 29, 2021).

We used the following questions to evaluate whether an alternative substantially meets the purpose of, and need for, the proposed action:

- Is the alternative limited to the scope of revisions to the 2015 10(j) rule the Service is undertaking in response to the March 31, 2018, Court Order, which includes the following features or characteristics: the population objective, release recommendations, take on non-Federal lands, take on Federal land, and take in response to unacceptable impacts to a wild ungulate herd?
- Does the alternative facilitate an experimental population designation that serves the long-term conservation and recovery of the Mexican wolf by alleviating threats to the Mexican wolf? Specifically, does the alternative:
    - Contribute to the ability of the experimental population to achieve the demographic recovery criteria in the revised recovery plan for the United States (USFWS 2017a):
        - the population average over an 8-year period is greater than or equal to 320 wolves;
        - the population must exceed 320 wolves each of the last 3 years of the 8-year period; and
        - the annual population growth averaged over the 8-year period is stable or increasing.
    - Contribute to the ability of the experimental population to achieve the genetic recovery criteria in the revised recovery plan for the United States (USFWS 2017a):
        - gene diversity available from the captive population has been incorporated into the United States population through scheduled releases of a sufficient number of wolves to result in at least 22 released Mexican wolves surviving to breeding age in the United States population.
- Does the alternative contribute to the availability of responsive and flexible management options, including allowable forms of take, to respond to wolf-livestock or wolf-human conflict, or impacts to wild ungulates, in recognition that conflict management is a

necessary component of the long-term conservation and recovery of the Mexican wolf?

- Does the alternative promote flexibility in the management of Mexican wolves in the MWEPA in making decisions related to the release, translocation, take and removal of Mexican wolves to allow for consideration of social or economic impacts within the biological context of advancing recovery?

- Does the alternative facilitate federal, state agency, local, and tribal cooperation and coordination in the management of Mexican wolves in the MWEPA?

We also considered the following:

- The geographic boundaries of the MWEPA as designated in the 2015 10(j) rule are consistent with the revised recovery plan's geographic focus in the United States (i.e., the portions of Arizona and New Mexico south of Interstate 40). This is relevant given our intention to align the experimental population designation with the revised recovery plan for the long-term conservation and recovery of the Mexican wolf. The March 31, 2018, Court Order did not remand the geographic boundaries of the MWEPA but noted that the boundaries of the MWEPA provide hard limits on the dispersal of Mexican wolves although additional suitable habitat may be present in the region outside of the MWEPA. At the time of the 2014 FEIS we had not revised the recovery plan and were uncertain of the extent to which Mexican wolves may need habitat outside of the MWEPA for recovery (for example, to establish a metapopulation). However, we consider the geographic boundaries of the MWEPA, including the limits to dispersal, to be an appropriate feature in our alternatives for this FSEIS because the MWEPA is within the historical range of the Mexican wolf and contains sufficient suitable habitat to support a population that meets the recovery criteria in the revised recovery plan for the United States population (USFWS 2017a). Therefore, alternatives developed for the FSEIS adhere to the existing geographic boundaries of the MWEPA.

- The management zones (i.e., Zone 1, Zone 2, Zone 3) designated in the 2015 10(j) rule were developed to provide expanded and specific areas for initial releases, including cross-fostering, translocations, and wolf occupancy in the MWEPA. The March 31, 2018, Court Order did not remand these management zones, nor do we see any inconsistency between the zone management and our recovery strategy for the Mexican wolf, therefore alternatives developed for the FSEIS include the existing MWEPA management zones.

- The 2015 10(j) rule also included a geographic three-part phased approach to wolf occupancy, dispersal, translocation, and initial release in western Arizona to moderate the expansion of wolves in Zones 1 and 2 in the first eleven years of implementation of the 2015 10(j) rule. The 2015 10(j) rule included two evaluation periods at five and eight years after February 17, 2015, to determine whether we will move forward with the next phase. The March 31, 2018, Court Order did not remand the phasing strategy, nor do we see any inconsistency between the phasing strategy and our recovery strategy for the Mexican wolf, therefore alternatives developed for the FSEIS maintain this feature, including the schedule of evaluations. Due to the timing of annual population counts, the first five-year phasing evaluation is based on the annual population count from 2019, which was conducted during the winter of 2019-2020, at which time the minimum population estimate was 163 wolves

(USFWS files). Because the population was above 150, we have remained in Phase 1.

- We considered it important to assess the effects of the take provisions remanded by the March 31, 2018, Court Order from the 2015 10(j) rule within the context of our proposed revised population objective and release recommendations. We wanted to compare the effects of the take provisions in the 2015 10(j) rule against our proposed revised take provisions because it would help us determine how to manage in support of the genetic health of the population and long-term conservation and recovery of the Mexican wolf while still providing desired management flexibility to respond to conflict situations. The potential effects of the take provisions, and whether or not they may be supportive of long-term recovery, are highly variable depending on the level and timing of take expected to occur, as well as the context within which they are being implemented. By assessing the effects of these provisions, we could estimate the actual expected level of take expected from these provisions based on over five years of implementation and could evaluate these take provisions against more rapid population growth than previously documented in the 2015 10(j) rule, a larger population goal without an upper limit, and a larger number of and more rapid release schedule than established in the 2015 10(j) rule. Therefore, we determined that including our proposed revised take provisions in one alternative and the 2015 10(j) rule take provisions in another alternative would provide a useful comparative analytical structure to help us address the specific issues of the remand.

Based on these considerations, we incorporated the geographic boundaries of the MWEPA, the management zones, and phasing in western Arizona, as well as inclusion of the existing and revised take provisions, in our alternatives.

2.2 Alternatives Eliminated from Further Consideration

We eliminated each proposed alternative identified in this section from further consideration because we determined that it was not economically or technically practical or feasible and/or did not substantially meet the purpose of, and need for, the proposed action based on the selection criteria above.

Adult releases

Alternative that includes annual releases from captivity of the maximum feasible number of well-bonded male/female Mexican wolf pairs with pups until the average gene diversity has increased to halfway between that in the captive population and the wild population.

The management zones established by the 2015 10(j) rule regulate the release of wolves in the MWEPA. These zones provide options for release, including cross-fostering and the release of adult Mexican wolves, that can be responsive to our logistical constraints as well as any social or economic impacts associated with releases. We are not modifying these zones in our revision of the 2015 10(j) rule. We acknowledge that the release of adult pairs with pups, which can be conducted in Zone 1, could have beneficial effects on the gene diversity of the experimental population. However, we have experienced success cross-fostering pups from captivity to the wild and currently prefer this method of release as our primary technique to improve the gene diversity of the MWEPA population. This method of release has had higher support from local communities/livestock operators because cross-fostered pups are raised in wild dens, relieving concern about captive adult wolves being habituated to humans prior to their release. Cross-fostering also enables us to conduct a substantial number of releases within a relatively short time

period during the year, aiding in our management efficiency, and is allowed throughout a large portion of suitable habitat in the MWEPA, including all of Zone 1 and on Federal land in Zone 2. Therefore, we eliminated this alternative from the standpoint that it calls for the maximum feasible number of pairs with pups released annually until the average gene diversity has increased halfway between that in the captive and wild population, which does not promote flexibility in the management of Mexican wolves.

Removals/Take

Alternative that includes no take/removal provisions for wolf predation on wildlife, including elk or deer.

We eliminated this alternative from further consideration because it does not promote flexibility in the management of Mexican wolves in the MWEPA in making decisions related to the take and removal of Mexican wolves to allow for consideration of social or economic impacts within the biological context of advancing recovery. We did however consider the intent of this suggested alternative in our proposed revision of take in response to unacceptable impacts to a wild ungulate herd and are proposing to delay the use of this take provision until specific progress toward recovery has been achieved (see 2.3.1 Alternative One - Proposed Action and Preferred Alternative). We consider the biological and economic impacts of our proposed action and alternatives associated with wild ungulates in Chapter 4 of this FSEIS.

Alternative that includes take only in cases where a wolf is threatening human safety.

Take in defense of human life continues to be authorized under our 10(j) regulations for the MWEPA. Because wolves are wide-ranging predators, we consider various forms of take, including harassment and removal, to be necessary management tools. We eliminated this alternative from further consideration because it does not contribute to making decisions related to the release, translocation, take and removal of Mexican wolves to allow for consideration of social or economic impacts within the biological context of advancing recovery.

Alternative that includes no take/removal provisions for wolf predation on livestock on public lands while the permittee or permittee's agent was not present on the grazing allotment if the permittee was cognizant of the nearby presence of wolves.

We eliminated this alternative from further consideration because it does not promote flexibility in the management of Mexican wolves in the MWEPA in making decisions related to the take and removal of Mexican wolves to allow for consideration of social or economic impacts within the biological context of advancing recovery. We recognize that it may not be logistically feasible for a permittee or their agent to be present during a period in which they are cognizant of the nearby presence of wolves. As the population continues to grow and expand, some livestock operations will frequently have wolves nearby due to the proximity of suitable habitat to the operation.

Alternative that includes no take/removal provision for wolf predation on livestock where carcasses of non-wolf-killed livestock attracted the wolves to the vicinity of livestock.

We eliminated this alternative from further consideration because it does not promote flexibility in the management of Mexican wolves in the MWEPA in making decisions related to the take and removal of Mexican wolves to allow for consideration of social or economic impacts within the biological context of advancing recovery. We recognize that carcass removal has varying levels of logistical feasibility across the recovery area and that it is extremely difficult in remote areas.

Carcass removal occurs in some areas, such as on some public lands. However, occasionally carcasses can assist in management actions for problem wolves in specific situations. We will continue to work with our partners to educate and assist livestock operators in managing carcass removal to reduce the likelihood of attracting wolves to the area and leading to depredation activity.

Alternative that includes no take/removal provision for wolf predation on livestock south of Interstate Highway 10 in Arizona and New Mexico to facilitate natural connectivity between wolves in the U.S. and Mexico.

We eliminated this alternative from further consideration because it does not promote flexibility in the management of Mexican wolves in the MWEPA in making decisions related to the take and removal of Mexican wolves to allow for consideration of social or economic impacts within the biological context of advancing recovery. We recognize that connectivity to Mexico may be beneficial as a source of gene flow between populations, as discussed in the revised recovery plan (USFWS 2017a). However, our recovery goals and objectives for the MWEPA do not require natural connectivity between Mexican wolf populations in the U.S. and Mexico such that a management regime that did not allow any removals for wolf depredation south of Interstate Highway 10 would be warranted. The MWEPA contributes to the long-term conservation and recovery of the Mexican wolf regardless of the level of natural connectivity occurring between the U.S. and Mexico populations. Human-assisted translocations between populations can be conducted if beneficial for both populations. In addition, this alternative is beyond the scope of the issues remanded to the Service in the March 31, 2018, Court Order.

Alternative that includes no take/removal provision for wolf dispersal across any specific boundary, in particular dispersal and inhabitance north of I-40.

We eliminated this alternative from further consideration because it does not promote flexibility in the management of Mexican wolves in the MWEPA in making decisions related to the take and removal of Mexican wolves to allow for consideration of social or economic impacts within the biological context of advancing recovery. We also eliminated this alternative from further consideration because it is outside the scope of revisions necessary to respond to the March 31, 2018, Court Order. The geographic extent of the MWEPA provides a sufficiently large region to achieve the objectives we have established for the MWEPA. We note that wolves that disperse outside of the MWEPA may be immediately translocated back to the MWEPA rather than removed, but we make this decision on a case-by-case basis depending on the location, logistics, and behavior of the dispersing wolf or wolves

<u>Wolf protection</u>

Alternative that includes Service requesting that land-management agencies revoke livestock grazing permits of any permittee found guilty of the illegal killing or injuring of a Mexican wolf.

We eliminated this alternative from further consideration because it is outside the scope of revisions necessary to respond to the March 31, 2018, Court Order.

Alternative that includes stipulation that only government employees and persons under supervision of such government employees or scientists have access to wolf-programmed telemetry receivers or real-time information from GPS collars.

Only government employees or scientists have access to GPS information which is not “real-time”

information. In certain situations, information and telemetry receivers are shared with livestock owners to work collaboratively to prevent depredations, which is a shared goal of the project, livestock producers, and some non-governmental organizations. Thus, we eliminated this alternative from further consideration because it does not contribute to the availability of responsive and flexible management options to respond to wolf-livestock conflicts.

Alternative that includes a provision that to the extent feasible, every wolf found to have been or reasonably presumed to have been killed unlawfully in the wild be replaced within a year through the release to the wild of a wolf born in captivity, selected to increase genetic diversity.

We recognize the intention of this comment to address the loss of wolves from illegal killing with an action that also promotes gene diversity. However, we eliminated this alternative from further consideration because it does not promote flexibility in the management of Mexican wolves in the MWEPA in making decisions related to the release, translocation, take and removal of Mexican wolves to allow for consideration of social or economic impacts within the biological context of advancing recovery. We cannot control when illegal kills occur, which may make replacement within the year at odds with our planned cross-foster or other release plans established for the year, which many times require breeding events and logistical coordination with captive facilities. In addition, we have gained sufficient experience to understand the times of year and circumstances when our releases will have the best chance of wolves surviving (for example, single wolves versus pairs, or pairs with pups). For these reasons, we do not consider replacement within a year to be flexible. We also do not deem it necessary if the population is growing toward our population objective and we are conducting releases sufficient to achieve our genetic objective of releasing a sufficient number of wolves such that at least 22 survive to breeding age.

Alternative that includes designation of the MWEPA population as essential under section 10(j) of the Act.

We eliminated this alternative from further consideration because the essentiality determination is not subject to NEPA. The essentiality determination is conducted in the appropriate place in the proposed revised 10(j) rule that accompanies this FSEIS.

Preventing livestock conflicts

Alternative that includes mandatory proactive outreach and education of citizens, associations, local governments, and tribal governments by management agencies.

We eliminated this alternative from further consideration because it is outside the scope of revisions necessary to respond to the March 31, 2018, Court Order. The Service and our partners conduct outreach and education throughout the year in communities across the recovery area. We provide a summary of our outreach activities in our annual reports, which are online at: https://www.fws.gov/program/mexican-wolf. In addition, our recovery plan for the Mexican wolf (USFWS 2017a), also available on our website, includes outreach and education actions for implementation by the Service and our partners.

Alternative that includes mandatory documentation by land-management agencies of every known instance of wolves feeding on livestock along with conclusion on cause of death based on a necropsy or other evidence.

We eliminated this alternative from further consideration because it does not contribute to the availability of responsive and flexible management options to respond to wolf-livestock conflicts.

The Service and our partners, particularly US Department of Agriculture Wildlife Services, investigate depredation events and provide a conclusion of whether the livestock cause of death is confirmed to be from a Mexican wolf or wolves.

Alternative that includes all livestock permittees with knowledge that wolves are on or near public lands that they lease must ensure the presence on each such grazing allotment at all times of a person equipped to chase and harass (but not injure or kill) wolves to deter livestock predation.

We eliminated this alternative from further consideration because it does not contribute to the availability of responsive and flexible management options to respond to wolf-livestock conflicts. We are not able to mandate the presence of livestock permittees when wolves or on or near public lands. We work with livestock operators to inform them of wolf presence, as well as assisting with preventative management measures to reduce the likelihood of wolf-livestock conflict.

2.3 Proposed Action and Alternatives Considered

Each of the alternatives considered utilize the existing boundaries of the MWEPA as defined in the 2015 10(j) rule, bounded on the north by Interstate Highway 40, on the east by the eastern state line of New Mexico, on the west by the western state line of Arizona, and on the south by the international border with Mexico (Figure 2-1). The MWEPA designation includes zone management boundaries for Zone 1, Zone 2, and Zone 3 and phasing boundaries in western Arizona for Phase 1, Phase 2, and Phase 3 (see Appendix B).

2.3.1 Alternative One – Proposed Action and Preferred Alternative

Alternative One includes **a proposed revised population objective** to the population objective in the 2015 10(j) rule. The population objective in the 2015 10(j) rule at Part 17.84 (k)(9)(iii) states:

> Based on end-of-year counts, we will manage for a population objective of 300 to 325 Mexican wolves in the MWEPA in Arizona and New Mexico. So as not to exceed this objective, we will exercise all management options with the preference for translocation to other Mexican wolf populations to further the conservation of the subspecies. The Service may change this provision as necessary to accommodate a new recovery plan.

We propose to replace it with the following revised population objective:

> Based on end-of-year counts, we will manage to achieve and sustain a population average greater than or equal to 320 wolves in Arizona and New Mexico. This average must be achieved over an 8-year period, the population must exceed 320 Mexican wolves each of the last 3 years of the 8-year period, and the annual population growth rate averaged over the 8-year period must demonstrate a stable or increasing population, as calculated by a geometric mean.

The population objective in the 2015 10(j) rule was intended to establish a robust population that would contribute to full recovery of the Mexican wolf. When setting this population objective, we explained: "The Service may change this provision as necessary to accommodate a new recovery plan" (80 FR 2563). Our proposed revised population objective is now based on the results of the population viability analysis that we conducted during the development of the revised recovery plan (Miller 2017). In developing the recovery criteria for the revised recovery plan, we explored management scenarios that would achieve at least a 90% likelihood of persistence of the MWEPA population over a 100-year period to alleviate the threat of demographic stochasticity (USFWS

2017a). We consider a 90% likelihood of persistence over a 100-year period to be indicative of a robust population that contributes to recovery because it has a sufficiently low chance of extinction

The 2017 population viability model was populated with wild and captive Mexican wolf data sets that were more extensive (that is, collected over a longer period of time, and including a larger number of wolves or events) than data sets used in previous population viability modeling efforts or publications, including those that were conducted during or related to the Service's previous recovery planning efforts for the Mexican wolf (e.g., Carroll et al. 2006, 2014; Hedrick and Wayne 2010). We consider both the extensiveness and geographic specificity of data used to parameterize the 2017 model to be critically important to the quality of results obtained because the model's input parameters reflected the biological characteristics of the Mexican wolf rather than other gray wolf populations, as used in previous modeling efforts. For example, the 2017 model used data on disease prevalence and frequency, survival and mortality, and reproductive rates, that were specific to the MWEPA rather than gray wolf population from other areas of the country where habitat quality, wolf/prey density, or management regimes may influence these factors and result in data input not reflective of the MWEPA. The model also included the most up-to-date data from the captive population, which was important for simulating release of captive wolves into the MWEPA. In addition, the data collected and analyzed for the 2017 model provided insights into the current biological condition of the MWEPA population. For example, the model incorporated data from an inbreeding analysis of 89 wild litters (Miller 2017, Appendix C), as opposed to analyses used in previous modeling efforts that were based on only 39 litters (Fredrickson et al. 2007); this larger dataset suggested that diversionary feeding affected litter size but a significant effect of inbreeding on litter size was not found, which was a deviation from our previous understanding of the effect that inbreeding may be having in the wild In addition, model simulations were structured to incorporate management techniques likely to be applied in the future, such as supplemental feeding, that affect model results and lead to more realistic findings.

Based on the results of Miller 2017, we established demographic recovery criteria for the Mexican wolf in the revised recovery plan that would achieve at least a 90% likelihood of persistence over 100 years (USFWS 2017a), as follows:

- The population average over an 8-year period is greater than or equal to 320 wolves (e.g., annual wolf abundance of 200, 240, 288, 344, 412, 380, 355, and 342 averages 320 wolves);
- The population must exceed 320 wolves each of the last 3 years of the 8-year period; and
- The annual population growth rate averaged over the 8-year period is stable or increasing (e.g., annual averages of 1.2, 1.2, 1.2, 1.2, 1.2, 0.9, 0.9, and 1.0 averages 1.1).

To ensure the MWEPA population serves the long-term conservation and recovery of the Mexican wolf, we are proposing to manage the MWEPA population for an average of greater than or equal to 320 wolves consistent with these criteria. After we achieve the proposed population objective, we will continue to manage for an average population size of greater than or equal to 320 Mexican wolves until delisting occurs.

Whereas our population objective in the 2015 10(j) rule set a firm upper limit of 325 Mexican wolves in the MWEPA, we are now removing the upper limit of 325. We established the upper limit in the 2015 10(j) rule because we did not have an up-to-date recovery plan to provide context

for the contribution of the MWEPA to recovery; in other words, we did not know how many wolves may be needed for recovery or how those wolves should be distributed geographically between different populations. We now have a strategy for the full recovery of the Mexican wolf in the revised recovery plan. This provides clear direction for the MWEPA's contribution to recovery, and we recognize that an upper limit of 325 in the MWEPA is not consistent with being able to adequately alleviate the threat of demographic stochasticity to the Mexican wolf. Although "300-325" and "an average of 320" sound very similar, a range of 300-325 with an upper limit of 325 does not adequately reduce the risk of extinction of the Mexican wolf; it does not ensure at least a 90% likelihood of persistence over 100 years. Because our proposed population objective requires an average population size over a multi-year period, we are not establishing a specific maximum population size limit under this alternative. Removing the upper limit of 325 and managing for an average of greater than or equal to 320 wolves will result in more wolves in the MWEPA, and higher wolf density in suitable habitat, than under the 2015 10(j) rule. Under this alternative, we project an annual average population growth of approximately 14% per year. We derived this estimate based on the average annual population growth of the population under the 2015 final rule (i.e., 2015-2020 annual population counts). We previously projected the MWEPA population would grow at an average of 10-11% annually, based on the population's performance in the Blue Range Wolf Recovery Area and our proposed action and alternatives in the 2014 FEIS (USFWS 2014, Appendix D). Based on our current projection of population growth, we could reach the proposed population objective as soon as or near 2027, and we would expect the population may increase above 400 wolves to reach an average of greater than or equal to 320 wolves (Table 2.1).

We would expect the geographic distribution of the Mexican wolf in the MWEPA to continue to expand throughout suitable habitat in Zone 1 and Zone 2 as the population grows under this alternative. We do not expect frequent wolf occupancy in Zone 3 due to lack of suitable habitat, including inadequate prey base. Based on the amount of suitable habitat in the MWEPA, we expect wolf density in suitable habitat under this alternative to reach up to eight wolves per square kilometer (km^2) of habitat (Table 2.1; and USFWS 2014, Appendix D). We would expect population growth to naturally curtail at this density due to resource limitations. As we continue to manage for an average population size of greater than or equal to 320 Mexican wolves after the proposed population objective is reached, the population would likely vacillate between the mid-300s to low 400s. Although a larger (than low 400s) population size would be possible due to natural population growth, we would expect that population growth would slow down or stabilize in the mid-300s to low 400s after the proposed population objective is reached in response to our future management actions such as reduced food caching, translocation of wolves to Mexico in support of their recovery goals, or removals for various management purposes (see scenario results in Miller 2017).

Alternative One includes **a proposed revised strategy for the release of captive Mexican wolves into the MWEPA** from the 2015 10(j) rule release recommendation**.** We propose to modify our recommendation from the preamble of the 2015 10(j) rule related to the release of Mexican wolves from captivity into the MWEPA to improve the genetic health of the experimental population. The recommendation in the 2015 10(j) rule specified that we would release Mexican wolves from captivity at a level that would achieve "…a minimum of 1 to 2 effective migrants per generation entering the population, depending on its size, over the long term…In the more immediate future, we may conduct additional releases in excess of 1-2 effective migrants per generation to address

the high degree of relatedness of wolves in the current Blue Range Wolf Recovery Area (80 FR2517)".

We are proposing to modify the 2015 10(j) rule release recommendation in two ways. First, we will revise the language pertaining to releases to state that the Service and designated agencies will, "Conduct a sufficient number of releases into the MWEPA from captivity to result in at least 22 released Mexican wolves surviving to breeding age." Second, we will establish this recommendation as a genetic objective by codifying it at Part 17.84 (k)(9)(iv). This proposal would serve as the first time the Service has established a genetic objective for the MWEPA since the reintroduction began in 1998, demonstrating a firm commitment to managing the genetic health of the MWEPA population.

Our proposed genetic objective for the MWEPA is consistent with the genetic recovery criterion in the revised recovery plan for the United States' population of Mexican wolves, which states:

> Gene diversity available from the captive population has been incorporated into the United States population through scheduled releases of a sufficient number of wolves to result in 22 released Mexican wolves surviving to breeding age in the United States population. "Surviving to breeding age" means a pup that lives 2 years to the age of breeding or an adult or subadult that lives for a year following its release. "Scheduled releases" means captive releases and translocations that achieve genetic representation, as described in Rationale for Recovery Criteria (Service 2017a, p. 19).

In the 2015 10(j) rule, our release strategy focused on releasing Mexican wolves from captivity (which we called "effective migrants", or a wolf released from the captive population that survives to breed and produce pups in one wolf generation (~4 years)). This release strategy was an important component of our intention to establish a robust population that would enable it to contribute to the next phase of working toward full recovery of the Mexican wolf. Under this strategy, we envisioned releasing between 35-50 captive wolves into the MWEPA by 2035 to achieve approximately 7-10 effective migrants over 5 generations (USFWS 2014, Appendix D). We are now revising our strategy based on the updated population viability analysis of Miller (2017) and our genetic recovery criterion (USFWS 2017a). When establishing our genetic recovery criterion, we anticipated that short- and long-term genetic threats would be sufficiently alleviated in the MWEPA when 90% of the gene diversity in captivity is represented in the MWEPA, and we determined through the modeling scenarios we explored that at least 22 released wolves surviving to breeding age would achieve this. As described above in the discussion of the proposed population objective, we consider the 2017 population viability model results to provide the best available information to establish recovery objectives and goals for the Mexican wolf because of the quality of data used in the model and the realistic approach of model simulation structure. Therefore, we are increasing the number of releases we will conduct compared to our recommendation in the 2015 10(j) rule, and we are strengthening our commitment to alleviate genetic threats by codifying this language in the regulatory part of the rule. In addition, in this alternative we are tying the proposed genetic objective to the temporary restriction of three take provisions by establishing benchmarks for progress toward recovery; the benchmarks we are proposing would promote achieving the proposed genetic objective by 2030, five years ahead of the recommendation in the revised recovery plan.

Based on the data we used in the revised recovery plan of first year mortality of wolves released from captivity into the MWEPA, we anticipated that we would need to release at least 70 wolves, beginning with wolves released after December 31, 2015, in order for at least 22 to survive to breeding age and meet the genetic recovery criterion for the United States. We stated, "The number of releases required may increase or decrease if the survival of released wolves changes" (USFWS 2017a, pg. 23). At the time of the revised recovery plan, we had only two years of experience with the cross-foster release technique (2014, 2016), therefore our estimate of first-year release survival and the number of releases needed to achieve the criterion was not derived from cross-foster data. If we continue to primarily use cross-fostering as a release technique, the number of pups surviving to breeding age in a given year will reflect the cross-fostered pups placed in dens two years prior, or earlier, that have reached breeding age, because it takes two years from placement of the pup into a den for it to reach breeding age. In other words, our annual tally of released wolves surviving to breeding age will have a lag that reflects the age of the released animal. (Comparatively, adult, or sub-adult releases have a lag of one year, as they would count as surviving to breeding age the year after their release.) Currently, we estimate that cross-foster Mexican wolf pups have similar survival to wild-born Mexican wolf pups (approximately 50%, USFWS 2018), however more data are needed to enable us to predict the number of cross-foster pups we will need to release in order to reach our genetic criterion. We have increased the number of cross-fostered pups placed in wild dens over the last few years as our capacity has increased, in recognition that if survival of pups is high, we will reach our genetic criterion more quickly than anticipated, but if it is low, we will need to continue to maximize the number of events we conduct each year or reconsider our release strategy. We also retain the regulatory ability to release adult wolves or pairs with pups in limited circumstances if there are management reasons to do so.

As of the spring of 2021, we have released 72 Mexican wolves from captivity to the wild via cross-fostering (see Chapter 1.3) and we have documented a minimum of seven out of 30 released pups surviving to breeding age. Pups released in 2020 (20 pups) and 2021 (22 pups) had not yet reached breeding age in the spring of 2021 and are therefore not eligible to be included in the total number of released pups that could have survived to breeding age in 2021 (30 pups). Of the seven cross-fostered animals that have survived to breeding age from cross-foster events between 2016 and 2019, we are aware of two animals that have produced one litter and two animals that have produced multiple litters, resulting in the equivalent of four effective migrants, and no documented reproduction by the remaining three animals (USFWS files). Given the number of cross-fostered pups we placed in 2020-2021, we would expect similar or better results when these pups reach breeding age. As we continue to gain experience cross-fostering, documenting survival of released pups, and compiling data, we will adjust the number of releases we conduct annually until at least 22 released Mexican wolves have survived to breeding age.

Alternative One includes the **proposed revision of three take provisions from the 2015 10(j) rule**: take on non-Federal lands, take on Federal land, and take in response to unacceptable impacts to a wild ungulate herd. We are proposing to temporarily restrict the use of these take provisions during a critical phase of the recovery process, that is, reaching recovery criteria for the Mexican wolf. Temporarily restricting these take provisions supports our ability to recover the Mexican wolf to the extent that take would be reduced compared to the level of take that would occur if we did not impose restrictions (see Chapter 2.3.2 Alternative Two, below). We propose that establishing restrictions for take dependent on progress benchmarks toward recovery would ensure that these take provisions are only utilized when the condition of the population has improved

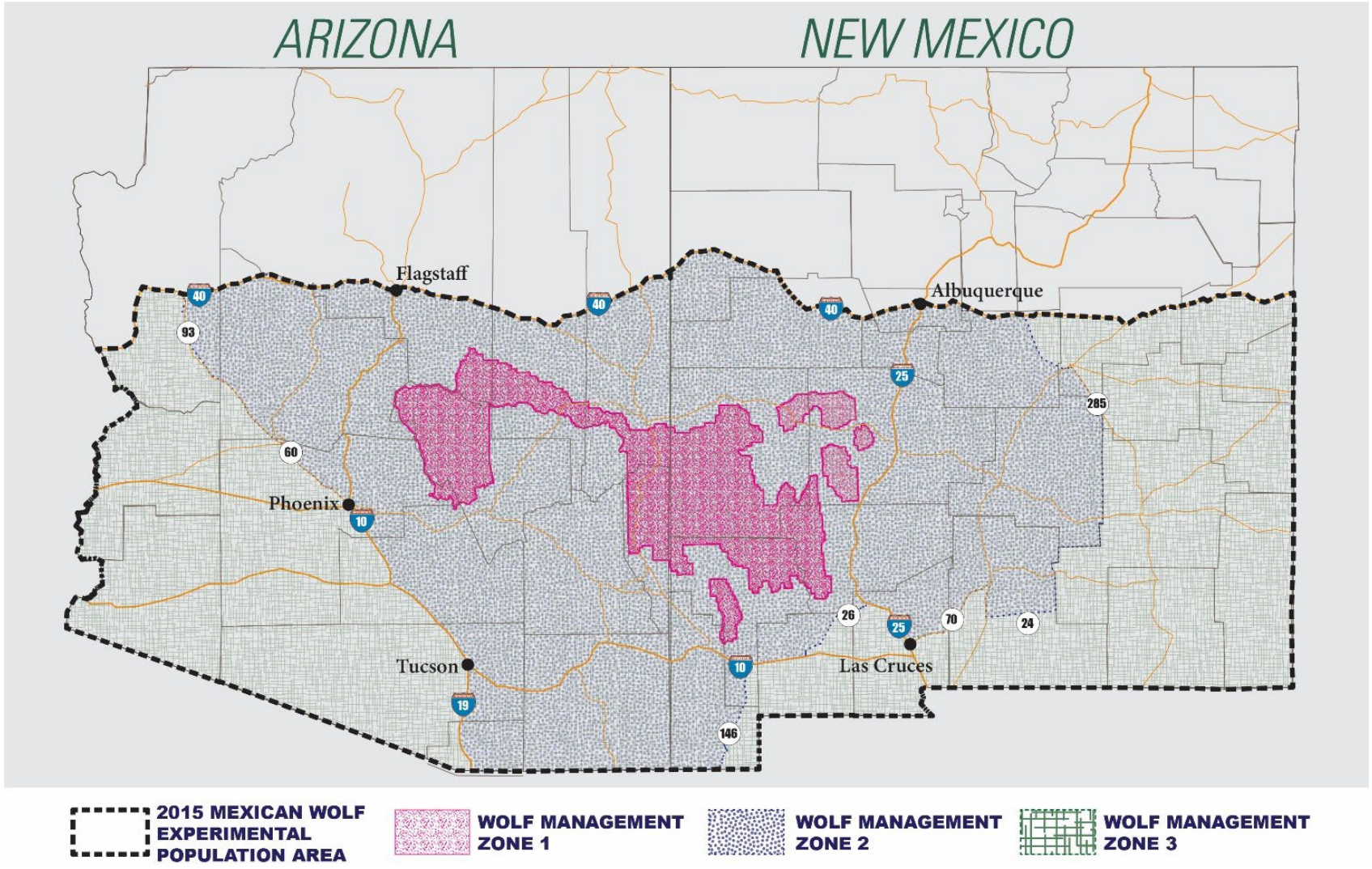


Figure 2-1. Mexican Wolf Experimental Population Area. (Source: USFWS)

Table 2.1 MWEPA Population Size, Permit Issuance, Density, Wolves per 1000 Elk Projections: 2014 FEIS and 2021 SEIS

Year	End-of-Year Population Projections from 2014 FEIS[1]	End-of-Year Actual Minimum Population under 2015 10(j) Rule	End-of-Year Population Projection for 2021 SEIS[2]	Actual or Projected Issuance of Federal Permits[3]	Actual or Projected Issuance of Nonfederal Permits[4]	Wolf Density[5] Projections from 2014 FEIS (wolves/1000 km^2 of suitable habitat)	Wolf Density Projection for 2021 SEIS, Alternatives One and Two (wolves/1000 km^2 of suitable habitat)	Wolves per 1000 Elk Ratio Projection from 2014 FEIS[6]	Wolves per 1000 Elk Ratio Projection for 2021 SEIS[7]
2015 (Year 1)	100	98	--	--	--	1.92		1.46	--
2016 (Year 2)	110	114	--	--	--	2.11		1.60	--
2017 (Year 3)	122	117	--	--	--	2.34		1.78	--
2018 (Year 4)	134	131	--	5 (actual)	2 (actual)	2.57		1.95	--
2019 (Year 5)	147	163	--	--	4 (actual)	2.82		2.14	--
2020 (Year 6)	162	186	--	--	--	2.74-3.11	3.57	2.04-2.36	2.55
2021 (Year 7)	178		212	--	--	3.01-3.41	4.07	2.24-2.59	2.91
2022 (Year 8)	196		242	8 (projected)	6 (projected)	3.31-3.76	4.65	2.47-2.86	3.32
2023 (Year 9)	215		276	9 (projected)	7 (projected)	3.22-4.12	5.31	2.69-3.13	3.79
2024 (Year 10)	237		316	10 (projected)	8 (projected)	3.55-4.55	6.06	2.96-3.45	4.33
2025 (Year 11)	260		361	12 (projected)	9 (projected)	3.89-4.99	6.92	3.25-3.79	4.94
2026 (Year 12)	287		412	14 (projected)	11 (projected)	4.30	7.90	3.59	5.64
2027 (Year 13)[8]	315		470	16 (projected)	12 (projected)	4.72	8.03	3.94	5.21

Year	End-of-Year Population Projections from 2014 FEIS[1]	End-of-Year Actual Minimum Population under 2015 10(j) Rule	End-of-Year Population Projection for 2021 SEIS[2]	Actual or Projected Issuance of Federal Permits[3]	Actual or Projected Issuance of Nonfederal Permits[4]	Wolf Density[5] Projections from 2014 FEIS (wolves/1000 km^2 of suitable habitat)	Wolf Density Projection for 2021 SEIS, Alternatives One and Two (wolves/1000 km^2 of suitable habitat)	Wolves per 1000 Elk Ratio Projection from 2014 FEIS[6]	Wolves per 1000 Elk Ratio Projection for 2021 SEIS[7]
2028 (Year 14)	315-347		537	18 (projected)	14 (projected)	4.72-5.90	8.03	3.94	5.95
2029 (Year 15)	315-381		537	18 (projected)	14 (projected)	4.72-6.54	8.03	3.94	5.95
2030 (Year 16)	315-420		537	18 (projected)	14 (projected)	4.72-7.26	8.03	3.94	5.95
After 2030	315-534		537	18 (projected)	14 (projected)	4.72-7.99	8.03	3.94	5.95

[1]2014 FEIS Appendix D, Tables D-2, D-3, D-4; MWEPA population projections for Alternatives One through Three, until population objective of 300-325 was reached or density of 8 wolves per 1000 km^2 suitable habitat was reached. [2]14.17% annual growth, based on average growth of MWEPA 2015-2020, rounded, until density of eight wolves per 1000 km^2 suitable habitat is reached. [3] Data for years 2015-2020 reflects the actual number of permits issued by the Service. Data for subsequent years provides a projection of the permits we may issue, estimated at an issuance rate of 0.033 permit/wolf/year. [4] Data for years 2015-2020 reflects the actual number of permits issued by the Service. Data for subsequent years provides a projection of the permits we may issue, estimated issuance rate of 0.026 permit/wolf/year. [5]2014 FEIS Appendix D, Table D-2, Mexican wolf density projection for Alternative One under two scenarios (A and B) to represent the range of potential densities within suitable habitat in the MWEPA due to uncertainty in phasing implementation in western Arizona (USFWS 2014). [6] 2014 FEIS Appendix D, Table D-2, wolves per 1000 elk projections under two scenarios (A and B) (USFWS 2014). [7] The wolf to 1,000 elk ratio is calculated using the number of elk inside of the MWEPA, Phase 1 (projected as in place until 2027 based on population growth) until 2027 when phasing in western Arizona ends. [8]Phasing in western Arizona ends twelve years after February 17, 2015. *Note*: Yellow shading represents an eight-year period during which the proposed population objective in Alternatives One and Two would be met if population growth is consistent with projected ~14% annual population growth, for illustrative purposes only.

sufficient to withstand any potential impacts of the provisions. We specifically propose restrictions based on benchmarks toward achieving the proposed genetic objective in recognition that continued robust population growth is likely and we need to ensure improvements in gene diversity keep pace with population growth (see Chapter 1.3 Current Status of the Mexican Wolf Population in the MWEPA).

Our proposed revisions for these three take provisions utilize two different approaches, based on the type of take that we expect to occur. For take on non-Federal land and Federal land, we expect that our issuance of a permit would not lead to take for every permit issued, and that most permits would specify the take of a single wolf. Under the 2015 10(j) rule through August 15, 2021, we have issued 11 permits, collectively, for take on Federal and non-Federal land (Table 2.1), none of which resulted in take of a Mexican wolf. Because we do not have any other data to inform our estimate of the likelihood of take occurring when a permit to take a wolf on Federal or non-Federal land is issued, we conservatively estimate that take of one Mexican wolf could occur for approximately every 12 permits we issue. Further, we recognize that a wolf taken under these permits may or may not be a released wolf (wolf released from captivity that could count toward the proposed genetic objective). Depending on the circumstances surrounding the permitted take, it may or may not be possible to know whether one or more of the wolves causing the livestock conflict is a released wolf. For example, a released wolf may or may not have a collar, depending on whether we handled the animal after a cross-fostering event when the animal was old enough for a collar. We have not, nor do we intend to, collar every Mexican wolf in the MWEPA, but we try to have at least one collared animal or pair per pack. Currently, there is a much higher likelihood of take resulting in the take of a wild-born wolf rather than a released wolf, based on the size of the population and the number of released animals that may be surviving to breeding age (assuming cross-foster pup survival rate of 50% the first year after release, see Chapter 1.3 Current Status of the Mexican Wolf Population in the MWEPA). Therefore, while we want to be protective of released wolves that may count toward the proposed genetic objective, we do not want to impose a complete moratorium on the ability of a domestic animal owner or their agent on non-Federal land or a livestock owner or their agent on Federal land from being able to receive a permit to address wolf-livestock conflicts when the likelihood of take of a released wolf is low (also see Chapter 4.3.2. Potential Environment Impacts and Proposed Mitigation Measures – Mexican wolves, Alternative One, for our data on and projections of permitted take). Further, we recognize that many factors could influence the pace at which we reach the proposed genetic objective, although the primary factor is the number of releases we conduct. Therefore, we are proposing a revision to these two take provisions that ensures we demonstrate annual progress toward the proposed genetic objective. If we achieve our annual benchmark, then permits could be issued the following year in recognition that we are on track to improve gene diversity and the likelihood of take of a released wolf is low, but meanwhile a growing population may be experiencing conflicts for which this take flexibility is a helpful management tool. If we do not reach our annual benchmark, we will consider whether any permitted take the prior year resulted in the take of a released animal; if it did, we will not issue permits to domestic animal owners/livestock owners or their agents the following year or until we are back on track with our annual benchmarks. If permitted take the following year resulted in take but *not* of a released wolf, then we recognize that the permits are not the cause of our inability to reach our benchmark and we will continue to issue permits in the following year.

Utilizing this conditional approach, our proposed revisions to the take provisions for take on

Federal land and non-Federal land will establish annual benchmarks of progress toward recovery while also allowing us to establish near-term expectations for domestic animal owners and livestock owners of whether permits may be issued in the following year. We intend for this approach to maximize our accountability toward recovery, while ensuring we do not eliminate a management tool unnecessarily during a period of sustained population growth and progress toward the genetic objective. After we have reached the proposed genetic objective, issuance of both the Federal land and non-Federal land permits could continue without the conditional, annual restrictions in place. At that time, the gene diversity of released wolves will have integrated into the population through breeding events between released and wild wolves such that released wolves will no longer represent a pool of unique gene diversity; in other words, as more released wolves survive and breed in the wild, the contribution of each released wolf to the gene diversity of the MWEPA diminishes.

The 2015 10(j) take provision for *Take on non-Federal land* ((50 CFR 17.84(k)(7)(iv)(C)) states:

Based on the Service's or a designated agency's discretion and in conjunction with a removal action authorized by the Service, the Service or designated agency may issue permits to domestic animal owners or their agents (*e.g.,* employees, land manager, local officials) to take (including intentional harassment or killing) any Mexican wolf that is present on non-Federal land where specified in the permit. Permits issued under this provision will specify the number of days for which the permit is valid and the maximum number of Mexican wolves for which take is allowed. Take by permittees under this provision will assist the Service or designated agency in completing control actions. Domestic animal owners or their agents must report this take as specified in accordance with paragraph (k)(6) of this action.

We are proposing to restrict the issuance of permits according to the following;

> Until the Service has achieved the genetic objective for the MWEPA by documenting that at least 22 released wolves have survived to breeding age in the MWEPA, the Service or a designated agency may issue permits only on a conditional, annual basis according to the following provisions:
>
> (i) Either annual release benchmarks ((here, the term "benchmark" means the minimum cumulative number of released wolves surviving to breeding age since January 1, 2016, as documented annually in March) are achieved based on the following schedule:

YEAR	BENCHMARK
2021	7
2022	9
2023	11
2024	13
2025	14
2026	15
2027	16
2028	18
2029	20
2030	22

> ; or

(ii) permitted take on non-Federal (vi)(C) or Federal land (v)(A) during the previous year (April 1 to March 31) did not include the lethal take of any released wolf or wolves that were or would have counted toward the genetic objective at 17.84 (k)(9)(iv).

After the Service has achieved the genetic objective at 17.84 (k)(9)(iv), the conditional annual basis for issuing permits will no longer be in effect.

The 2015 10(j) take provision for *Take on Federal land* (50 CFR 17.84(k)(7)(v)(A) states:

Based on the Service's or a designated agency's discretion and in conjunction with a removal action authorized by the Service, the Service may issue permits to livestock owners or their agents (e.g., employees, land manager, local officials) to take (including intentional harassment or killing) any Mexican wolf that is in the act of biting, killing, or wounding livestock on Federal land where specified in the permit. (1) Permits issues under this provision will specify the number of days for which the permit is valid and the maximum number of Mexican wolves for which take is allowed. Take by permittees under this provision will assist the Service or designated agency in completing control actions. Livestock owners or their agents must report this take as specified in accordance with paragraph (k)(6) of this action. (2) After the take of a Mexican wolf, the Service must be provided evidence that the wolf was in the act of biting, killing, or wounding livestock at the time of take, such as evidence of freshly wounded or killed livestock. The take of any Mexican wolf without evidence of biting, killing, or wounding domestic animals may be referred to the appropriate authorities for investigation.

We are proposing to restrict the issuance of permits according to the following:

Until the Service has achieved the genetic objective for the MWEPA by documenting that at least 22 released wolves have survived to breeding age in the MWEPA, the Service or a designated agency may issue permits only on a conditional, annual basis according to the following provisions:

(i) Either annual release benchmarks (here, the term "benchmark" means the minimum cumulative number of released wolves surviving to breeding age since January 1, 2016, as documented annually in March) are achieved based on the following schedule:

YEAR	BENCHMARK
2021	7
2022	9
2023	11
2024	13
2025	14
2026	15
2027	16
2028	18
2029	20
2030	22

; or

(ii) permitted take on non-Federal (vi)(C) or Federal land (v)(A) during the previous year (April 1 to March 31) did not include the lethal take of any released wolf or wolves that

were or would have counted toward the genetic objective at 17.84 (k)(9)(iv).

After the Service has achieved the genetic objective at 17.84 (k)(9)(iv), the conditional annual basis for issuing permits will no longer be in effect.

Our proposed revision to the take provision for take in response to unacceptable impacts to a wild ungulate herd does not utilize a conditional approach due to our uncertainty surrounding the take that could occur under this provision. We are uncertain as to the number or frequency of future authorizations the Service may issue to a state or designated agency to remove wolves due to an unacceptable impact to a wild ungulate herd because we do not know when (e.g., at what number of wolves or wolf density) wolf predation on a localized herd could result in an ungulate decline that is deemed unacceptable based on state management goals (see Alternative Two below, and 4.2.1 Potential Environmental Impacts and Proposed Mitigation Measures - Ungulates). Further, the level of removal (i.e., number of wolves, timing, and duration) that could be requested by the state agency would depend on the level of ungulate decline occurring within the context of the state's management goals for that herd or herds, as well as other pertinent factors, but would more likely result in authorized removal of one or more packs of wolves rather than an individual wolf. Therefore, we recognize that the likelihood of take of a released wolf may be higher under this take provision than the other two take provisions we are proposing to revise. On the other hand, take under this provision could result in the translocation of Mexican wolves rather than removal, and in those cases no loss of gene diversity in the MWEPA would occur. Further, we do not expect this take provision to be utilized until a larger wolf population exists. If we have successfully improved gene diversity by the time we begin to utilize this provision, then the take of some released wolves will no longer be as significant to the gene diversity of the MWEPA. As we describe immediately above in this section, when we reach the proposed genetic objective, gene diversity of released wolves will have integrated into the population through breeding events between released and wild wolves such that released wolves will no longer represent a pool of unique gene diversity; in other words, as more released wolves survive and breed in the wild, the contribution of released wolves to the gene diversity of the MWEPA diminishes. Therefore, our approach to this proposed revised take provision is to ensure we are protective of released wolves during the time we are achieving the proposed genetic objective by temporarily restricting removal requests and authorizations. When we reach the proposed genetic objective, we would remove this temporary restriction in recognition that removals that potentially result in the removal of released wolves would no longer hinder the recovery of the Mexican wolf. In the near term, establishing a contingent timeframe for the restriction of this take provision upon achieving the proposed genetic objective provides an additional layer of synergistic support toward the recovery of the Mexican wolf.

The 2015 10(j) provision for *Take in response to unacceptable impacts to a wild ungulate herd* (50 CFR 17.84(k)(7)(vi) states:

If the Arizona or New Mexico game and fish agency determines that Mexican wolf predation is having an unacceptable impact to a wild ungulate herd, as defined in paragraph (k)(3) of this section, the respective State game and fish agency may request approval from the Service that Mexican wolves be removed from the area of the impacted wild ungulate herd. Upon written approval from the Service, the State (Arizona or New Mexico) or any designated agency may be authorized to remove (capture and translocate in the MWEPA, move to captivity, transfer to Mexico, or lethally take) Mexican wolves. These

management actions must occur in accordance with the following provisions:

(A) The Arizona or New Mexico game and fish agency must prepare a science-based document that:

(*1*) Describes what data indicate that the wild ungulate herd is below management objectives, what data indicate that the impact on the wild ungulate herd is influenced by Mexican wolf predation, why Mexican wolf removal is a warranted solution to help restore the wild ungulate herd to State game and fish agency management objectives, the type (level and duration) of Mexican wolf removal management action being proposed, and how wild ungulate herd response to wolf removal will be measured and control actions adjusted for effectiveness;

(*2*) Demonstrates that attempts were and are being made to identify other causes of wild ungulate herd declines and possible remedies or conservation measures in addition to wolf removal;

(*3*) If appropriate, identifies areas of suitable habitat for Mexican wolf translocation; and

(*4*) Has been subjected to peer review and public comment prior to its submittal to the Service for written concurrence. In order to comply with this requirement, the State game and fish agency must:

(*i*) Conduct the peer review process in conformance with the Office of Management and Budget's most recent Final Information and Quality Bulletin for Peer Review and include in their proposal an explanation of how the bulletin's standards were considered and satisfied; and

(*ii*) Obtain at least three independent peer reviews from individuals with relevant expertise other than staff employed by the State (Arizona or New Mexico) requesting approval from the Service that Mexican wolves be removed from the area of the affected wild ungulate herd.

(B) Before the Service will allow Mexican wolf removal in response to impacts to wild ungulates, the Service will evaluate the information provided by the requesting State (Arizona or New Mexico) and provide a written determination to the requesting State game and fish agency on whether such actions are scientifically based and warranted.

(C) If all of the provisions above are met, the Service will, to the maximum extent allowable under the Act, make a determination providing for Mexican wolf removal. If the request is approved, the Service will include in the written determination which management action (capture and translocate in MWEPA, move to captivity, transfer to Mexico, lethally take, or no action) is most appropriate for the conservation of the Mexican wolf subspecies.

(D) Because tribes are able to request the capture and removal of Mexican wolves from tribal trust lands at any time, take in response to impacts to wild ungulate herds is not applicable on tribal trust lands.

We are proposing to restrict this form of take temporarily by adding the following stipulation:

No requests for take in response to unacceptable impacts to a wild ungulate herd may be

made by the state game and fish agency or accepted by the Service until the genetic objective of at least 22 released wolves surviving to breeding age for the MWEPA has been met.

2.3.2 Alternative Two

Alternative Two incorporates the proposed revised population objective and genetic objective described in Alternative One but does not include the proposed revision of the 2015 10(j) rule provisions for take on non-Federal land, take on Federal land, and take in response to an unacceptable impact to a wild ungulate herd. Therefore, permits could still be issued based on the specifications of the 2015 10(j) rule for the take of Mexican wolves on non-Federal and Federal land and take in response to an unacceptable impact to a wild ungulate herd could still be authorized by the Service to a state game and fish agency. These three take provisions, both individually and collectively, authorize an unquantified amount of take during any year. This alternative allows us to determine our ability to conserve and recover the Mexican wolf within the context of the proposed revised population objective and proposed genetic objective, which are consistent with our recovery goals for the Mexican wolf, while maintaining the management flexibility that these take measures provide to address wolf-livestock conflicts or impacts to wild ungulates.

Under the 2015 10(j) rule (through August 15, 2021), we have issued six permits for take on non-Federal land, including two permits in 2018 and four permits in 2019, none of which resulted in the take of a Mexican wolf. We have issued five permits for take on Federal land under the 2015 10(j) rule, all during 2018, none of which resulted in the take of any Mexican wolf. Under this alternative, we would expect our issuance of permits for take on non-Federal and Federal land in the future to occur at a rate of approximately 0.026 permits/wolf/year on non-Federal land and 0.033 permits/wolf/year on Federal land. This is based on the maximum number of permits we issued during any year under the 2015 10(j) rule and the population size during that period: four permits and five permits respectively at a population size of around 150 wolves (Table 2.1). Estimating a rate of permit issuance recognizes that our permit issuance would likely increase or decrease consistent with the MWEPA population's size; as the population grows, more conflicts arise, and we would likely issue more permits, as shown in Table 2.1.

We have not authorized the removal of Mexican wolves in response to an unacceptable impact to a wild ungulate herd under the 2015 10(j) rule, and neither the state of Arizona nor New Mexico have requested such authorization. In the 2014 FEIS, we predicted that unacceptable impacts to a wild ungulate herd would be more likely to occur as predation pressure increases with more Mexican wolves. We utilized the concept of a wolf to elk ratio (number of wolves per 1,000 elk) in suitable habitat as an indicator of when impacts to ungulates may potentially become significant and warrant mitigation. Predicting impacts to ungulates using a wolf to elk ratio is a recognized concept from other wolf/ungulate systems such as the Northern Rockies and serves as a useful predictive tool for the MWEPA because we do not have geographically specific data suggesting when impacts to ungulates may become observable and significant. In other ecosystems, wolf to elk ratios above 4:1000 have been observed to result in impacts to elk populations under specific conditions (USFWS 2014, Appendix D and Chapter 4; White and Garrott 2005; Hamlin and Cunningham 2009). Although we did not expect range-wide impacts to wild ungulate herds across the MWEPA from the alternatives under consideration in the 2014 FEIS, we recognized our uncertainty surrounding the reliability of predictions from other ecosystems for the MWEPA and

therefore modified the take provision for unacceptable impacts to a wild ungulate herd to ensure that smaller scale impacts (to localized herds) could be mitigated. Under this alternative, we would expect to utilize this provision at wolf to elk ratios higher than our current ratio of 2.55 wolves to 1000 elk, given that we have not measured any unacceptable impacts to date.

2.3.3 Alternative Three (No Action Alternative)

Under Alternative Three no changes to the population objective, recommendations for release of captive wolves, take on non-Federal land, take on Federal land, or take in response to unacceptable impacts to a wild ungulate herd from 2015 10(j) rule would be made. We would continue to implement the 2015 10(j) rule without any changes, making it the No Action Alternative. This alternative was Alternative One in the 2014 FEIS and was selected in the Record of Decision for implementation in the 2015 10(j) rule.

Under this alternative, we would expect to reach the population objective of 300-325 wolves within approximately five years, based on our 2020 minimum population count and projected growth of the MWEPA of approximately 14% annually (Table 2.1). We would conduct releases to achieve 1-2 effective migrants per wolf generation (approximately four years) for around five generations for a total of 7-10 effective migrants, likely through the release of cross-fostered pups, although we are also authorized to conduct adult releases according to the zone provisions of the 2015 10(j) rule. We would continue to issue permits for take on Federal land, non-Federal land and could authorize the removal of Mexican wolves by a state or designated agency in response to unacceptable impacts to a wild ungulate herd.

2.3.4 Summary of Actions by Alternative

In this section we provide a tabular comparison of the actions in the proposed action and alternatives.

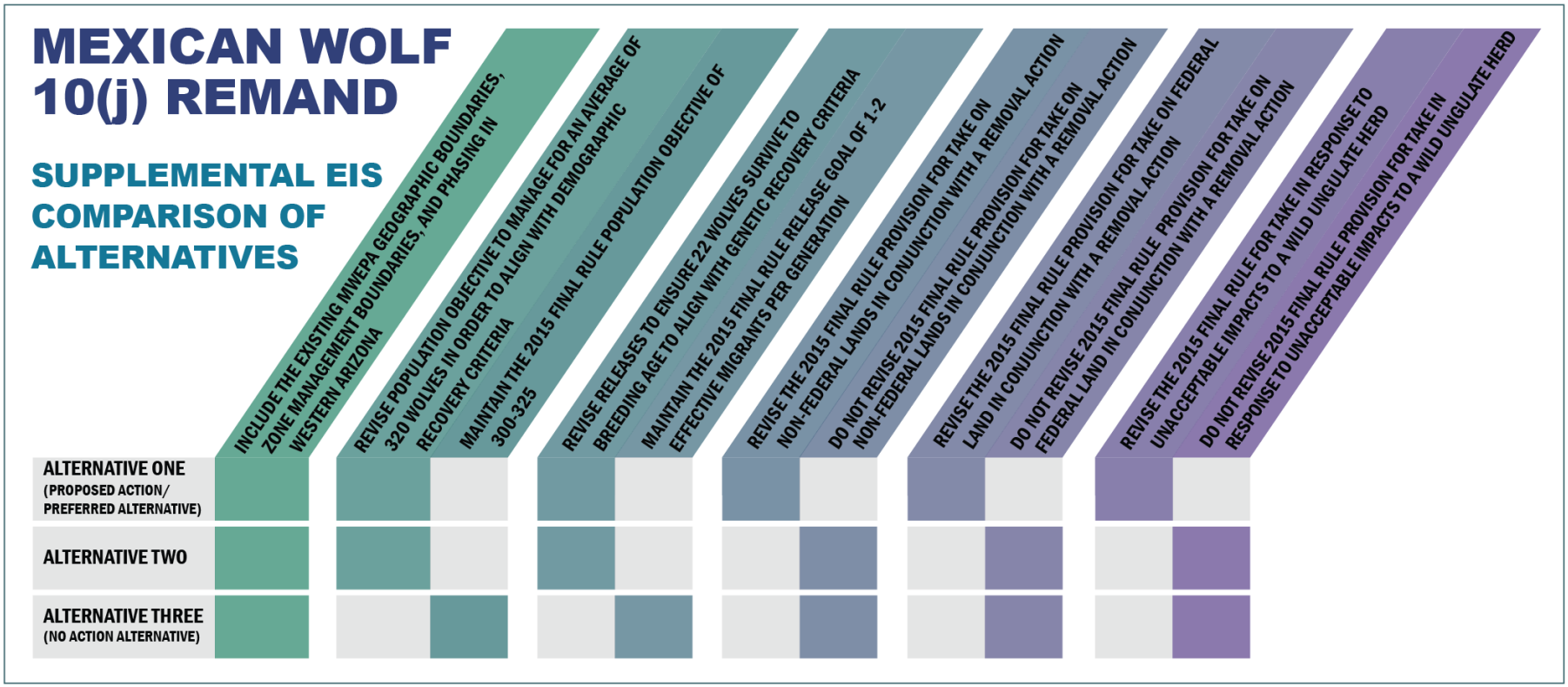


Figure 2-2. Infographic Comparison of the Proposed Action and Alternatives in the Draft Supplemental Environmental Impact Statement. (Source: USFWS)

2.3.5 Summary of the Environmental Consequences by Alternative

In this section we provide a comparative summary of the assessment of environmental consequences by alternative.

Table 2-2. Summary and Comparison of the Environmental Consequences by Alternative.

Resource Area	**Alternative One**	**Alternative Two**	**Alternative Three**
Land Use	No significant direct or indirect adverse or beneficial impacts	No significant direct or indirect adverse or beneficial impacts	No significant direct or indirect adverse or beneficial impacts
Biological Resources (wild ungulate prey)	Less than significant direct adverse impact	No significant direct or indirect adverse impact with mitigation	No significant direct or indirect adverse impact with mitigation
Biological Resources (Mexican wolf)	Significant beneficial impact	Significant beneficial impact	Significant beneficial impact
Economic Activity (ranching/livestock)	Less than significant direct adverse impact at regional/state scale; significant *or* less than significant direct adverse impact at scale of individual operator with mitigation	Less than significant direct adverse impact at regional/state scale; significant *or* less than significant direct adverse impact at scale of individual operator with mitigation	Less than significant direct adverse impact at regional/state scale; significant *or* less than significant direct adverse impact at scale of individual operator with mitigation
Economic Activity (hunting)	Less than significant indirect adverse impact	No significant adverse direct or indirect impacts with mitigation	No significant adverse direct or indirect impacts with mitigation
Human Health/Public Safety	No significant direct or indirect adverse or beneficial impacts	No significant direct or indirect adverse or beneficial impacts	No significant direct or indirect adverse or beneficial impacts
Environmental Justice	Mitigated disproportionate adverse impacts	Mitigated disproportionate adverse impacts	Mitigated disproportionate adverse impacts
Cumulative Impacts	No significant adverse cumulative impacts on any resource area; less than significant beneficial cumulative impacts on Mexican wolves; less than significant adverse impacts on wild ungulate prey, big game hunting, ranching/livestock.	No significant adverse cumulative impacts on any resource area; less than significant beneficial cumulative impacts on Mexican wolves; less than significant adverse impacts on ranching/livestock.	No significant adverse cumulative impacts on any resource area; less than significant beneficial cumulative impacts on Mexican wolves; less than significant adverse impacts on ranching/livestock.

Resource Area	Alternative One	Alternative Two	Alternative Three
Relationship Between Short-Term Uses of Man's Environment and Enhancement of Long-term Productivity	Would not permanently narrow the range of beneficial uses of the human environment or adversely affect the long-term productivity of the project area.	Would not permanently narrow the range of beneficial uses of the human environment or adversely affect the long-term productivity of the project area.	Would not permanently narrow the range of beneficial uses of the human environment or adversely affect the long-term productivity of the project area.
Irreversible and Irretrievable Commitment of Resources	Would not result in a significant irreversible or irretrievable commitment of resources.	Would not result in a significant irreversible or irretrievable commitment of resources.	Would not result in a significant irreversible or irretrievable commitment of resources.

1

2.3.6 Basis for Selection of Preferred Alternative

We have selected Alternative One as our Preferred Alternative because it meets the requirements of the court order and accomplishes our Purpose and Need to ensure that the experimental designation contributes to the long-term conservation and recovery of the Mexican wolf. Specifically:

- It aligns the population objective for the MWEPA with the demographic recovery criterion for the United States in the revised recovery plan to alleviate the threat of demographic stochasticity.
- It aligns the genetic objective for the MWEPA with the genetic recovery criterion for the United States in the revised recovery plan to alleviate genetic threats.
- It reduces the potential loss of beneficial gene diversity from the take of released captive wolves during a critical period in the recovery process for the Mexican wolf by restricting the use of three take provisions temporarily based on our progress toward recovery.
- It provides flexibility to the Service and our partners in managing conflict situations with the assistance of domestic animal owners or their agents on non-Federal land and livestock owners or their agents on Federal land by allowing the use of take permits after we have reduced genetic threats by improving gene diversity in the MWEPA.
- It provides flexibility to the Service and our partners in managing situations with the state game and fish agencies when unacceptable impacts to a wild ungulate herd occur after we have reduced genetic threats by improving gene diversity in the MWEPA.

We expect these outcomes to serve the long-term conservation and recovery of the Mexican wolf because they directly reduce significant demographic and genetic threats to the Mexican wolf that are identified in the revised recovery plan. Of the three alternatives, Alternative One and Two would establish management objectives for the MWEPA that are directly consistent with, and therefore support, the revised recovery plan's recovery criteria for the United States' population of Mexican wolves. Alternative One includes revised take provisions that establish annual benchmarks for progress toward recovery, that are more protective of the Mexican wolves we release from captivity than Alternative Two or Three, and therefore better supports our near-term efforts to reduce genetic threats to the Mexican wolf. Alternative Three (No Action), while providing for some degree of demographic and genetic threat alleviation, does not directly align with the revised recovery plan that now guides the recovery of the Mexican wolf, and would be less likely to achieve adequate threat reduction to recover the Mexican wolf and pursue delisting.

3. AFFECTED ENVIRONMENT

3.1 Specific Resource Areas Evaluated

This chapter describes the environment that the proposed action or alternatives we are considering in this FSEIS may affect. We focus the description of the affected environment only on those resource areas potentially subject to impacts, including Land Use, Biological Resources, Economic Activity, Human Health/Public Safety, and Environmental Justice. The range of proposed revisions to the experimental population designation that we analyze in this FSEIS is considerably narrower in scope than the proposed revisions we analyzed in the 2014 FEIS. Therefore, we limit our description and subsequent evaluation of specific resource areas in this FSEIS to those subsets of the resources that relate to, and may be affected by, our proposed action, as described within this chapter.

We incorporate by reference (40 C.F.R. 1502.21) Chapter 3.1 Specific Resource Areas to be Evaluated from the 2014 FEIS. This inclusion serves as our explanation of why we do not evaluate the following resource areas in this FSEIS: aesthetics/visual resources, air quality, cultural/historic resources, climate change, community services, geology/soils, noise, resident population, solid/hazardous waste, transportation/parking, utilities, and water resources.

3.2 The Project Study Area

We define the project study area as the geographic area potentially subject to impacts from the proposed action or alternatives. This geographic area incorporates the portions of Arizona and New Mexico south of Interstate-40 to the international border with Mexico, as defined by the 2015 10(j) rule as the MWEPA. Within the MWEPA, the project study area includes Zone 1, 2, and 3, which delineate geographic areas with specific limitations for release, translocation, dispersal, and occupancy of Mexican wolves (80 FR 2562-2563) (see Figure 2-1 and Appendix B). A three-part temporary phasing strategy further delineates release, translocation, dispersal, and occupancy of Mexican wolves in western Arizona for the first 11 years of rule implementation after February 17, 2015 (80 FR 2563-2566) (see Appendix B).

Within the MWEPA, we define suitable Mexican wolf habitat as forested areas with low human density and high native ungulate density (74 FR 15123, pp. 15157-15159). In the 2014 FEIS we estimated suitable habitat by identifying areas where at least two of three gray wolf habitat models suggested suitable habitat (USFWS 2014). Subsequently, a habitat analysis conducted for the revised recovery plan identified the same areas in the MWEPA as high-quality focal areas for Mexican wolf recovery (Figure 3 in USFWS 2017a, from Martínez-Meyer et al. 2017). We consider these sources to be the best available information upon which to identify suitable Mexican wolf habitat in our project area. Based on the methodology used in the 2014 FEIS, which we maintain in this SEIS for simplicity/comparability of analysis between the two documents, the MWEPA contains approximately 32,265 square miles (mi^2) (83,566 square kilometers (km^2)) of suitable habitat, which is twenty-one percent of the total land area of the MWEPA (USFWS 2014). We continue to observe Mexican wolf occupancy in the MWEPA primarily within areas identified as suitable (See our Recent Wolf Locations and Mexican Wolf Home Range Map, online at: https://www.fws.gov/southwest/es/mexicanwolf/). In 2020, wolves occupied approximately 19,495 mi^2 (50,492 km^2) of the MWEPA (USFWS files).

Counties with a significant amount of suitable Mexican wolf habitat in the project area that may be affected by the proposed action and alternatives were identified in the 2014 FEIS and include

(Figure 3-1):

- Arizona counties: Apache, Gila, Greenlee, Graham, Coconino, Maricopa, Mohave, Pinal, Pima, Santa Cruz, Cochise, Yavapai, and Navajo;
- New Mexico counties: Bernalillo, Catron, Chaves, Cibola, Dona Ana, Eddy, Grant, Hidalgo, Lea, Lincoln, Luna, McKinley, Otero, Sierra, Socorro, Torrance, and Valencia.

Counties that do not have a significant amount of suitable habitat and are therefore unlikely to be affected by the proposed action and alternatives include La Paz and Yuma counties in Arizona, and Curry, De Baca, Guadalupe, Lea, Roosevelt, Quay and Santa Fe counties in New Mexico (Figure 3-1).

Tribal trust land with a significant amount of suitable Mexican wolf habitat in the project area that may be affected by the proposed action and alternatives include (Figure 3-2):

- Tribal trust land: White Mountain Apache Tribe, Fort Apache Indian Reservation; San Carlos Apache Tribe, San Carlos Apache Reservation; Navajo Nation, Navajo Indian Reservation; Navajo Nation, Navajo Reservation Trust; Navajo Nation, Ramah Navajo Indian Reservation; Navajo Nation, Alamo Band Navajo Indian Reservation; Mescalero Apache Tribe, Mescalero Apache Indian Reservation; Pueblo of Acoma, Acoma Indian Reservation; Pueblo of Zuni, Zuni Indian Reservation; Pueblo of Isleta, Isleta Indian Reservation; Pueblo of Laguna, Laguna Indian Reservation.

Tribal trust lands that do not have a significant amount of suitable habitat and are therefore unlikely to be affected by the proposed action and alternatives include (Figure 3-2):

- Fort McDowell Indian Reservation, AZ; Ak-chin Indian Reservation, AZ; Cocopah Indian Reservation, AZ; Colorado River Indian Reservation, AZ; Fort Yuma Indian Reservation, AZ; Gila Bend Indian Reservation, AZ; Gila River Indian Reservation, AZ; Pascua Yaqui Reservation, AZ; Salt River Indian Reservation, AZ; Tohono O'odham Indian Reservation, AZ; San Xavier Indian Reservation, AZ; Yavapai Prescott Indian Reservation, AZ; Yavapai Apache Indian Reservation, AZ.

Some of the counties and tribal trust lands with suitable habitat have been inhabited by Mexican wolves over the course of the reintroduction effort, as discussed subsequently in this chapter within the context of various resource areas (e.g., economic activity and environmental justice). Other counties or tribal trust lands with suitable habitat have not had wolf presence to date but may in the future as wolves continue to expand their range within suitable habitat in the MWEPA.

We did not describe counties and tribal trust lands that do not have a significant amount of suitable habitat in the 2014 FEIS nor did we provide an analysis of environmental consequences; similarly, we do not describe or analyze environmental impacts for those areas in this supplement because they will be unaffected by our proposed action or alternatives.

We incorporate by reference (40 C.F.R. 1502.21) Chapter 3.2 The Project Study Area from the 2014 FEIS for additional description of the project study area.

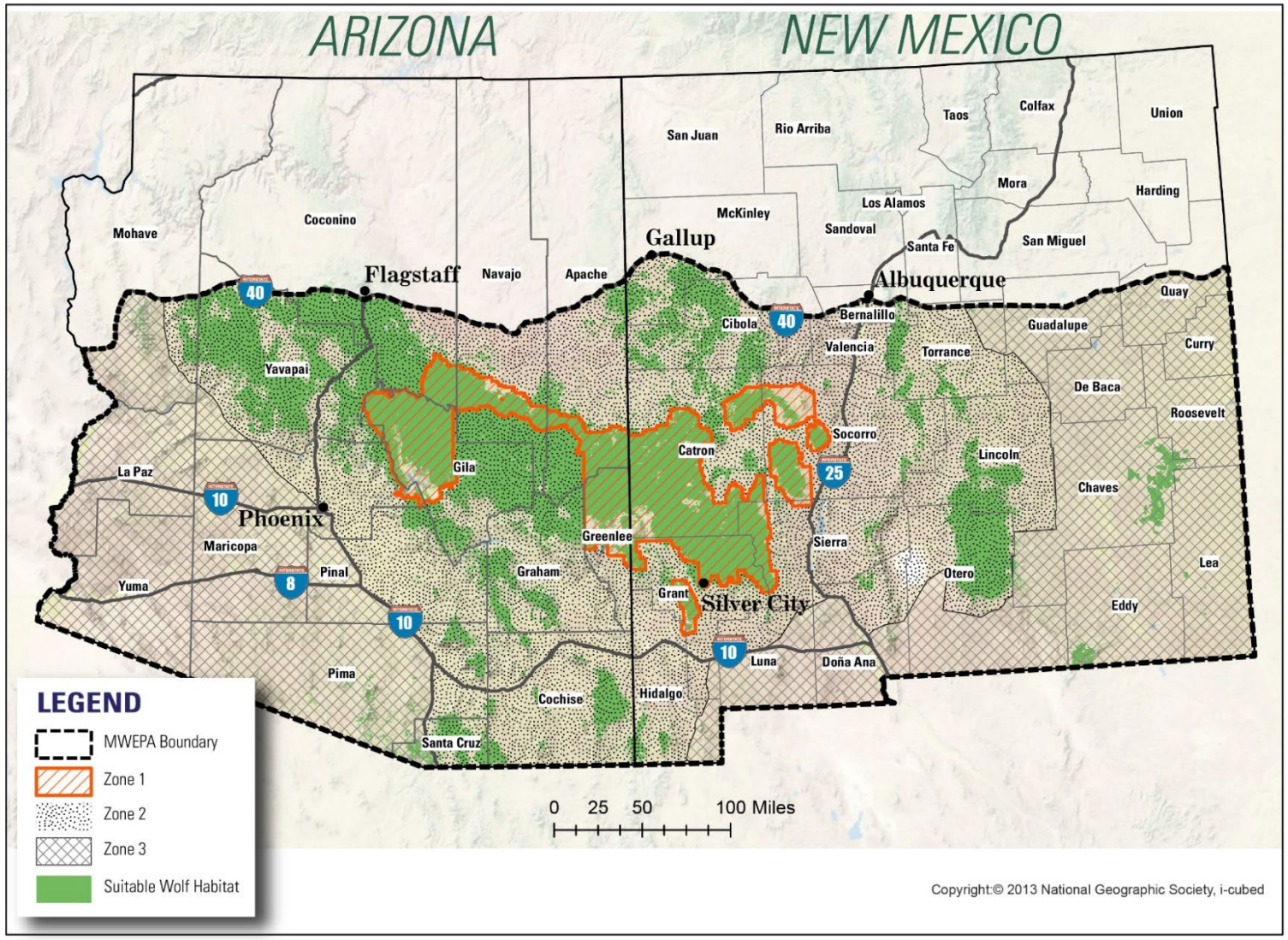


Figure 3-1. MWEPA Counties with Suitable Habitat by Management Zone in the MWEPA. (Source: USFWS)

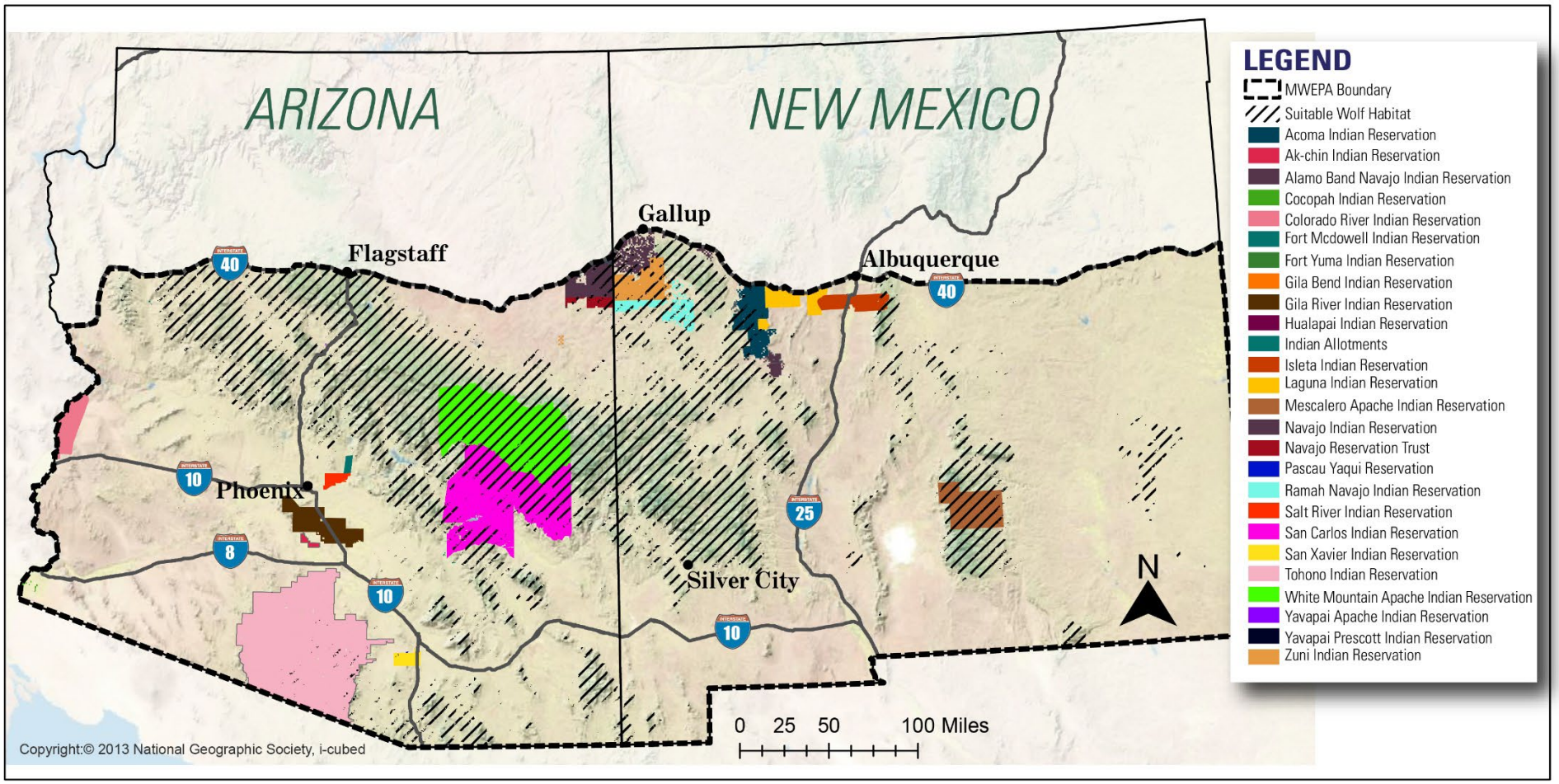


Figure 3-2. Tribal Trust Land and Suitable Mexican Wolf Habitat in the MWEPA. (Source: USFWS) (Note: Some Tribal trust land shown in the key may not visible due to the scale of the map.)

3.3 Land Use

Land use refers to the management of land by people and is regulated by plans and policies that identify the type and extent of uses allowed by the governing authorities in specific areas. Both Arizona and New Mexico have a diverse land base that reflects a mixture of tribal lands, Federal government lands, state lands, county lands, and private land (USFWS 2014). Both states have significant portions of Federal land (41.8% and 33.7% in Arizona and New Mexico respectively) and several counties in the project area have over 50 percent of their land base controlled by Federal agencies (Figure 3-3). The U.S. Forest Service and Bureau of Land Management (BLM) manage most of the Federal land in both states (Tables 3-1 and 3-2 in USFWS 2014).

Approximately 21% of the MWEPA provides suitable habitat for Mexican wolves (32,256 mi^2 (83,566 km^2)). Sixty-three percent of this suitable habitat occurs on Forest Service land and seven percent on BLM land. The final two percent occurs on other Federal land owned by the Department of Defense, the National Park Service, and the USFWS (Figure 3-3). The remaining 37 percent of suitable wolf habitat in the MWEPA occurs on state land (6%), tribal (17.5%), and private land (13%) (Figures 3-2 and 3-4). Other ownership such as private conservation lands, land owned by nongovernmental agencies and land of unknown ownership make up the remaining 0.5 percent (USFWS 2014).

Land use on public lands in the MWEPA includes activities such as natural resource management, including timber and fire management, grazing, mining, and recreation. Land use on tribal lands in the area are similar to uses across the region but is focused on individual tribal management. Livestock grazing, forest management, mining, agriculture, energy production, and recreation are common land uses, and hunting and fishing are predominant land uses for many tribes (USFWS 2014). The dominant use of State land is livestock grazing, and these areas are typically available for recreational use. State lands generate revenues from a variety of land uses, which, in addition to grazing, include agriculture, commercial use, renewable energy, oil and gas drilling, and mining (USFWS 2014). Private land holdings predominate in urban areas but there are large private ranches or small isolated parcels surrounded by federal land in rural areas in both states, with ranches typically dedicated to grazing and/or outfitting for recreational activities (USFWS 2014).

No significant changes in land ownership in Arizona and New Mexico at a scale relevant to our proposed action have occurred since the completion of the 2014 FEIS. Therefore, we incorporate by reference (40 C.F.R. 1502.21) Chapter 3.3 Land Use, which provides an overview of the landownership of Arizona and New Mexico. The information in that section remains accurate, with only minor clarifications and updates that are not directly relevant or significant to the proposed action and alternatives. Therefore, we provide those available updates for Federal land (Chapter 3.3.2.1 in the 2014 FEIS) in Appendix F as general information.

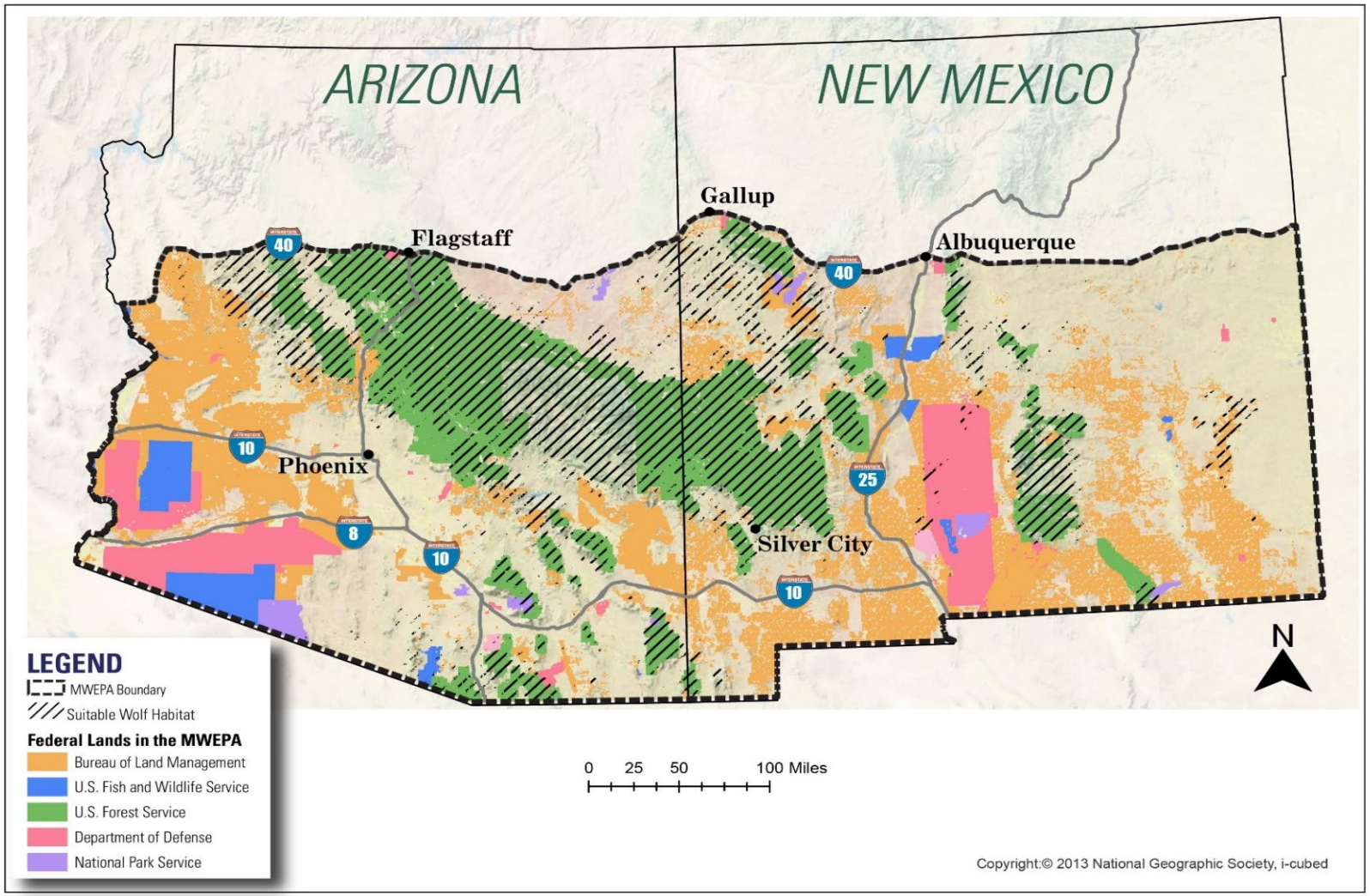


Figure 3-3. Federal Land and Suitable Mexican Wolf Habitat in the MWEPA. (Source: USFWS)

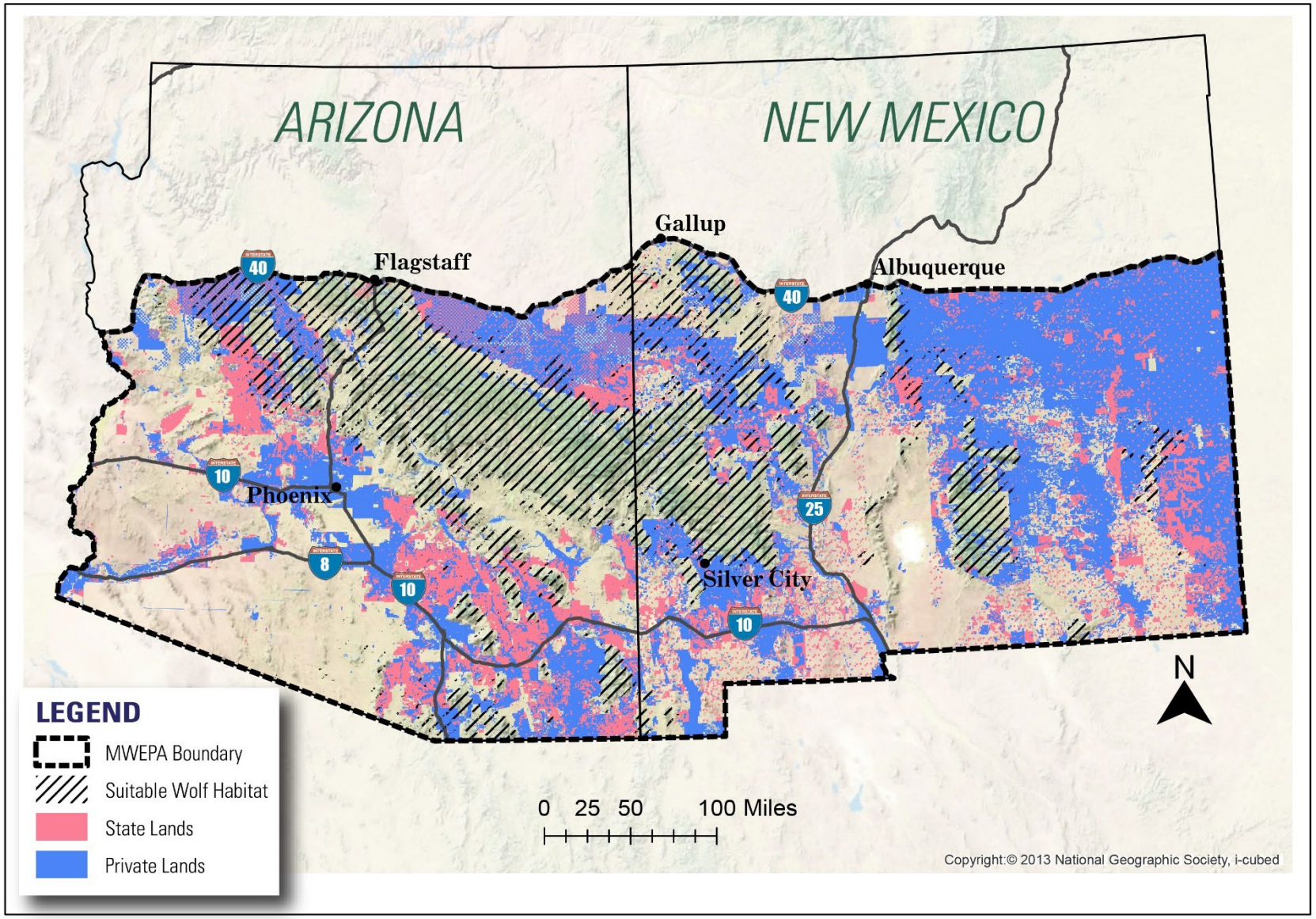


Figure 3-4. State and Private Land and Suitable Mexican Wolf Habitat in the MWEPA. (Source: USFWS)

3.4. Biological Resources – Wild Ungulate Prey Species

Biological Resources refers to the flora (vegetation) and fauna (wildlife) that may occupy the project area, including protected or special status species. Mexican wolves may interact with several species, but their primary direct interactions are with elk, their primary source of prey. Elk comprise 77 to 80 percent of Mexican wolves' diet by mass in the MWEPA (Reed et. al 2006; Merkle et al. 2009). Mexican wolves occasionally prey on mule deer and white-tailed deer, livestock, and non-ungulate species such as wild turkey, rabbits, beaver, porcupine, and skunks. Mexican wolves may also have competitive interactions with other predators and mesopredators that compete with the Mexican wolf for food such as mountain lions, bears, coyotes, bobcats, and foxes. Scavenger species such as ravens, eagles, coyotes, and bears, may be indirectly affected by Mexican wolves through wolf-killed carcasses resulting from predation (USFWS 2014).

In this SEIS, we focus on updating the descriptions and data from the 2014 FEIS primarily for elk, and secondarily mule deer, and white-tailed deer because as Mexican wolves' primary sources of prey (in particular, elk) these species may be affected by our proposed action or alternatives, specifically the revision of the take provision for take in response to unacceptable impacts to wild ungulates. We do not provide updated data or analysis for species that are not a primary or significant prey item because the proposed action and alternatives will not result in changes to Mexican wolf distribution or abundance beyond that described in the 2014 FEIS that would affect the extent to which Mexican wolves interact with or prey on these species. Similarly, we do not describe or analyze impacts to species that may have competitive or indirect interactions with Mexican wolves because the proposed action and alternatives will not result in changes to Mexican wolf abundance or distribution that will alter the interactions previously described and assessed in the 2014 FEIS. We incorporate by reference (40 C.F.R. 1502.21) Chapter 3.4 of the 2014 FEIS in its entirety, as it provides pertinent background information related to biological resources such as climate, vegetation, previous wildfire activity, and information on species that may interact with Mexican wolves, but the interactions are not germane to the proposed action and alternatives in this SEIS. We also incorporate by reference (40 C.F.R. 1502.21) Appendix A: Special Status Species in the 2014 FEIS, which provides a list of special status species with which the Mexican wolf may interact. The information in the appendix remains accurate.

3.4.1 Elk

Elk are abundant in Arizona and New Mexico, inhabiting mixed habitat types including mountain meadows, Ponderosa pine woodlands, spruce-fir forests, and other high elevation habitats between 7,000-10,500 feet (ft) (~2134-3200 meters (m)) in elevation. They forage on grasses, sedges, aster, goosefoot, bear grass, erigonums, lupines, and other montane plants (Boyce et al. 2003).

In Arizona, an estimated elk population of 44,000 pre-hunt adults and young inhabit the MWEPA south of Interstate 40 (I-40) (AZGFD, 2019 data), distributed primarily in an east-west band across the Mogollon Rim (Figure 3-5). As reported in the 2014 FEIS, trends in bull to cow ratios and cow to calf ratios, which can be used as an indicator of population productivity, within the Arizona portion of the MWEPA have been relatively stable during the last decade with normal annual fluctuations. The number of calves per 100 cows has been within the 30 to 40 calves per 100 cow range for standard management for most of the last decade, with a few years rising above Arizona Game and Fish Department's guideline range for recruitment (A. Munig, AZGFD, pers. comm. 2021). Most herds are managed to maintain 25–35 bulls per 100 cows. The elk population within the MWEPA in Arizona has been within and below that range since 2002.

AZGFD's 2019 management objective for 5 elk herd units (Units 1, 3A, 3C, 4A, 4B, and 27) is to "stabilize or slightly increase" and to "stabilize" at current levels for all other herd units (including Units 3B, 5A, 5B, 6A, 6B, 8, 16A, 19A, 21, 22, 23, and 24A) (A. Munig, AZGFD, pers. comm. 2021). Although elk are managed at the unit level or within subunits thereof, AZGFD groups several units into very general herds based on proximity, similarities of vegetation, and similar population performance for the purpose of monitoring elk across the larger landscape (Table 3-1). None of these clustered herd units are discrete; interchange occurs among them or with adjacent tribal lands.

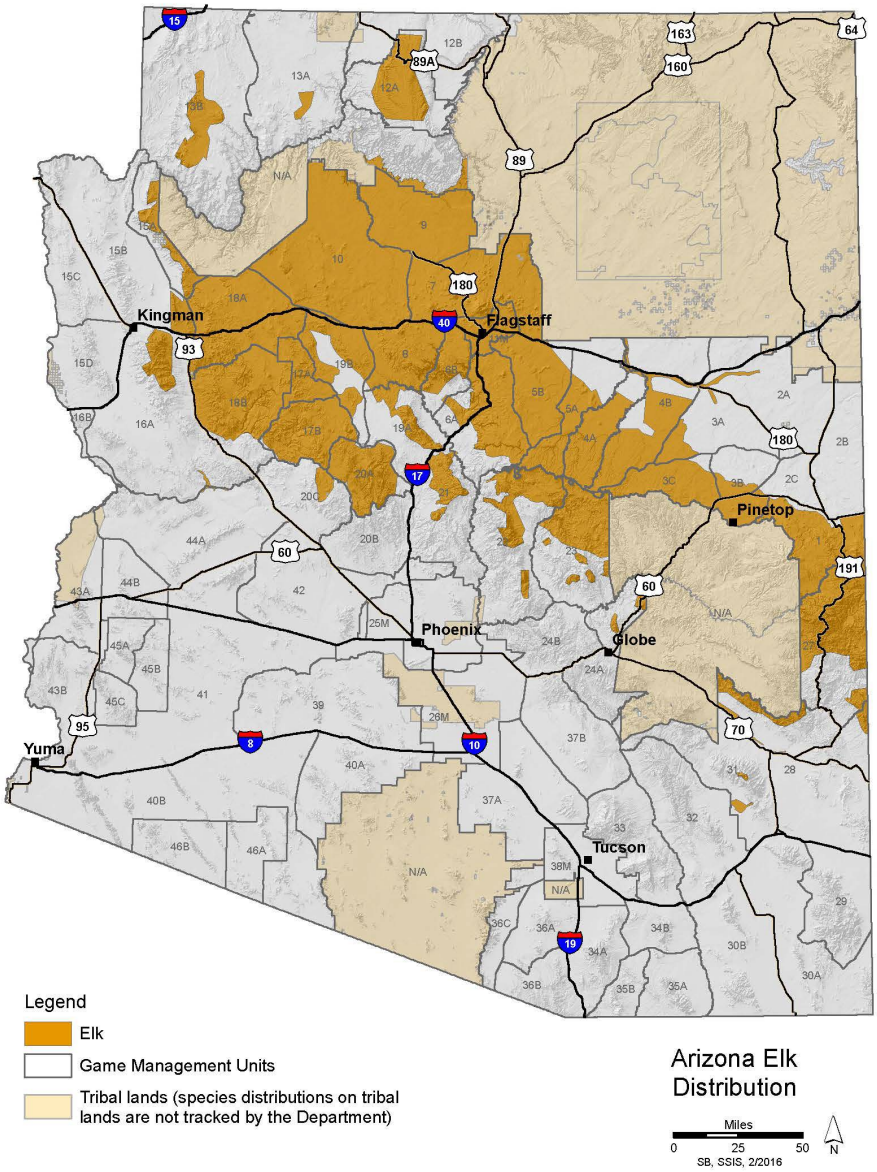


Figure 3-5. Arizona Elk Distribution, 2019. (Source: AZGFD, 2019 data)

Table 3-1. Elk population estimates (2019) and demographic ratios of 10 "herd units" in the Arizona portion of the MWEPA. (Source: AZGFD, 2019 data)

Herd Unit (Arizona)	2019 Population Estimate	Bulls:100 Cows	Calves:100 Cows
1/2B/2C/27	11,514	28	31
3A/3C	2,008	39	52
3B	250	-	-
4A	2,550	15	31
4B	684	29	29
5A/5B/6A	13,899	29	28
6B/8	5,212	37	41
16A	50	-	-
17AB/18AB/19AB/20A/20C	500	-	-
21/22/23	6,421	39	33

In New Mexico, 39,200 to 47,600 elk occur within defined herd units south of I-40 (NMDGF unpublished data 2019). New Mexico Department of Game and Fish (NMDGF) previously estimated elk in these herds at 28,800 to 38,700 animals (USFWS 2014). However, improvements in survey methodology in conjunction with additional herds being quantified since 2014 contribute to the apparent increase in elk numbers. Elk herds south of I-40 are stable to slightly increasing, with individual variation among these herds. The current management objective for elk across New Mexico is to maintain stable population sizes (N. Tatman, NMDGF, pers. comm. 2021).

Elk are the most numerous ungulate in southwestern New Mexico and occur in four defined herd units totaling 31,500 to 40,000 elk (NMDGF, 2018 data) (Figure 3-6). The largest population is the Gila herd (estimated as 22,300-26,900 elk), followed by the Fence Lake (3,400-6,000), Datil (3,600-4,500), and San Mateo herds (2,000-2,600 animals). The San Mateo herd remains stable and the Gila, Fence Lake and Datil herds are stable to slightly increasing (NMDGF unpublished data 2019). Elk can also be found on the periphery of the Gila, Datil, and San Mateo herds (in Game Management Units 21A and 23). However, these units are surveyed infrequently due to their low elk densities, so reliable data are not available for these areas.

In the 2014 FEIS, we provided data on three elk herds in the southwestern quadrant of the state (Gila, San Mateo, and Datil). Since then, NMDGF defined the Fence Lake herd as an individual herd and now attributes survey data to this herd. The Fence Lake herd, which is north of the Gila herd and northwest of the Datil herd in Catron, Cibola, and McKinley counties, are animals that have been on the landscape but were previously included in other herd data rather than being defined as a herd. For this reason, current ungulate data at the herd level in this FSEIS is not directly comparable to previous herd data from the 2014 FEIS for this area.

In south central New Mexico, elk occur in the Sacramento Mountains in Otero and Lincoln counties and on the Mescalero Apache Indian Reservation. North of the Reservation, the elk are defined by NMDGF as the Ruidoso herd; south of the Reservation they are defined as the Sacramento herd. Both herds are stable or increasing, with current herd sizes estimated at 3,300 to 6,600 animals and 6,000-7,000 animals, respectively (NMDGF unpublished data 2019). Approximately 4,500 elk were estimated to occur on the Reservation in 2010; a current estimate is unavailable. NMDGF has not surveyed the Capitan herd, which is north of the Ruidoso herd,

recently and still estimates the population at 700-1000 animals (USFWS 2014, Chapter 3, p. 49, and N. Tatman, NMDGF, pers. comm. 2021) (Table 3-2). Elk are also present on Laguna Pueblo in central New Mexico.

The wolf to elk ratio for the MWEPA in 2020 was 2.55 wolves per 1,000 elk, based on a minimum population in the MWEPA of 186 Mexican wolves. As described in Chapter 2, this ratio provides an indication of predation pressure on elk. In the 2014 FEIS, the wolf to elk ratio in 2014 was 2.56 wolves per 1,000 elk based on the Mexican wolf minimum population of 80 wolves in the Blue Range Wolf Recovery Area (USFWS 2014). We estimated that the wolf to elk ratio would be between 2.04 and 2.36 in 2020 based on an expected population size of 162 in suitable habitat in the MWEPA (USFWS 2014, Appendix D, Table D-2). Therefore, our current wolf to elk ratio of 2.55 wolves per 1,000 elk is slightly higher than the estimate we made in 2014.

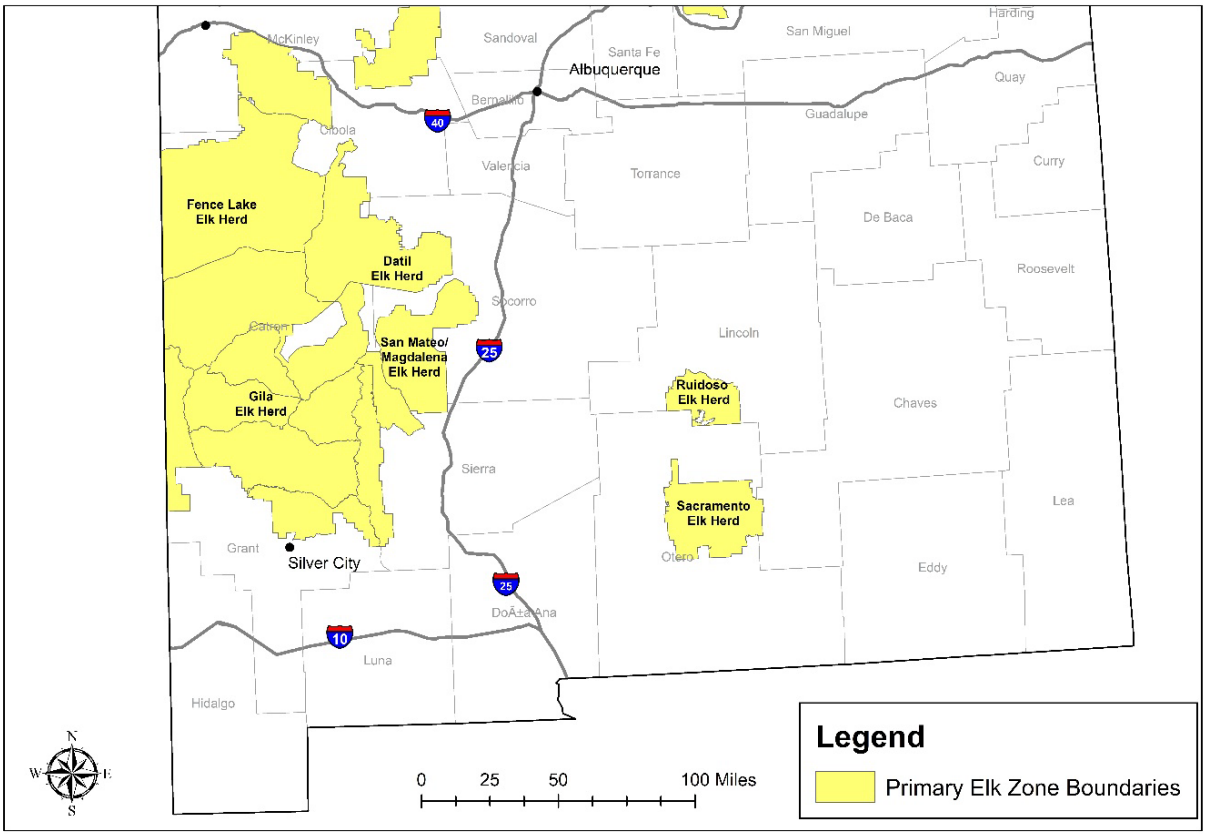


Figure 3-6. Elk Distribution in Southwestern New Mexico. (Source: NMDGF, 2018 data)

Table 3-2. Updated Elk Herd Population Estimates in New Mexico in the MWEPA. (Source: NMDGF, 2019 data)

Elk Herd	**Population Estimate 2014**	**Population Estimate 2019**	**Bull to Cow *4-year average (2015-2018)***	**Calf to Cow *4-year average (2015-2018)***
Gila	17,000-21,000	22,300-26,900	38:100	36:100
Datil	2.400-4,200	3,600-4,500	33:100	32:100
San Mateo	1,700-2,800	2,000-2,600	49:100	41:100
Fence Lake	--	3,400-6,000	34:100	47:100
Ruidoso	2,600-3,900	3,300-6,600	71:100	52:100
Sacramento	4,400-5,800	6,000-7,000	49:100	49:100

3.4.2 Mule Deer

Mule deer (*Odocoileus hemionus*) are found throughout Arizona and New Mexico in the higher elevation forests and shrublands in the northern part of the state and chaparral, desert grasslands, and deserts in the southern portion. Mule deer population trajectories in the arid Southwest are primarily related to moisture events. Frequent droughts can keep population sizes relatively low; however, when there are consecutive years of appropriate precipitation mule deer populations respond quickly and increase.

Mule deer are the most abundant big game animal in Arizona, with the statewide population estimate (not including tribal lands) at 85,000-100,000 post-hunt adults in 2018 (WAFWA 2020). Mule deer are found throughout Arizona in the higher elevation forests and shrublands in the northern part of the state and chaparral, desert grasslands, and deserts in the southern portion. Mule deer are much more widespread than white-tailed deer. The mule deer population is considered secure (Subnational Status Rank S5; NatureServe Explorer 2012). The population peaked during the mid-1980s in response to favorable precipitation and good fawn survival (Watkins et al. 2007). During the 1990s the statewide population declined (Heffelfinger and Messmer 2003). In the 2000s, statewide deer populations had increased about 10–15% overall (Watkins et al. 2007), but now appears to be stable or possibly slightly declining (A. Munig, AZGFD, pers. comm. 2021). Trends in the number of bucks per 100 does in the MWEPA have been relatively stable over the last decade and generally within 20 to 30 bucks per 100 does. Recruitment, as indexed by the number of fawns per 100 does has been between 40 to 50 fawns per 100 does most of the past decade but has been slowing declining and dropped below 40 fawns per 100 does in 2018 (AZGFD, unpublished data, 2021). Consistent recruitment below 40 fawns per 100 does is normally an indicator of a declining population. Mule deer populations statewide are perhaps at 50% of the population levels observed in the mid-1980s. The large-scale fires in east-central Arizona could provide improved nutrition and increase deer survival, although these improvements are probably temporary as the improved habitat will likely decline in value over time.

In the southern part of the state, mule deer occupy lower Sonoran Desert and desert grassland-shrubland generally below 4,000 ft in elevation. The number of fawns per 100 does (recruitment) has been stable in this area since the mid-1990s, but at a level below what is needed to maintain a stable population. As a result, desert mule deer populations have decreased and are currently below established management objectives. Winter precipitation is the primary driver that may aid in the recovery of these populations. Nearly all desert mule deer habitat has livestock grazing as its primary use and management of vegetative resources important to deer is variable dependent on the land management agency. Grazing pressure in more arid desert mule deer habitat is generally higher than in more mesic white-tailed deer habitat at higher elevations. Trends in the number of bucks per 100 does in the MWEPA area have been relatively stable and even a little higher recently when compared to the mid-1990s. Over the last decade buck to doe ratios have been generally stable. The observed number of deer per hour of helicopter survey time has remained stable in the last decade (AZGFD, unpublished data, 2021). Desert mule deer in this area are low, but currently stable.

Mule deer are one of the most abundant big game animals in New Mexico, with a statewide population estimated at approximately 80,000 individuals (WAFWA 2020). Although mule deer declined in New Mexico in the early 1990s and 2000s, the population has stabilized in recent years, with some areas of the state experiencing mule deer population growth due to beneficial fires and moisture events. Trends in the number of bucks per 100 does in the MWEPA have been relatively stable over the last decade; they are generally within 25-35 bucks per 100 does, which meets the Department's management objectives (see Appendix F, Figure F-1). Recruitment in the MWEPA has been above 35 fawns per 100 does 6 out of the last 10 years (N. Tatman, NMDGF, pers. comm. 2020). Ratios of 35-40 fawns per 100 females are required to maintain stable populations over the long term in the Southwest while higher ratios typically indicate population growth (Heffelfinger 2006).

3.4.3 White-tailed deer

White-tailed deer can occupy a range of habitats in the western United States, including desert grassland and shrub lands, oak woodlands, and pine forests, from 2,500-10,000 feet in elevation, although they are most common in oak woodlands and on chaparral covered hillsides with oaks and pines at elevations of 4,000 to 6,000 feet (NMDGF 1993). White-tailed deer are generally found at higher elevations and in rougher country than mule deer (USFWS 1996). However, because of the interspersion of white-tailed and desert mule deer habitat, there is an extensive zone where the two species overlap (Heffelfinger 2006).

In Arizona, one species of white-tailed deer occurs, the Coues' white-tailed deer *(O.v. Couesi*). Coues' deer are most common in Arizona's southeastern mountains, inhabiting all of the sky islands south of I-10, but range up on to the Mogollon Rim and into the White Mountains. These populations are at density levels below that of several decades ago but have maintained their abundance better than desert mule deer occupying lower-elevation areas. Fawn recruitment has been slightly increasing over the last 20 years but remains at low levels. The observed number of deer/hour of helicopter survey also indicates a slow increase in the last 10 years (J. Heffelfinger, AZGFD, pers. comm. 2014). Coues' deer in the sky islands are geographically separate from the white-tailed deer occupying the Mogollon Rim and exist as subpopulations by mountain range with little interchange among them. White-tailed deer densities in central Arizona are relatively low compared to populations in their more typical habitat in the Madrean Sky Islands. Because of

their lower density and scattered distribution, they do not contribute substantially to total prey biomass. The Arizona statewide population of white-tailed deer not including tribal lands was estimated at 60,000-85,000 post-hunt adults in 2018 (AZGFD, unpublished data, 2019).

In New Mexico, Coues white-tailed deer occupy the western half of the state and Texas white-tailed deer occupy the eastern half of the state into Texas (see Appendix F, Figures F-2, and F-3). Deer populations declined throughout much of New Mexico through 2015, especially in the southern portion of the state; although population numbers remain low compared to historic levels, populations appear to be stable with some populations experiencing population growth (N. Tatum, NMDGF, pers. comm. 2020) (see Appendix F, Table F-4).

3.5 Economic Activity

Economic Activity refers to the economic conditions of the project study area. In the 2014 FEIS, the Service considered how proposed management actions for the Mexican wolf would affect the economic activities of the communities that were likely to be affected by the actions. The analysis focused on communities located in Arizona and New Mexico south of the I-40 corridor in the action area. The profiled area focused primarily on three counties in New Mexico (Catron, Grant, and Sierra) and two counties in Arizona (Apache and Greenlee) that overlapped with wolf presence in the formerly designated Blue Range Wolf Recovery Area. Economic activities most likely to be affected and discussed in the analysis were ranching activities/livestock production, big game hunting, and tourism.

The following information provides an update, to the extent that information is available, to the economic information contained in the 2014 FEIS related to ranching activities/livestock production and big game hunting. The content in the 2014 FEIS remains the appropriate and relevant economic context for our proposed action and alternatives in this FSEIS. However, since 2014, Mexican wolves have expanded their geographic range beyond the previously delineated Blue Range Wolf Recovery Area due to the new MWEPA management zones established by the 2015 10(j) rule. Consequently, we are supplementing the descriptions and analysis from the 2014 FEIS with the additional counties and state game management units where Mexican wolves have had home ranges through 2019. Mexican wolf home ranges between 1998 and 2019 have occurred in five Arizona counties (Apache, Gila, Graham, Greenlee, and Navajo) and four New Mexico counties (Catron, Grant, Sierra, and Socorro). Although we provide data at the county scale, this does not mean that Mexican wolves were present throughout these counties, as some of these counties extend north of the MWEPA boundary at I-40. For the remainder of this analysis where applicable, the counties in which Mexican wolves have had home ranges at any time between 1998-2019 will collectively be referred to as the "focal counties" so that we can differentiate them from counties in the MWEPA that have not had wolf presence and potentially associated impacts.

We incorporate by reference (40 C.F.R. 1502.21) Chapter 3.5 Economic Activity of the 2014 FEIS. We do not incorporate updated or supplemental information or analysis for the tourism industry because our proposed action and alternatives are not relevant to the tourism industry beyond the information, analysis, and impacts discussed in the 2014 FEIS.

3.5.1 Overview of Arizona and New Mexico

The 2014 FEIS began with a general overview of the larger State economies, in part, to provide context for how the presence of wolves could impose related impacts on the overall economy. Since 2010, the overall population for Arizona increased 14 percent to a current population of 7.3

million, while the population for New Mexico increased two percent to a current estimate of 2.1 million. The largest population centers in Arizona were in Maricopa County (4.5 million) and Pima County (1.0 million). Bernalillo County was the largest population center in New Mexico (680 thousand). Maricopa County and its neighbors, Pinal, and Yavapai Counties, all had double-digit increases in population over the last decade. In contrast, the counties that lie within the MWEPA, with the exception of Greenlee County's double-digit growth, experienced moderate or negative population growth (Figure 3-7).

Table 3-3 provides an update to the general socio-economic statistics presented in the 2014 FEIS; this table was presented in the 2014 FEIS to provide a general overview of the States in which the MWEPA lies. While the populations for both States grew, the overall profile of the general population has not significantly changed since 2014. Of note, is that the State of Arizona's population growth has been twice as great than the U.S. over the last decade, while the population growth for New Mexico has increased less than one-half of the national average. The 2014 FEIS stated that both Arizona and New Mexico had a higher percentage of children and older adults compared to the national average, while simultaneously experiencing lower per-capita as well as median household incomes than the national average. Both States had a higher percentage of persons living in poverty along with a higher percentage of Hispanics and Native American residents compared to the national average.

Table 3-3. General Socio-economic Profile for Arizona and New Mexico.

People American Fact Finder	**Arizona**	**New Mexico**	**USA**
Population, 2019 Estimate	7,278,717	2,096,829	328,239,523
Population, 2010 Census	6,392,017	2,059,179	308,745,538
Population, percent change 2010-2017	13.9%	1.8%	6.3%
Persons under 18 years	22.5%	22.7%	22.3%
Persons 65 years and over	18.0%	18.0%	16.5%
White persons, percent	82.6%	81.9%	76.3%
Black persons, percent	5.2%	2.6%	13.4%
American Indian and Alaska Native persons, percent	5.3%	11.0%	1.3%
Asian persons, percent	3.7%	1.8%	5.9%
Other	3.2%	2.7%	3.1%
Persons of Hispanic or Latino Origin, percent	31.7%	49.3%	18.5%
White persons not Hispanic, percent	54.1%	36.8%	60.1%
Median household income ($2018)	$56,213	$48,059	$60,293
Per capita income ($2018)	$29,265	$26,085	$32,621
Persons in poverty, percent	13.5%	18.2%	10.5%

Source: U.S. Census Bureau, State and County Quickfacts, https://www.census.gov/quickfacts. Accessed 10/06/2020.

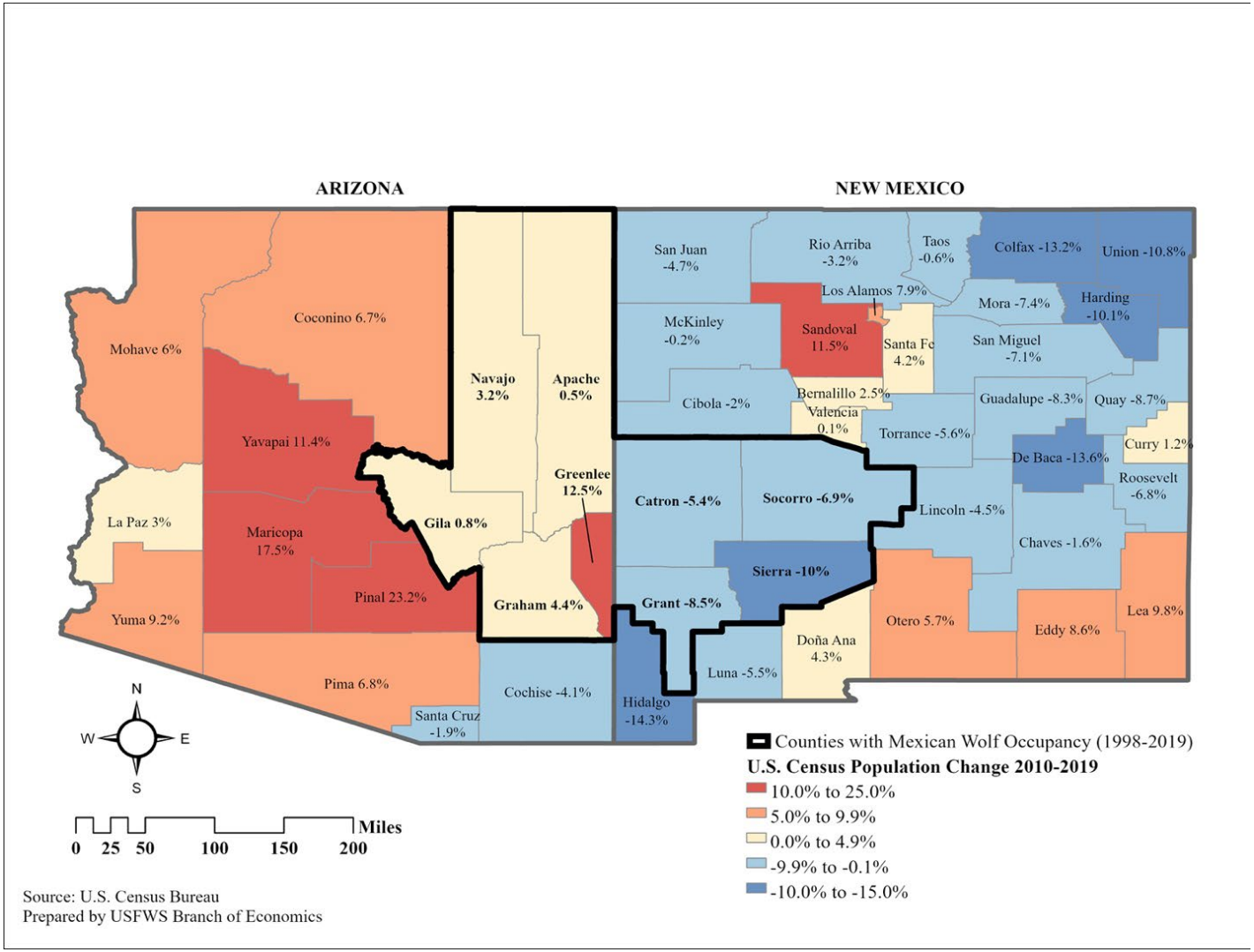


Figure 3-7. County Population Change 2010 – 2019, Arizona and New Mexico.

3.5.2 Ranching Activities/Livestock Production

Figure 3-8 shows the updated total inventory for cattle and calves in Arizona and New Mexico since 2000. New Mexico cattle production averages around 1.5 million head compared to an average for Arizona of less than one million. Combined, the States produce about 2.5 million head each year. This represents about 2.5 percent of total national production.

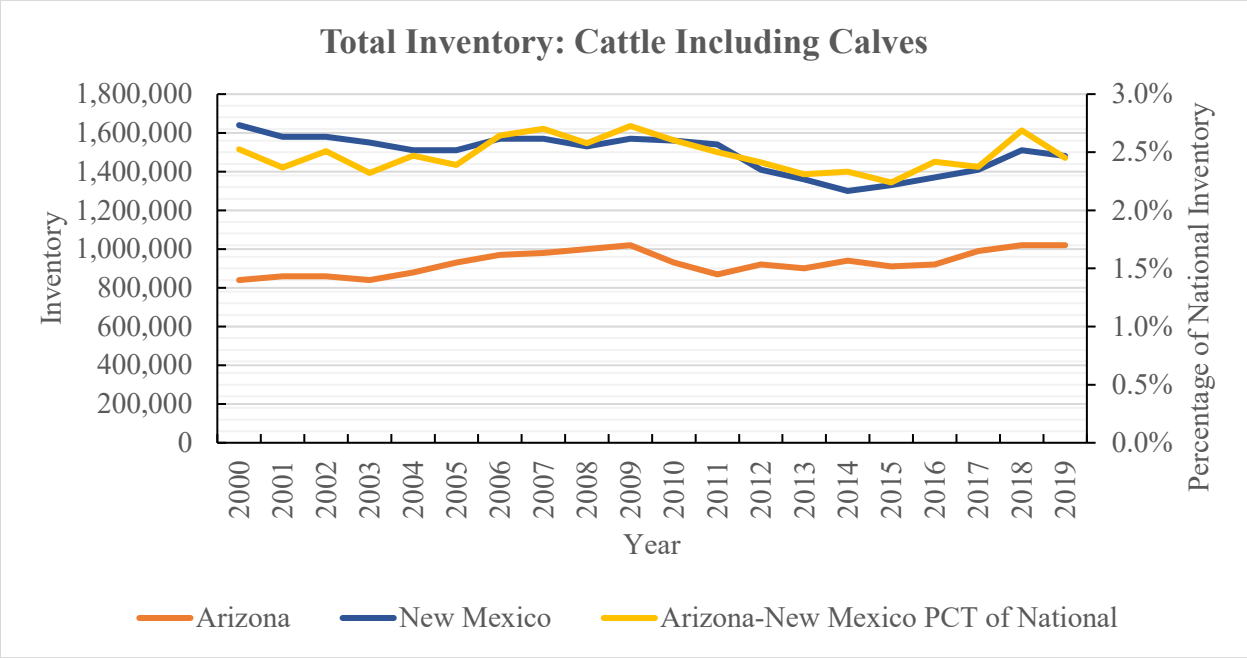


Figure 3-8. Total Inventory in Arizona and New Mexico 2000-2019: Cattle Including Calves. (Source: NASS, http://quickstats.nass.usda.gov/. Accessed on 10/07/20.)

Figure 3-9 updates the annual sales (nominal dollars) of cattle and calves for Arizona and New Mexico since 2004. From 2004-2018, combined sales have averaged nearly $1.8 billion. New Mexico sales comprise 57 percent of the total with Arizona sales accounting for the other 43 percent. New Mexico sales peaked in 2012 with a sales volume of $1.4 billion, while Arizona sales peaked two years later with a sales total of nearly $1.1 billion. 2018 sales were approximately $850 million for Arizona and $920 million for New Mexico.

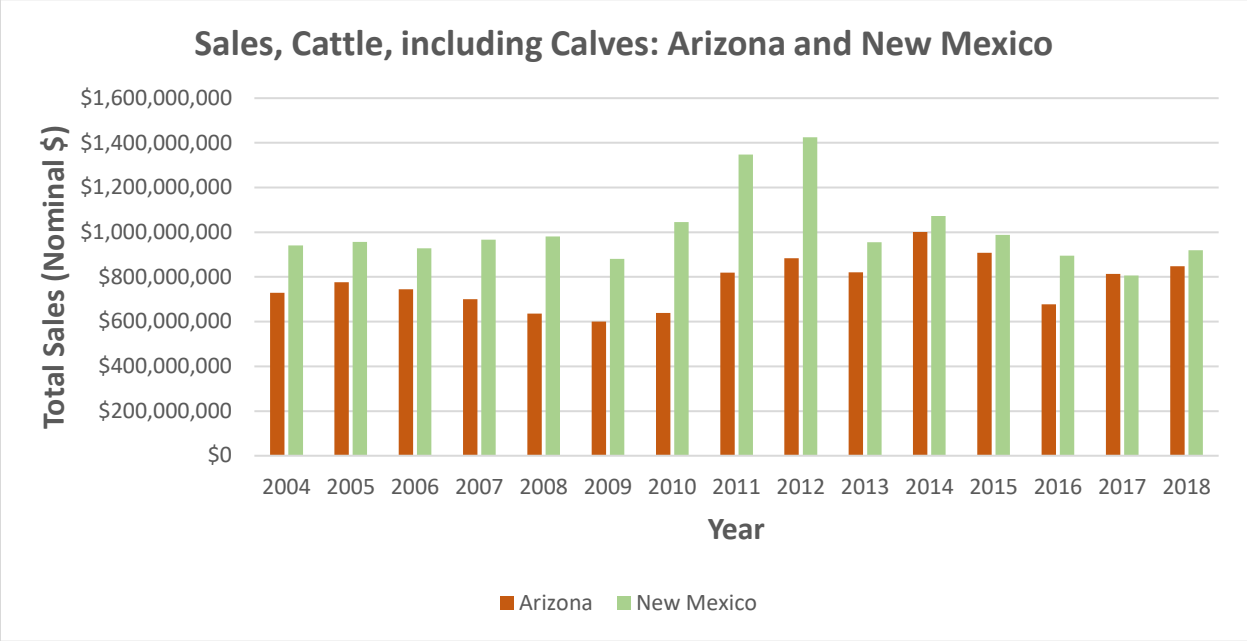
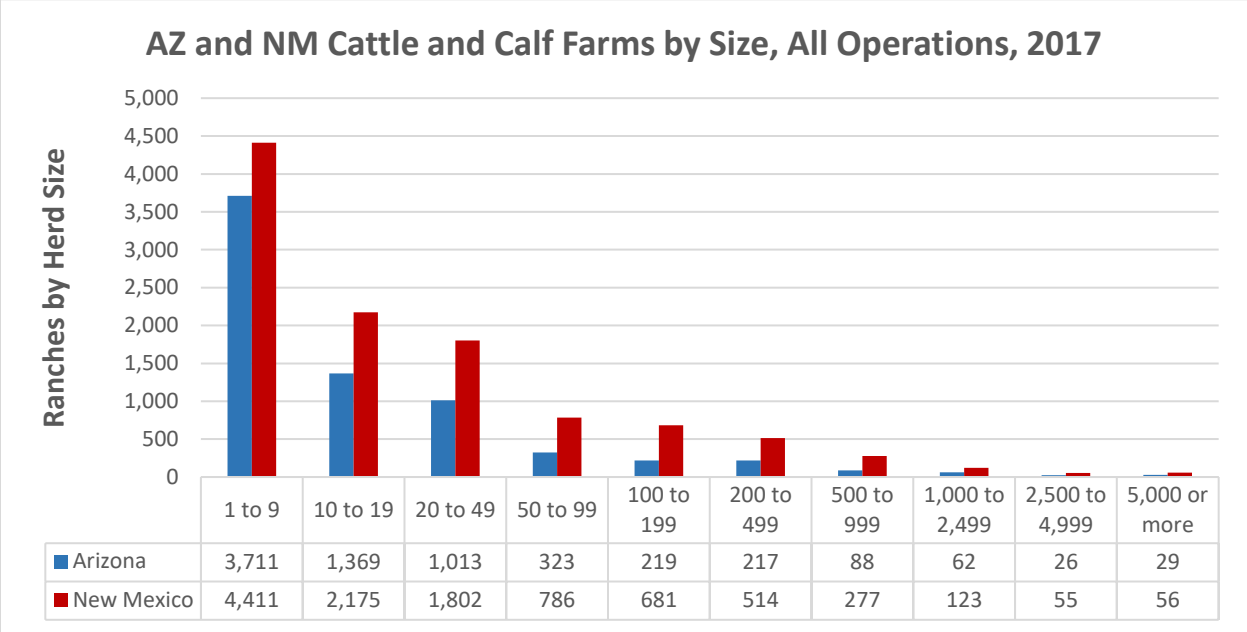


Figure 3-9. Sales Figures of Cattle and Calves for Arizona and New Mexico, 2004-2018. (Source: NASS, http://quickstats.nass.usda.gov/. Sales figures exclude inter-farm in-state sales. Sales estimates are in nominal dollars. Accessed 01/22/20.)

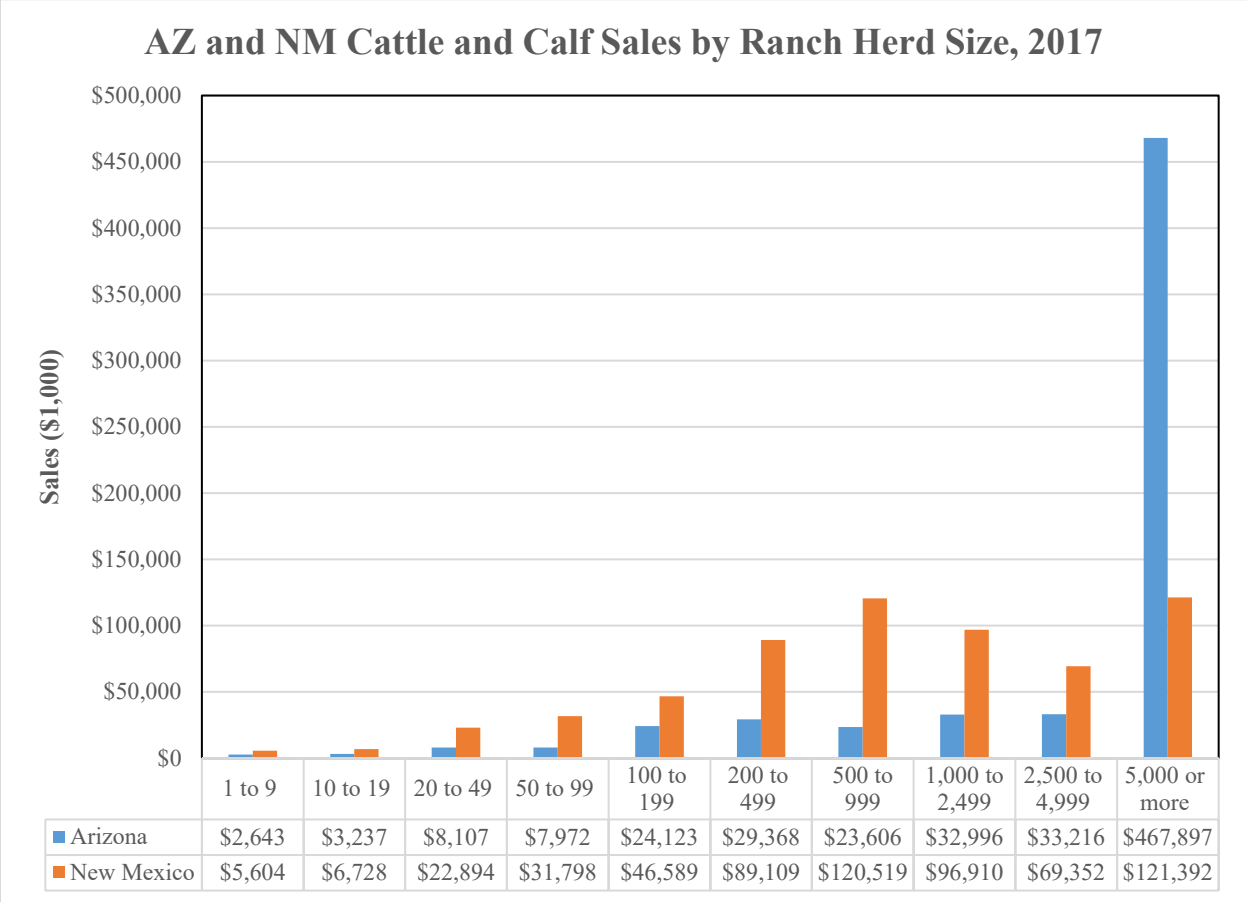
Figure 3-10 updates the distribution of cattle and calf operations by size of ranch measured in number of cattle. In 2017, Census reported a total of 7,057 cattle and calf farms in Arizona with a total herd size of 1,015,237 and in New Mexico there were 10,880 cattle and calf farms with a total herd size of 922,034. Compared to 2012, Arizona farms and cattle increased by 1,028 and 103,903, respectively, while New Mexico farms and cattle decreased by 1,916 and 432,206, respectively. Just over 85 percent of Arizona operations had a herd size of less than 50 head, while 77 percent of New Mexico operations consisted of 50 head or fewer.



	1 to 9	10 to 19	20 to 49	50 to 99	100 to 199	200 to 499	500 to 999	1,000 to 2,499	2,500 to 4,999	5,000 or more
Arizona	3,711	1,369	1,013	323	219	217	88	62	26	29
New Mexico	4,411	2,175	1,802	786	681	514	277	123	55	56

Figure 3-10. Arizona and New Mexico Cattle and Calf Farms by Size, All Operations, 2017 (Source: 2017 Census of Agriculture, accessed 10/08/2020. https://www.nass.usda.gov/Publications/AgCensus/2017/Full_Report/Volume_1,_Chapter_1_State_Level/Arizona/ https://www.nass.usda.gov/Publications/AgCensus/2017/Full_Report/Volume_1,_Chapter_1_State_Level/New_Mexico/)

In 2017, Census reported that the total value of sales for cattle and calf was $633.2 million for Arizona farms and $610.1 million for New Mexico farms. Interestingly, the largest operations in Arizona, with 5,000 or more head of cattle, represented nearly 75 percent of the State's total sales, in contrast to similar sized operations in New Mexico, which only accounted for 20 percent of the State's total sales. Figure 3-11 shows the total cattle and calf sales for farms and ranches in Arizona and New Mexico that occurred in 2017. Figure 3-12 shows the updated proportion of cattle owned and operated by size of ranch in 2017.



	1 to 9	10 to 19	20 to 49	50 to 99	100 to 199	200 to 499	500 to 999	1,000 to 2,499	2,500 to 4,999	5,000 or more
Arizona	$2,643	$3,237	$8,107	$7,972	$24,123	$29,368	$23,606	$32,996	$33,216	$467,897
New Mexico	$5,604	$6,728	$22,894	$31,798	$46,589	$89,109	$120,519	$96,910	$69,352	$121,392

Figure 3-11. Arizona and New Mexico Cattle and Calf Farm Sales by Size of Farm, 2017.
(Source: 2017 Census of Agriculture, accessed 10/08/2020. https://www.nass.usda.gov/Publications/AgCensus/2017/Full_Report/Volume_1,_Chapter_1_State_Level/Arizona/. Table 14; https://www.nass.usda.gov/Publications/AgCensus/2017/Full_Report/Volume_1,_Chapter_1_State_Level/New_Mexico/. Table 14.)

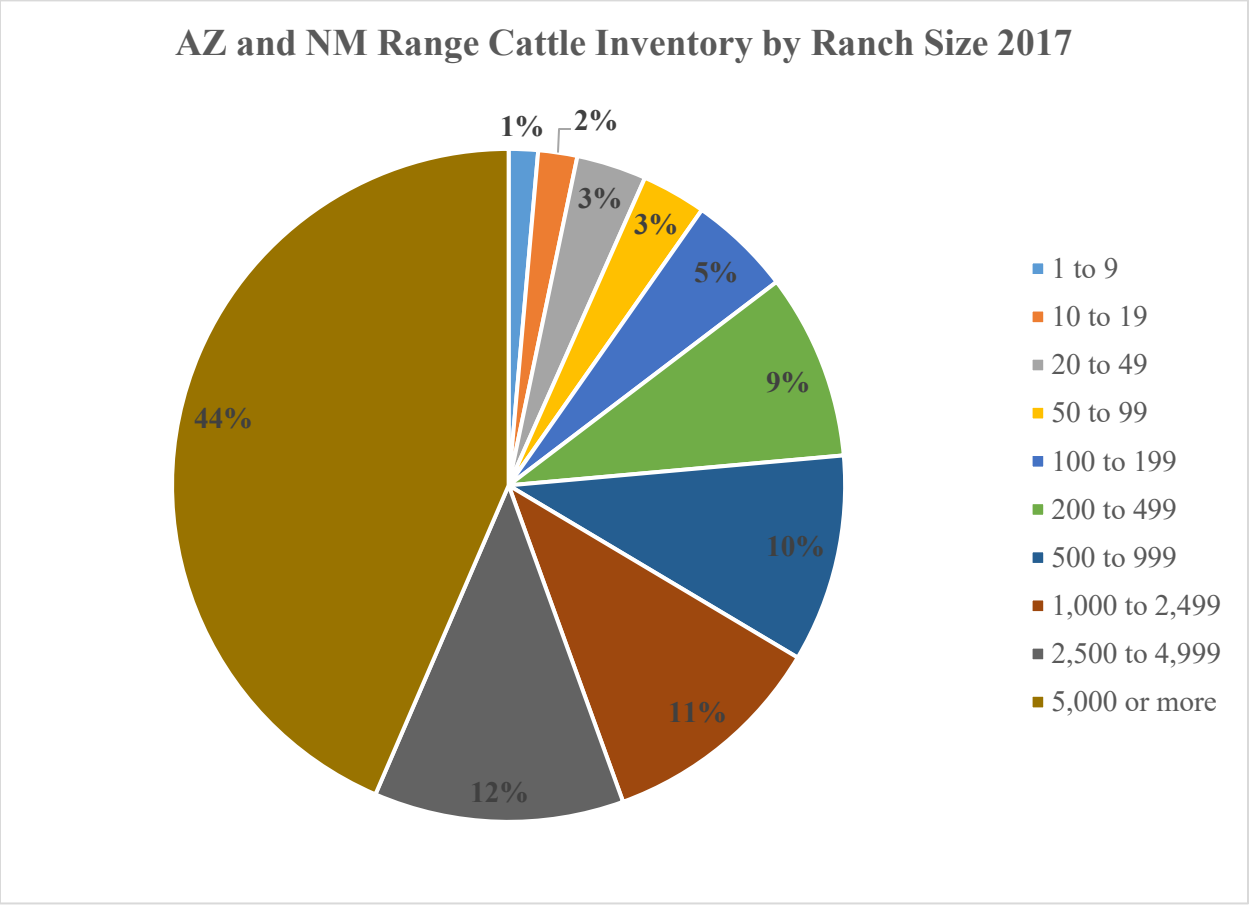


Figure 3-12. Arizona and New Mexico Inventory by Herd Size. (Source: 2017 Census of Agriculture. https://quickstats.nass.usda.gov/. Accessed October 20, 2020.)

Mexican wolf home ranges since the reintroduction began through 2019 have included parts of five counties in Arizona (Apache, Gila, Graham, Greenlee, and Navajo) and four counties in New Mexico (Catron, Grant, Sierra, and Socorro). Similar to the overall makeup for the two States, operations with less than 50 head of cattle represent over 85 percent of all the ranching operations in the focal area. In contrast, the larger operations, those with herd sizes greater than 50 head, account for over 75 percent of the cattle in the area. Out of this total, operators with 500 or more head of cattle account for nearly one-half of the total herd size in the area. Table 3-4 shows the distribution of both the number of ranches by herd size as well as the total herd size for each category of ranches, for each of the counties in the focal area for the year 2017.

Table 3-4: Cattle and Calf Herd Size and Inventory by Ranch Size for Focal Counties in the MWEPA (2017).

Herd Size	Arizona					New Mexico				Total	Pct of Total
	Apache	Gila	Graham	Greenlee	Navajo	Catron	Grant	Sierra	Socorro		
Ranches											
1-9	1,042	102	171	21	907	57	115	29	139	2,583	54.0%
10-19	439	28	26	16	316	43	42	22	49	981	20.5%
20-49	249	10	17	15	226	54	39	19	38	667	14.0%
50-99	38	9	12	8	58	18	24	10	10	187	3.9%
100-199	17	11	13	9	16	25	25	19	19	154	3.2%
200-499	11	13	15	4	9	16	13	16	19	116	2.4%
500 or more	9	10	6	4	8	13	16	8	17	91	1.9%
Total	1,805	183	260	77	1,540	226	274	123	291	4,779	100%
Inventory											
1-9	8,946	349	733	111	3,696	256	550	141	672	15,454	6.0%
10-19	11,722	355	325	210	4,197	573	544	291	661	18,878	7.3%
20-49	13,944	306	500	505	6,515	1,605	1,184	649	1,079	26,287	10.1%
50-99	5,106	605	872	534	4,042	1,266	1,747	756	661	15,589	6.0%
100-199	4,882	1,568	1,819	1,162	2,205	3,185	3,624	2,439	2,478	23,362	9.0%
200-499	7,026	3,669	4,612	1,368	2,435	5,078	4,041	4,856	5,882	38,967	15.0%
500 or more	26,364	8,262	4,898	5,605	6,656	11,278	15,369	11,135	31,088	120,655	46.6%
Total	77,990	15,114	13,759	9,495	29,746	23,241	27,059	20,267	42,521	259,192	100%

Source: NASS Quickstats, US Department of Agriculture, https://quickstats.nass.usda.gov/ Accessed October 23, 2020.

Figure 3-13 shows the most recent statistics for the total amount of both permitted and authorized grazing by the U.S. Forest Service throughout all of the National Forests and Grasslands of Arizona and New Mexico. The total number of permitted AUMs (an Animal Unit Month (AUM) is the amount of forage required to sustain one cow, either dry or with calf at up to six months of age, for one month) has been approximately 2.25 million over the previous six years. Because forage conditions change annually, the actual number of livestock authorized to graze in any single year can vary. In 2019, the Forest Service authorized 1.71 million total AUMs in the two States, down slightly from a peak of 1.81 million in 2016 and 2018. On average during this period, the Forest Service has authorized approximately 75 percent of the total allowable permitted AUMs throughout the states over the six-year period.

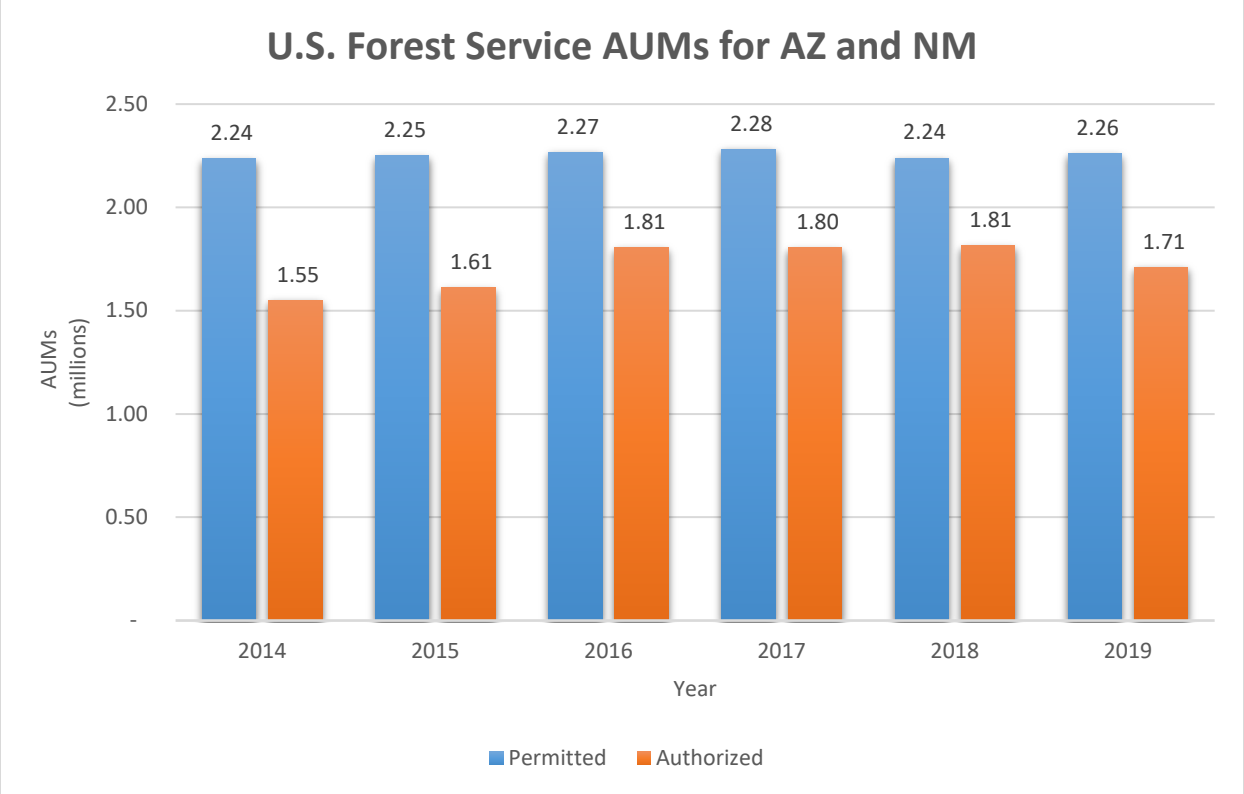


Figure 3-13. U.S. Forest Service Permitted and Authorized Use in Arizona and New Mexico. (Source: K. Sanchez, USDA Forest Service, pers.comm. 2020.)

Out of the eleven National Forests in Arizona and New Mexico, wolves occupy habitat in three National Forests as of 2019, the Apache-Sitgreaves in Arizona, and the Gila and Cibola National Forests in New Mexico. Over the six-year period, 2014 through 2019, the number of permitted AUMs has varied between 802.5 thousand in 2018 to 820.4 thousand in 2015, while the corresponding number of authorized AUMs has fluctuated between 474.0 thousand in 2014 to 587.4 thousand in 2018. On average, the total number of AUMs permitted in these three National Forests represent 36 percent of all the permitted AUMs in the two States and the authorized AUMs represent about 32 percent of the two-state authorization total. Figure 3-14 shows the number of

permitted and authorized AUMs for Apache-Sitgreaves, Gila, and Cibola National Forests from 2014 to 2019. On average during this period, authorized AUMs represent approximately 68 percent of the permitted total.

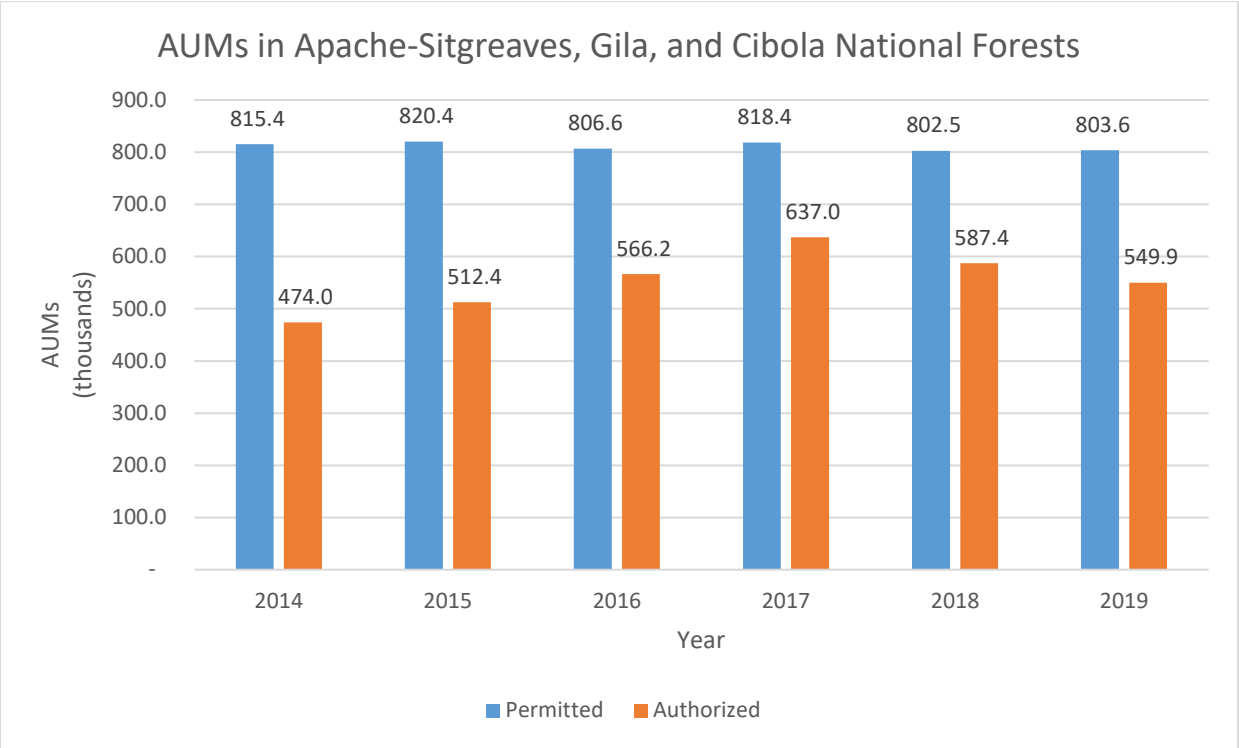


Figure 3-14. Permitted and Authorized Use in Apache-Sitgreaves, Gila, and Cibola National Forests. (Source: K. Sanchez, USDA Forest Service, pers.comm. 2020.)

Table 3-5 shows both the number of sheep and lamb ranches by herd size, as well as inventory by size of ranch for each of the focal counties for the year 2017. The overall vast majority of ranches and sheep are found in only two counties – Apache and Navajo Counties in Arizona. Combined, these two counties account for 97 percent of all ranches and sheep within the entire focal area.

Table 3-5: Sheep and Lamb Herd Size and Inventory by Farm Size for Focal Counties in the MWEPA (2017).

Herd Size	Arizona					New Mexico				Total	Pct of Total
	Apache	Gila	Graham	Greenlee	Navajo	Catron	Grant	Sierra	Socorro		
Ranches											
1-24	2,637	11	6	6	1,802	15	18	15	101	4,611	74.7%
25-99	818	-	-	2	636	2	2	-	13	1,473	23.9%
100-299	57	-	1	4	26	-	-	-	-	88	1.4%
300-999	2	-	-	-	-	-	-	-	-	2	0.0%
Total	3,514	11	7	12	2,464	17	20	15	114	6,174	100%
Inventory											
1-24	26,815	68	n/a	n/a	19,359	n/a	n/a	116	1,245	47,603	42.3%
25-99	34,212	-	-	n/a	25,222	n/a	n/a	-	757	60,191	53.8%
100-299	n/a	-	n/a	688	3,186	-	-	-	-	3,874	3.9%
300-999	n/a	-	-	-	-	-	-	-	-	n/a	0.0%
Total	61,027	68	n/a	688	47,767	n/a	n/a	116	2,002	111,668	100%

"n/a" is used to represent data that is withheld the by the USDA Census in order to avoid the disclosure of data for individual farms; (-) represents zero; Source: NASS Quickstats, US Department of Agriculture, https://quickstats.nass.usda.gov; Accessed October 23, 2020.

3.5.3 Big Game Hunting

Table 3-6 provides an update for the total number of license holders, days of participation, expenditures, and average expenditures for hunting activities throughout Arizona and New Mexico. The number of total licenses sold for hunting activities is reported by each State. Participation and expenditure estimates are based on reports found in the 2011 National Survey of Hunting, Fishing, and Wildlife-Associated Recreation (NSFHWR). For the purposes of updating these estimates for 2019, the 2011 ratio of participation and expenditures by license holder were assumed constant between 2011 and 2019. The latest NSFHWR survey conducted in 2017 was unable to update these particular estimates. The State of Arizona reported a significant increase in the number of licenses sold since 2011 (61.8 percent), while New Mexico reports a much smaller increase in sales (4.1 percent).

Table 3-6: Hunting Activity in Arizona and New Mexico, 2011, 2019.

State		2019	2011	Pct Change
Arizona	License Holders	310,392	191,834	61.8%
	Days of participation	3,039,303	2,634,000	15.4%
	Total expenditures	$623,012,439.62	$385,045,260	61.8%
	Average expenditure per license holder	$2,007	$2,007	0.0%
New Mexico	License Holders	106,661	102,463	4.1%
	Days of participation	964,980	927,000	4.1%
	Total expenditures	$165,265,537	$158,760,960	4.1%
	Average expenditure per spender	$1,549	$1,549	0.0%
Note: License Holders reported by State. 2011 Days of Participation and Total Expenditures reported in 2011 National Survey Tables 14 and 16. Dollars converted to 2019 end of year using CPI calculator.				
Source: U.S. Department of the Interior, U.S. Fish and Wildlife Service, and U.S. Department of Commerce, 2011 and National Hunting License Data, US Fish and Wildlife Service, 2019. State reports are not available for 2016 National Survey. U.S. Census Bureau. 2011 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation. Tables 2, 13, and 16.				

In Arizona, there were 70,146 first choice applicants for the general elk hunt in 2016 (AGFD 2017) from which there were 15,439 elk harvest permits issued. In 2016, 6,784 elk were harvested in the State, which represents an overall success rate of 44 percent per hunter on average. The success rate has been steadily rising over the years since hitting a low point of 31 percent in 2010. During this period, the number of elk hunters has declined by several thousand from its high of 18,021 in 2010 but the actual harvest number has increased from 5,574 in 2010 to 6,784 in 2016. The trends in deer hunting follow a similar pattern. Table 3-7 summarizes the annual number of hunters, harvest, and success rate for both elk and deer for the years 2000 – 2016, which reflect the most recent data available. Figure 3-15 illustrates the changing annual success rate for Arizona elk and deer hunting. It is important to note that the number of harvest permits issued is influenced by several factors as established in the Arizona Game and Fish Commission-adopted hunt guidelines to meet specific management objectives for these big game species.

Table 3-7: Arizona Big Game Hunting, 2000-2016.

Year	Elk			Deer		
	Hunters	**Total Harvest**	**Percent Success**	**Hunters**	**Total Harvest**	**Percent Success**
2000	14,940	7,415	50%	41,677	9,334	22%
2001	17,628	7,330	42%	41,110	9,218	22%
2002	15,767	6,349	40%	38,368	8,135	21%
2003	12,983	5,240	40%	33,905	7,690	23%
2004	14,399	6,112	42%	33,395	8,552	26%
2005	15,254	5,854	38%	34,883	8,571	25%
2006	15,773	6,544	41%	35,016	8,969	26%
2007	16,189	6,502	40%	37,002	9,750	26%
2008	16,968	6,715	40%	38,770	10,309	27%
2009	17,408	6,741	39%	40,468	11,528	28%
2010	18,021	5,574	31%	40,584	9,940	24%
2011	15,815	6,301	40%	40,142	9,884	25%
2012	15,178	5,735	38%	39,435	10,265	26%
2013	16,180	6,123	38%	38,928	10,213	26%
2014	15,986	6,291	39%	38,486	9,926	26%
2015	15,946	6,584	41%	38,320	12,881	34%
2016	15,439	6,784	44%	38,373	13,644	36%

Source: Hunt Arizona 2011 and 2017, Survey, Harvest and Hunt Data for Big and Small Game. Arizona Fish and Game Department.

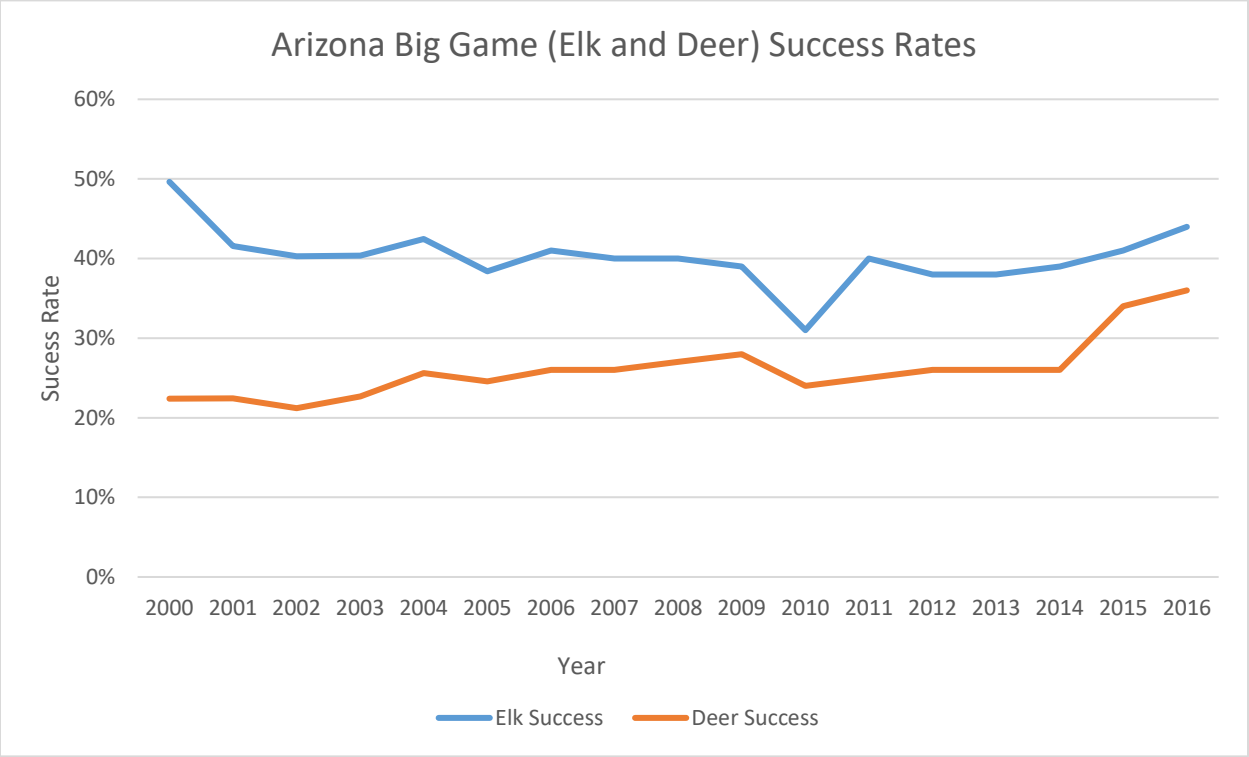


Figure 3-15. Big Game Arizona Hunting Success Rates, 2000 – 2016. (Source: Hunt Arizona 2017, Survey, Harvest and Hunt Data for Big and Small Game. Arizona Fish and Game Department)

Table 3.8 provides State-level data for elk and deer hunting in New Mexico from 2000 to 2019. This data includes the total number of hunting licenses issued, total harvest, and success rates. Figure 3-16 charts elk and deer hunting success rates over this period. Importantly, while the State collected and reported data for all of these years, the State changed its reporting requirements in 2006, making it difficult to directly compare statistics before and after 2006. Nonetheless, because the data have been collected and reported by the State, we include it in our report.

From 2000 to 2005, elk hunting success rates in New Mexico remained between 0.37 to 0.41. After a high success rate of 0.41 in 2005, the success rate dropped to 0.27 in 2006. Hunting licenses issued over these two years dropped from 37,561 in 2005 to 31,998 in 2006. Since the 2006 low, elk hunting success rates have increased to 0.40 in 2019. Over this period, issued licenses have increased steadily from 31,998 to 37,050 in 2019, a 15.8 percent increase.

The deer hunting success rate from 2000 to 2019 in New Mexico was at its lowest period from 2000 to 2006. Hunting success was at its lowest rate of 0.18 in 2005. Success increased to 0.33 in 2007. From 2008 to 2014 success rates decreased with a low of 0.23 in 2011. The deer hunting success increased in 2015 and 2016, peaking at 0.35 in 2017. Success dropped to 0.33 in 2018 and 2019. New Mexico Fish and Game issued 75,942 deer hunting licenses in 2000. By 2019, total license sales would decrease over the previous 19-year span by 51.2 percent to 36,990.

Figure 3-16 shows the trend in annual hunter success rates for both elk and deer from 2000 through

2019 for the state of New Mexico. Since 2006, when the State adopted new reporting requirements, hunter success rates are shown to be consistently increasing for both species. It is important to remember, however, that the State does not explicitly manage big game hunts to maximize license sales or hunter success rates. Instead, state games agencies, including NMDGF, focus on managing maximum sustainable herd sizes within particular areas. Thus, state agencies will vary the annual number of hunters and their associated likely success rates on an annual basis to maintain the pre-determined optimal herd sizes.

Table 3-8. New Mexico Deer and Elk Hunters and Harvest

Year	Elk				Deer		
	Hunters	Harvest		Success	Hunters	Harvest	Success
		Bulls	Cows				
2000	31,487	6,340	5,952	0.39	75,942	16,789	0.22
2001	24,390	6,063	3,979	0.41	53,586	14,027	0.26
2002	35,614	7,440	5,573	0.37	49,507	11,185	0.23
2003	37,668	7,420	6,781	0.38	48,396	9,066	0.19
2004	38,881	8,031	7,181	0.39	41,365	8,627	0.21
2005	37,561	8,336	7,151	0.41	40,325	7,184	0.18
2006	31,998	5,071	3,414	0.27	43,990	9,206	0.21
2007	27,273	5,588	3,189	0.32	39,858	13,178	0.33
2008	30,391	5,915	4,260	0.33	41,410	11,948	0.29
2009	31,543	5,915	4,260	0.32	42,618	13,205	0.31
2010	32,573	6,590	5,015	0.36	41,328	10,560	0.26
2011	32,822	6,567	5,101	0.36	41,123	9,630	0.23
2012	34,020	7,356	5,686	0.38	40,527	10,099	0.25
2013	35,982	7,881	6,238	0.40	38,301	8,633	0.25
2014	36,582	7,851	6,383	0.39	39,314	9,386	0.26
2015	36,374	8,002	6,553	0.37	36,619	10,773	0.34
2016	36,936	7,938	6,668	0.39	36,651	10,898	0.34
2017	36,704	8,366	6,021	0.39	36,220	11,316	0.35
2018	36,885	8,048	6,390	0.39	36,395	10,701	0.33
2019	37,050	7,840	5,954	0.40	36,990	10,661	0.33

Source: N. Tatman, NMDGF, pers.comm. 2020.
Note: Due to reporting changes initiated in 2006, previous year data is not directly comparable to years afterwards.

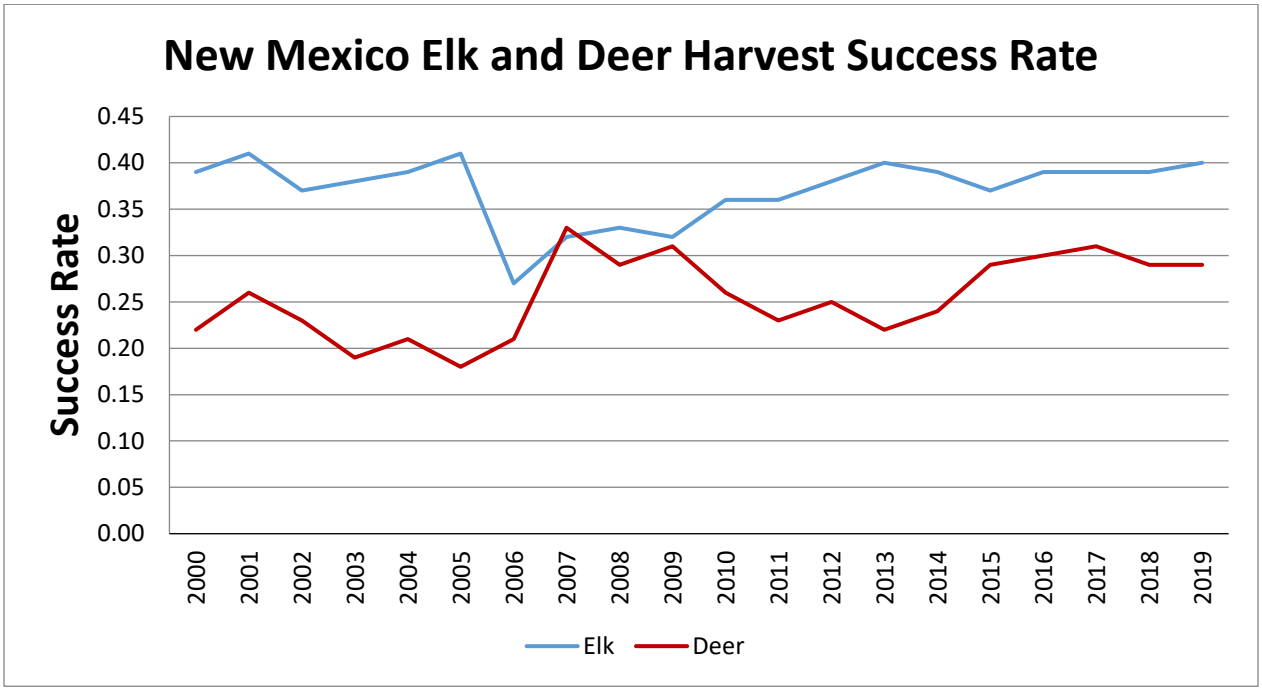


Figure 3-16. New Mexico Elk and Deer Harvest Success Rate, 2000-2019 (Source: N. Tatman, NMDGF, pers.comm. 2020. Note: Due to reporting changes initiated in 2006, previous year data is not directly comparable to years afterwards.)

The State game and fish agencies in Arizona and New Mexico are responsible for managing game resources within the States. The majority of habitat known to have or had Mexican wolf home ranges since their release in 1998 through 2019 consist of five game management units (GMUs) in Arizona (GMU 1, 2B, 2C, 3B, and 27) and 14 in New Mexico (GMU 12, 13, 15, 16A, 16B, 16C, 16D, 16E, 17, 21A, 21B 22, 23, and 24) for a total of 19 units. This list includes three additional units in AZ (GMU 2B, 2C, and 3B) and seven in NM (GMU 12, 13, 16E, 17, 21B, 22, and 24) that were not included in the 2014 FEIS. Since that time, Mexican wolves have been known to have expanded their range into these additional units. Figure 3-17 shows the location of GMUs known to have wolf occupancy and that will be included in this revised analysis.

Figure 3-17. Game Management Units with Known Mexican Wolf Home Ranges Through 2019. (Source: Arizona Game and Fish Department, New Mexico Department of Game and Fish, U.S. Census Bureau, Oregon State University, USFWS Branch of Economics)

Figure 3-18 updates the number of licensed elk hunters and the numbers of cows and bulls harvested over the period from 2007 to 2019 in the MWEPA in New Mexico. Bull elk continue to account for most of the total harvest.

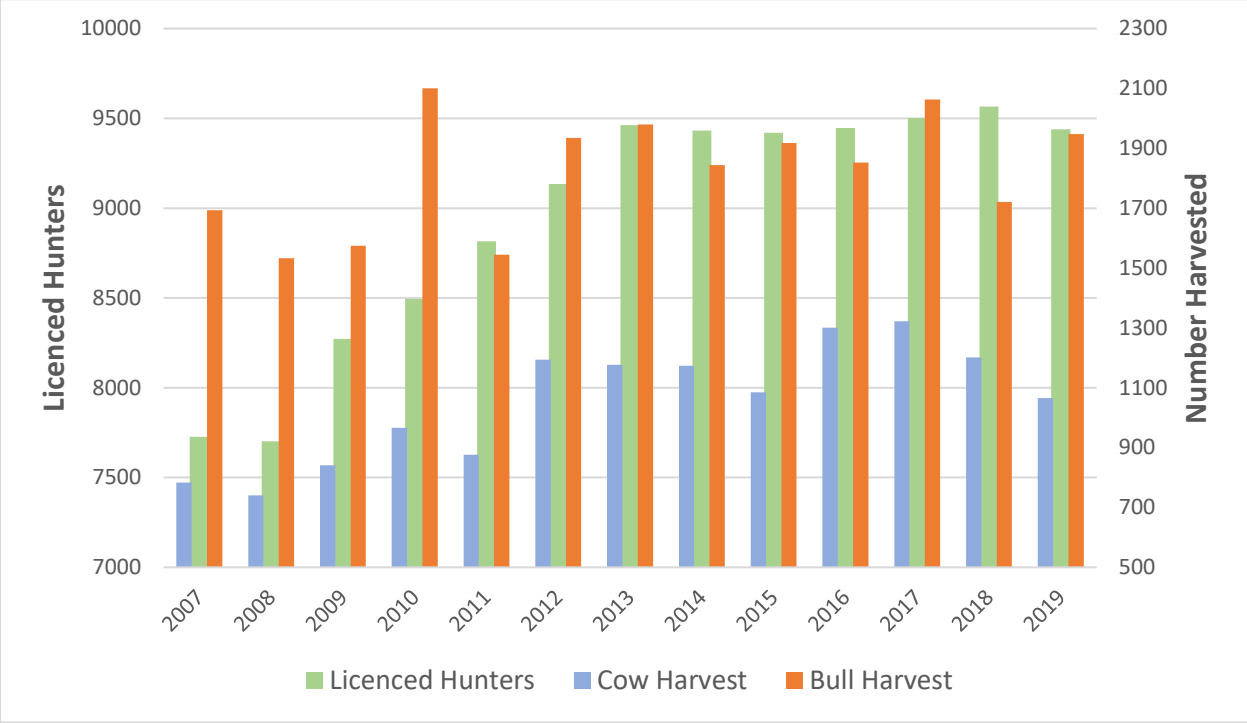


Figure 3-18. New Mexico MWEPA Hunters and Elk Harvest (Source: N. Tatman, NMDGF, pers.comm. 2020.)

Figure 3-19 illustrates the updated overall annual success rate for elk hunters by GMUs with wolf presence in New Mexico from 2007 to 2019. Overall success rate is calculated as the number of harvested elk divided by the number of licenses allocated during the hunt season. (Note: Elk hunts did not occur within GMU 24 during the 2007 and 2008 hunt seasons.)

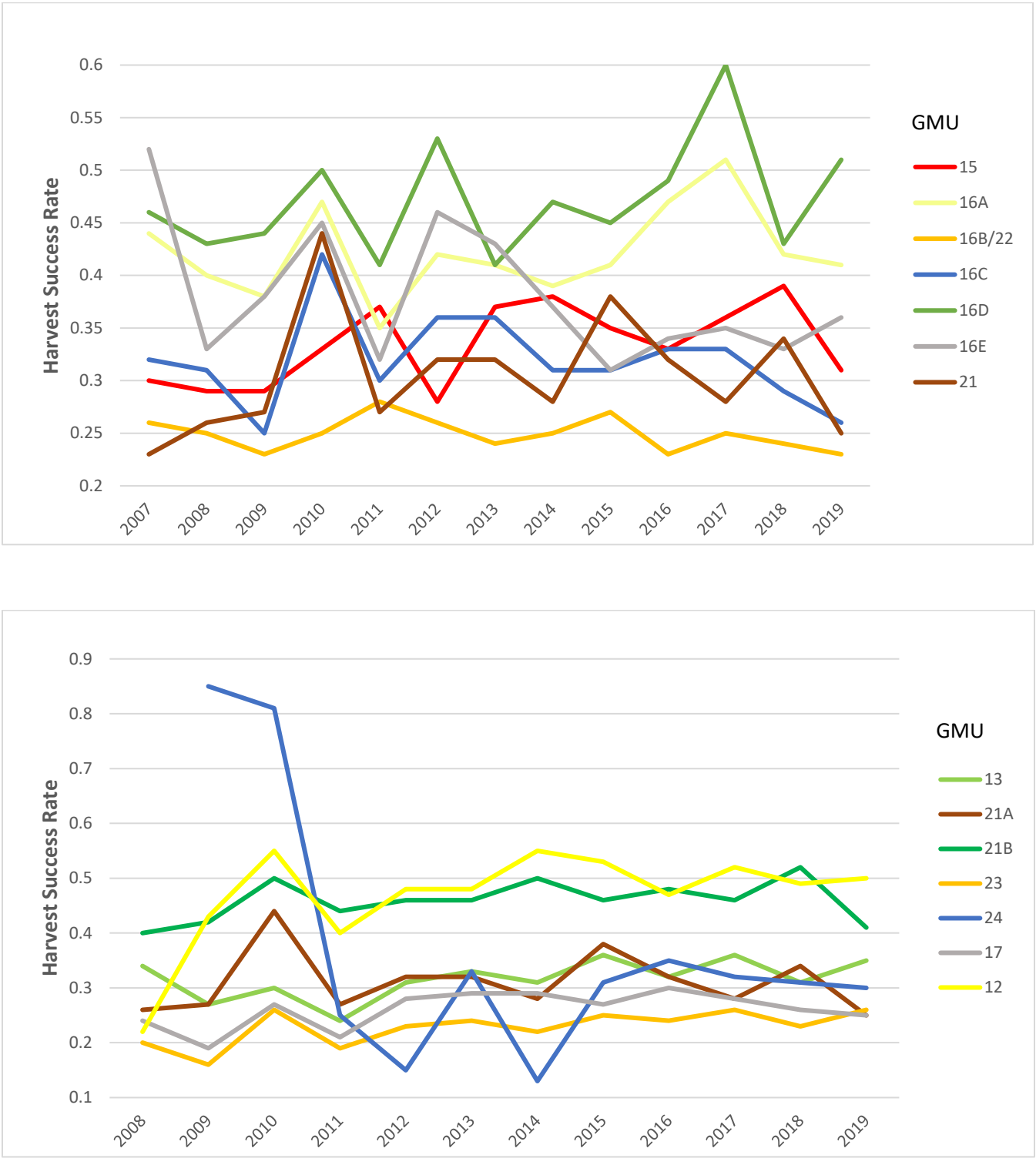


Figure 3-19. Elk Harvest Success Rate in New Mexico GMUs with Wolf Home Ranges in the MWEPA through 2019. (Source: N. Tatman, NMDGF, pers.comm. 2020, 2021)

Table 3-9 shows the year-over-year change in elk harvest success rates (%) for each of the GMU's in New Mexico with wolf presence between 2007 and 2019. Importantly, NMDGF manages each GMU primarily for optimal herd size based on factors such as forage. NMDGF will modify the number of hunters awarded permits for each GMU based on herd sizes. For example, if herd sizes are forecast to exceed optimal levels, more permits will be awarded to increase the harvest. If herd sizes are under optimal levels, less hunter permits will be issued. Success rates, being a function of both the number of hunters as well as the availability of harvestable elk, will thus change year over year. Overall, except for GMU 12 and 24, and to an extent, 16E, hunter success rate changes have been modest over the years.

Table 3-10 shows the annual number of hunters, harvested elk, and harvest success rates for elk in the New Mexico Wolf Recovery Area from 2007 to 2019. Overall, hunter participation and number of elk harvested increased during this period. Total harvest success fluctuated annually but remained relatively stable ($\dot{x} = 33.2 \pm 2.6\%$) between 2007 and 2019.

Table 3-9. Overall Elk Hunting Success Rates – Year over Year Change, New Mexico MWEPA

Year	New Mexico Game Management Unit (GMU)												
	12	13	15	16A	16B/22	16C	16D	16E	17	21A	21B	23	24
2007	-	-	-	-	-	-	-	-	-	-	-	-	-
2008	-8.3	3.0	-3.3	-9.1	-3.8	-3.1	-6.5	-36.5	-14.3	13.0	5.3	-9.1	-
2009	95.5	-20.6	13.8	-5.0	-8.0	-19.4	2.3	15.2	-20.8	3.8	5.0	-20.0	-
2010	27.9	11.1	12.1	23.7	8.7	68.0	13.6	18.4	42.1	63.0	19.0	62.5	-4.7
2011	-27.3	-20.0	-24.3	-25.5	12.0	-28.6	-18.0	-28.9	-22.2	-38.6	-12.0	-26.9	-69.1
2012	20.0	29.2	32.1	20.0	-7.1	20.0	29.3	43.8	33.3	18.5	4.5	21.1	-40.0
2013	0.0	6.5	2.7	-2.4	-7.7	0.0	-22.6	-6.5	3.6	0.0	0.0	4.3	120.0
2014	14.6	-6.1	-7.9	-4.9	4.2	-13.9	14.6	-14.0	0.0	-12.5	8.7	-8.3	-60.6
2015	-3.6	16.1	-5.7	5.1	8.0	0.0	-4.3	-16.2	-6.9	35.7	-8.0	13.6	138.5
2016	-11.3	-11.1	9.1	14.6	-14.8	6.5	8.9	9.7	11.1	-15.8	4.3	-4.0	12.9
2017	10.6	12.5	8.3	8.5	8.7	0.0	22.4	2.9	-6.7	-12.5	-4.2	8.3	-8.6
2018	-5.8	-13.9	-20.5	-17.6	-4.0	-12.1	-28.3	-5.7	-7.1	21.4	13.0	-11.5	-3.1
2019	2.0	12.9	16.1	-2.4	-4.2	-10.3	18.6	9.1	-3.8	-26.5	-21.2	13.0	-3.2
Percent Change 2007 - 2019	26%	2%	6%	-3%	-3%	-6%	5%	-16%	-3%	2%	3%	4%	-85%

Source: New Mexico Department of Game and Fish, T. Zaffarano per N. Tatman, NMDGF, pers. comm. 2020.
Note: NMDGF changed the methodology for estimating hunters and harvest data in 2007 resulting in practical difficulties in making comparisons to earlier records.

Table 3-10. State of New Mexico –Elk Hunting Statistics for GMUs with Wolf Home Ranges.

	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Licensed Hunters	7842	8200	8784	9077	9469	9824	10310	10307	10385	10460	10570	10650	10528
Bull Harvest	1724	1679	1740	2356	1738	2179	2246	2164	2234	2145	2408	2038	2284
Cow Harvest	794	791	894	1050	939	1280	1313	1174	1278	1502	1524	1417	1263
Total Harvest	2518	2470	2634	3406	2677	3459	3559	3338	3512	3647	3932	3455	3549
Elk Harvest Success Rates	32.1%	30.1%	30.0%	37.5%	28.3%	35.2%	34.5%	32.4%	33.8%	34.9%	37.2%	32.4%	33.7%

Source: New Mexico Department of Game and Fish, T. Zaffarano per N. Tatman, NMDGF, pers. comm. 2020.

Note: NMDGF changed the methodology for estimating hunters and harvest data in 2007 resulting in practical difficulties in making comparisons to earlier records. GMUs included in these estimates include 12, 13, 15, 16A,B,C,D,and E, 17, 21A and B, 22, 23, and 24.

Figure 3-20 shows the total number of hunters and harvested elk in Arizona Game Management Units 1, 2B, 2C, 3B, and 27 from 2012 to 2016. These units overlap with the current areas occupied by Mexican wolves. The total number of hunters in these units has varied between a low of 2,928 in 2012 to a high of 3,589 in 2013. In 2016, the most recent year of data, there were 3,390 elk hunters. Bull elk harvests peaked in 2014 with a total of 946, while cow, calf, spike harvests peaked in 2016 with a total harvest of 915. While the overall success rate has been increasing since 2013 as presented in Figure 3-21, it is important to remember that AZGFD, like NMGFD, manages its hunts to meet specific management objectives. In 2016, elk hunters experienced a combined hunting success rate greater than 50 percent for either a bull or cow/calf/spike elk.

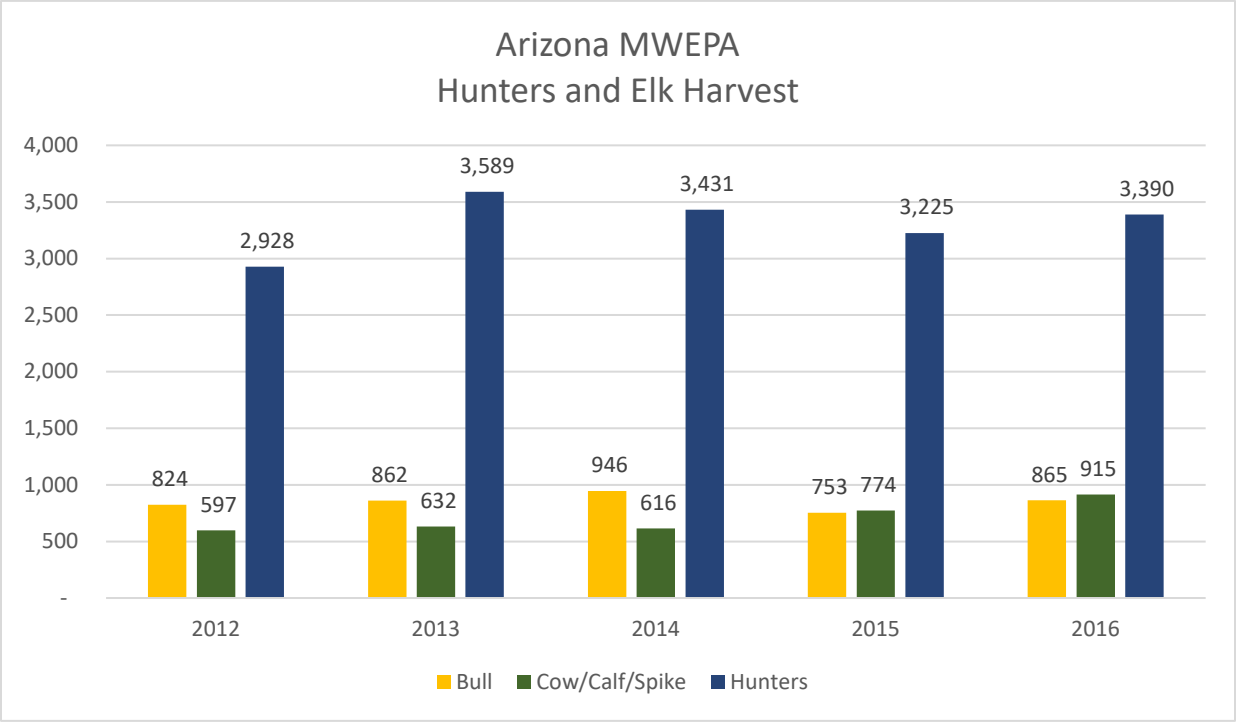


Figure 3-20. Arizona MWEPA Hunters and Elk Harvest (Source: AZ Game Management Units,1, 2B, 2C, 3B, and 27, Hunt Arizona 2017. https://www.azgfd.com/hunting/surveydata/.)

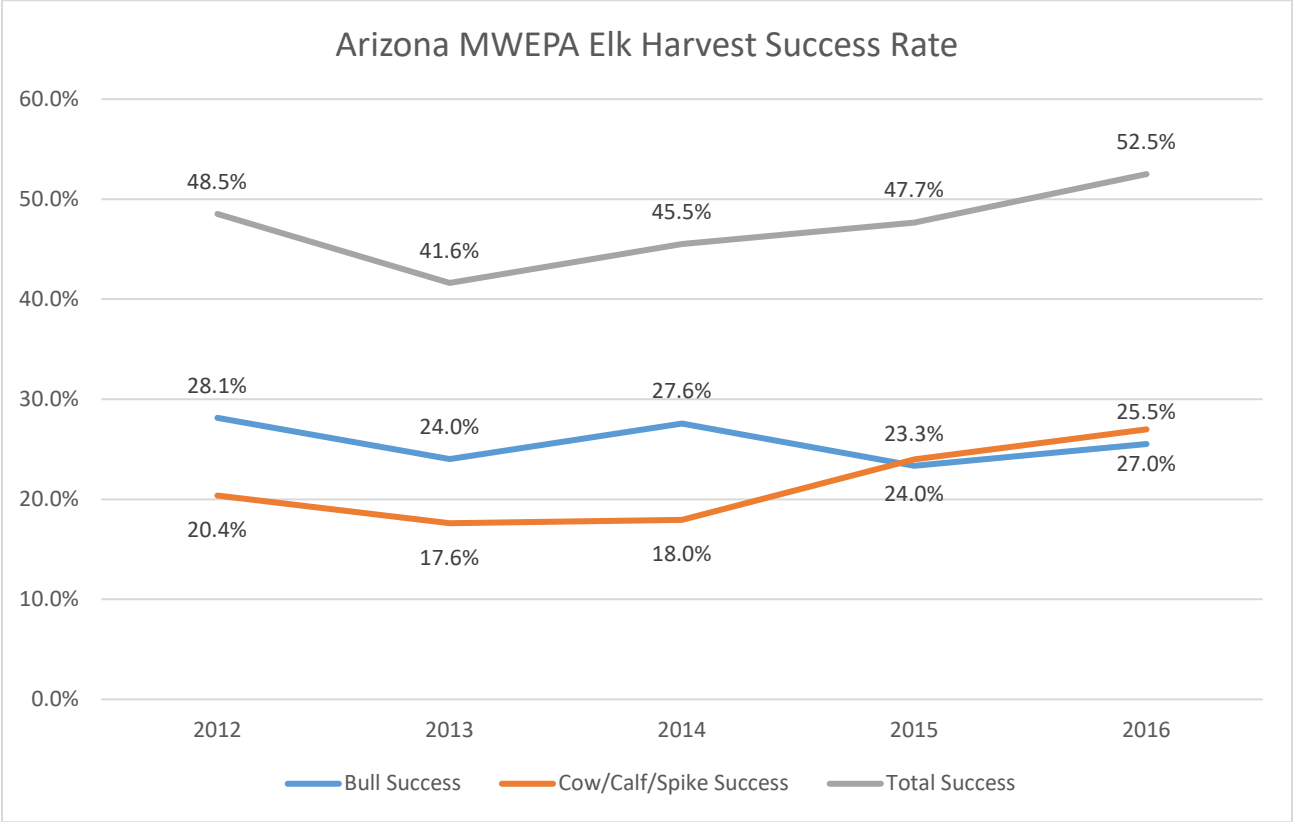


Figure 3-21. Arizona Elk Harvest Success Rates for Game Management Units with Wolf Home Ranges: 2012-2016 (Source: AZ Game Management Units,1, 2B, 2C, 3B, and 27, Hunt Arizona 2017. https://www.azgfd.com/hunting/surveydata/. Calculations by U.S. FWS Branch of Economics.)

Table 3-11 shows the elk hunting and harvesting statistics for Arizona GMUs 1, 2B, 2C, 3B, and 27 for the six years of most recently available data (2012 through 2016). The 2014 FEIS discussed the complex relationship between managing range for the size of elk herds and the available forage for livestock. Obtaining an elk hunting permit in these GMUs is very desirable and less than 20 percent of applicants succeed. In 2016, there were a total of 3,610 authorized elk permits with a total of 3,390 hunters. In this year, a high of 1,780 elk were harvested. Hunters spent a total of 18,719 days in their pursuit activity within the GMUs. Overall, harvest levels have trended upwards over the previous five years.

Table 3-11. Arizona Hunter and Harvest in GMUs in the MWEPA with Wolf Home Ranges: (2012 - 2016)

Year	Permits Authorized	1st Choice Applicants	Permits Issued	Hunters	Hunter Days	Harvest				
						Bull	Spike	Cow	Calf	Total
2012	3,225	13,727	3,189	2,928	14,778	824	64	479	54	1,421
2013	3,790	18,853	3,791	3,589	19,267	862	54	536	42	1,494
2014	3,839	19,144	3,841	3,431	18,747	946	61	520	35	1,562
2015	3,375	21,923	3,375	3,225	17,459	753	82	619	73	1,537
2016	3,610	20,504	3,611	3,390	18,719	865	99	785	31	1,780

Source: Hunt Arizona 5-Year: 2012-2016 Harvest. https://azgfd-portal-wordpress-pantheon.s3.us-west-2.amazonaws.com/wp-content/uploads/archive/HuntAZ2017.pdf. Note: Summary totals for Game Management Units 1, 27, 2B, 2C, and 3B. Calculations performed by FWS Branch of Economics.

3.6 Human Health/Public Safety

In this section, we describe the human health and public safety issues related to human-wolf interaction associated with the proposed action and alternatives. We incorporate by reference (40 C.F.R. 1502.21) Chapter 3.6.1 Existing Setting: Overview of Human Health/Public Safety Issues Associated with Wolves in North America and all its subsections, and Chapter 3.6.2 Human Health/Public Safety Issues Associated with the Mexican Wolf Reintroduction in Arizona and New Mexico and all its subsections from the 2014 FEIS. These sections describe: the general concern for public safety related to wolf conservation; the types of aggressive and nonaggressive encounters that may occur between people and wolves with information about Mexican wolf encounters with people in the MWEPA between 1998 and 2013; the human health concerns related to wolves carrying and transmitting parasites and disease to people; and, information related to disease surveillance and health protocols associated with the reintroduction and management of the Mexican wolf in the MWEPA. Below, we re-summarize ongoing disease surveillance and health protocols, including discussion of cross-fostering Mexican wolf pups from captivity into the MWEPA; discuss recent disease events in the MWEPA or captive Mexican wolves; and provide updated information about Mexican wolf encounters with people in the MWEPA since 2014.

3.6.1 Human Health

Mexican wolves are susceptible to various diseases and parasites that may affect humans. Examples of these include rabies (a disease) and parasitic infections from external parasites such as fleas and ticks and internal parasites such as tapeworms. Typically, infectious diseases such as viruses and bacteria are transmitted through direct contact (e.g., feces, urine, or saliva) with an infected animal, by aerosol routes, or by physical contact with inanimate objects (fomites). Parasites are infective through water, food sources, or direct contact. Wolves tolerate a number of parasites, such as tapeworms or ticks, although occasionally such organisms can cause significant disease or be lethal (Kreeger 2003).

To ensure public health, as well as the health of individual wolves and the general health of the wild Mexican wolf population, the Mexican Wolf Recovery Program implements an ongoing,

active disease surveillance program and comprehensive health protocols for captive Mexican wolves, wolves released into the MWEPA from pre-release facilities, and captured wild wolves (USFWS 2014; SSP 2009; AZA Canid TAG 2012). Captive Mexican wolves received regular vaccines for rabies, distemper, parvovirus, parainfluenza, adeno virus (with or without leptospirosis depending on the region of the country), and various kinds of kennel cough and canine flu depending on the region. Regular fecal parasitology is performed as well as deworming to prevent roundworm and tapeworm. Heartworm testing and prevention is also administered at all facilities (SSP 2009). We routinely test and vaccinate wild Mexican wolves in the MWEPA for distemper, parvovirus, leptospirosis serovars, plague, tularemia, and heartworm disease. We test fecal samples of wild Mexican wolves opportunistically for parasites and administer deworming treatments to protect against tapeworms, fleas, ticks, and mites (80 FR 2499, January 16, 2015).

The majority of captive wolves released into the MWEPA since the 2014 FEIS have been cross-fostered puppies born at captive facilities and subsequently transported to the MWEPA for placement into wild dens. These captive facilities adhere to the medical recommendations outlined in the SSP Husbandry Manual for vaccination, deworming, and disease surveillance, as well as rigorous pen cleaning and diets approved by the Association of Zoos and Aquariums (SSP 2009, AZA 2021). As part of these requirements, facilities institute rigorous medical oversight of pregnant female Mexican wolves and ensure that all puppies are inspected to evaluate for contagious diseases by an accredited veterinarian prior to their transport for release into the MWEPA. Although newborn puppies are too young to receive common vaccines and treatments, they are protected by the antibodies they receive through their mother's milk for their first few months of life. Given the age of the pups when they are transported from captivity to the wild for cross-fostering (<14 days), and the antibodies present in the vaccinated mother, there is an extremely low chance for disease transmission from the captive population to the wild via unvaccinated young pups. As these pups mature, they receive vaccinations and treatments consistent with their age and appropriate protocols for their location.

In recent years, two novel occurrences of pathogens infecting Mexican wolves in captivity have been documented. One recent investigation of six captive wolves in Mexico documented seroprevelance (presence in the blood) of antibodies to *Anaplasma phagocytophilum,* a pathogen carried by ticks that causes the disease granulocytic anaplasmosis in humans, in a single captive Mexican wolf (Morales-Soto et al. 2016; Woldehiwet 2009). This was the first, and is the only, documentation of these antibodies in a Mexican wolf in Mexico, leading to additional interest in studying the vectors for transmission and wolf response to this pathogen. In Michigan, two captive Mexican wolf pups in a zoo died from Eastern equine encephalitis virus (EEEV), likely transmitted by a mosquito bite during an outbreak of EEEV in the wetland adjoining the zoo property (Thompson et al. 2021). This virus, which can be fatal to humans, occurs primarily in the Atlantic and Gulf Coast states, where it is typically passed between mosquitos and birds in hardwood swamps (CDC 2020).

Based on our ongoing surveillance of Mexican wolves within the MWEPA, we are unaware of any diseases that have affected Mexican wolves in the MWEPA that were not described in the 2014 FEIS (USFWS 2014). Cyclical rabies outbreaks (fox and south-central skunk, and bat variants) continue to occur in the MWEPA in other species (NMDOH 2021, AZDHS 2021, Ma et al. 2021, KRQE 2021) but we have not documented any cases of rabies in Mexican wolves in the MWEPA since the reintroduction began in 1998. Distemper and parvovirus continue to be prevalent throughout the MWEPA in unvaccinated canids (e.g., feral dogs) and it is likely that

unvaccinated canids function as a reservoir for these diseases. Mexican wolves in the MWEPA exhibit high prevalence and risk of exposure to distemper relative to their low density (that is, wolf to wolf contact leading to transmission should be less likely in the MWEPA compared to higher density gray wolf populations in areas like Yellowstone National Park) (Brandell et al. 2021). Documented incidence of mortality of wild wolves in the MWEPA due to both distemper and parvovirus as of 2019, has been low, however (one Mexican wolf death from parvovirus in 1999, see 80 FR 2499-2500, January 16, 2015). Potential pup mortality caused by infectious disease may be poorly documented in the free-ranging population because pups are too young to radio collar and thus difficult to detect or monitor. Serologic (blood) testing of juveniles and additional data on litter size immediately after whelping and pup survival to weaning age would help determine the extent to which the effects of distemper and parvovirus may be underestimated in the MWEPA (Justice-Allen and Clement 2019).

Between 1998 and 2019, we have documented five Mexican wolf mortalities in the MWEPA from disease out of 185 known mortalities, including one each to canine parvovirus, chronic bacterial pleuritis (bacterial infection around the lungs), distemper, cancer, bacterial pneumonia (USFWS files). The pleuritis and pneumonia cases, though bacterial diseases, are likely both secondary to other unknown natural factors, rather than contagious, infectious diseases. We are not aware of any situation in which a Mexican wolf in the MWEPA has transmitted a disease to a human since the reintroduction began.

3.6.2 Public Safety

Wolf encounters with humans, including wolf attacks on humans leading to injury or death, have been documented in countries around the world. These occurrences are exceedingly rare statistically, based on data collected from Eurasia and North America between 2002 and 2020 (Linnell et al. 2021). Wolf encounters with humans are typically identified as one of three kinds: 1) attacks by rabid wolves; 2) predatory attacks where wolves appear to have regarded humans as prey; and 3) defensive attacks where a wolf has bitten a person in response to being cornered or provoked (Linnell et al. 2002). Factors associated with wolf attacks on humans include rabies, habituation, provocation, and highly modified environments (ibid). In some regions, including the MWEPA, wolves and humans live in proximity to one another in areas where habitat for wolves overlaps with human settlements. This proximity does not necessarily put humans in danger of attack; rather, wolves habituation to humans may become a safety risk when wolves become comfortable in proximity to humans (30-50 m), approach people, and associate humans with food (Linnell et al. 2021). Efforts to ensure Mexican wolves in captivity, semi-captive facilities, and in the wild do not become habituated to humans are continually implemented. Mexican wolves raised in captivity are screened thoroughly to ensure they demonstrate appropriate fear of humans (lack of habituation) before being considered for release into the MWEPA.

For the purposes of this SEIS, we reviewed our nuisance incident database and files, monthly updates, and annual reports to tally Mexican wolf - human interactions between 2014 and 2019. We documented at least 61 cases of confirmed Mexican wolf-human interactions between 2014 and 2019. Most of these incidents (69%) were considered investigative searches in which wolves did not approach people, but simply ignored human presence or withdrew when hazed by humans. Nine other cases were considered investigative approaches (15%) where the wolf approached a human in a non-threatening manner. There were six aggressive charges (9%) that occurred, all of which involved a dog(s) and were considered provoked. There were also two aggressive incidents

that were classified as self-defense behavior in which a human intruded into a known wolf rendezvous site with young pups. Lastly, two aggressive incidents were classified as agonistic and involved behavior consistent with wolves feeling threatened and eventually retreating. Of all the wolf-human interactions, eight interactions occurred with captive released wolves that were considered habituated (USFWS files).

3.7 Environmental Justice

The Environmental Justice mandate was established by Presidential Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*. The E.O. requires each Federal agency to "make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations in the United States…" [1] The U.S. Environmental Policy Agency (EPA) Office of Environmental Justice defines environmental justice as:

"The fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies." [2]

As directed by E.O. 12898, the Service considers environmental justice issues through the implementation of the National Environmental Protection Act (NEPA). Environmental justice concerns may arise from impacts on the natural and physical environment, such as human health or ecological impacts on minority populations, low-income populations, and American Indian tribes, or from related social or economic impacts.[3] In Chapter 3.2 we identified the project study area which could potentially be subject to impacts from our proposed action and alternatives. In this section we identify and describe those population groups of concern, including minority populations, low- income populations, and American Indian tribes in the project study area which could be subject to disproportionately high and adverse impacts from our proposed action and alternatives.

3.7.1 Existing Setting: Overview of Arizona and New Mexico

Low-income populations, racial minorities and American Indian tribes are the groups most likely to be harmed by inequities of environmental protection. The reference community is used to identify minority and low- income populations with possible environmental justice concerns. The reference community can be the general population or an appropriate sub-region. When addressing the issue of environmental justice all American Indian tribes, and minority populations that

[1] Executive Order No. 12898. 59 C.F.R. 7629, §1-101. February 11, 1994. https://www.archives.gov/files/federal-register/executive-orders/pdf/12898.pdf
Current E.O 12898 environmental justice guidelines are in the process of being amended by the White House Environmental Justice Interagency Council, per Executive Order No.14008, 3 C.F.R.7619, §202(b). January 20, 2021. https://www.federalregister.gov/documents/2021/02/01/2021-02177/tackling-the-climate-crisis-at-home-and-abroad .
A new executive order on environmental justice is forthcoming.

[2] U.S. Environmental Protection Agency. Environmental Justice Website. 2021. https://www.epa.gov/environmentaljustice

[3] U.S. Council on Environmental Quality. Environmental Justice: Guidance Under the National Environmental Policy Act. 1997. 8 https://www.epa.gov/sites/production/files/2015-02/documents/ej_guidance_nepa_ceq1297.pdf

comprise over 50 percent of the population of an affected area or that are larger than the reference community, are considered as population groups of concern. Low-income populations are identified by either having a poverty rate higher than the reference community and/or by meeting other analyst determined criteria. The term "subsistence consumption" is defined as "dependence by a minority population, low-income population, Indian tribe or subgroup of such populations on indigenous fish, vegetation and/or wildlife, as the principal portion of their diet".[4] Within the entire project study area in Arizona and New Mexico there are no identified groups that subsist principally on indigenous fish, vegetation and/or wildlife. We therefore focus on identifying and describing the minority populations, low-income populations, and American Indian tribes within the project study area that may be disproportionately affected by the proposed action and alternatives.

Reference communities are used as a basis for comparison for affected communities. Counties, states, and regions are used as basis to make reasonable and effective comparisons. Minority and low-income populations within the focal Mexican wolf home range counties (see 3.5 Economic Activity, which identifies Apache, Gila, Graham, Greenlee, and Navajo counties in Arizona and Catron, Grant, Sierra, and Socorro counties in New Mexico as focal counties due to the presence of Mexican wolf home ranges in these counties at any time between 1998 and 2019) and other greater study area counties with Mexican wolf habitat are compared with their respective states as reference communities. These reference communities were used due to vastness and dispersed nature of the affected populations. States were used for comparison, rather than combined region, to their corresponding affected counties to encompass each state's unique history, political system, demographics. Furthermore, these reference communities assist in establishing the existence of minority populations.[5] Table 3-12 provides the percentage of American Indian and Hispanics in Arizona and New Mexico compared to the national figures for these minority populations.

Data used in this section are taken from the U.S. Census Bureau's American Community Survey five-year estimates for 2012 (January 1, 2008-December 31, 2012) and 2019 (January 1, 2015-December 31, 2019). The samples are collected over these time periods as opposed to an exact point-in-time.[6] The five-year estimates were used instead of one-year timespan estimates. Although the five-year estimates use a rolling average of the five-year period, these estimates have greater degree of accuracy. The five-year estimates also cover all the smaller populations that are used in the study area.

Poverty rate is a critical criterion used for the identification of a low-income group with possible environmental justice concerns. Poverty is a fundamental measurement of an individual or family's financial ability to provide basic living needs. The poverty line definitions for this analysis are calculated by the U.S. Census Bureau and vary from household to household based on the number of individuals residing together. In 2019, the poverty line ranged between $13,011 for a single

[4] Council on Environmental Quality, 1997

[5] U.S. Environmental Protection Agency. Federal Interagency Working Group on Environmental Justice. Promising Practices for EJ Methodologies in NEPA Reviews: Report of the Federal Interagency Working Group on Environmental Justice & NEPA Committee. March 2016. 21. https://www.epa.gov/sites/production/files/2016-08/documents/nepa_promising_practices_document_2016.pdf

[6] U.S. Census Bureau. Understanding and Using the American Community Survey. 2018. 13-16 https://www.census.gov/content/dam/Census/library/publications/2018/acs/acs_general_handbook_2018_ch03.pdf

individual to $49,426 for a household of nine or more.[7]

Table 3-12. Percentage of American Indian and Hispanics in Arizona and New Mexico.

State	% American Indian 2015-2019	% Hispanic 2015- 2019
U.S.	0.8%	18.0%
Arizona	4.5%	31.3%
New Mexico	9.6%	48.8%

Source: U.S. Census, American Community Survey 2015-2019.
https://data.census.gov/cedsci/

Additional socioeconomic characteristics such as educational attainment, baseline health status, and health insurance coverage, may also be useful in identifying low-income groups.[8] For the purposes of this analysis we define a population group as low-income if it deviates from the respective state average in three of the following four listed four low-income categories:

- Higher Unemployment
- Lower per Capita Personal Income
- Lower Average Earnings per Job
- Higher Poverty Rate

The unemployment rate is an important metric of a regional economy's health. It can gauge short-term and long-term opportunities for a community's labor market. The unemployment rate is equal to the number of unemployed individuals in a population divided by the number or induvial in the labor force (those employed plus those unemployed and actively seeking work). Frictional and cyclical unemployment are more short-lived phenomena as one who is frictionally unemployed will experience a lag between separation and subsequent employment; cyclical unemployment occurs during the ups and downs in the business cycle.[9] Structural unemployment occurs when a segment of the greater labor force is out of work due to a misalignment of skills and available jobs.[10] This can occur due changes such as a loss of an industry in an economy or even automation.[11]

Per capita personal income is used as it measures available financial resources per person (regardless of age). The definition of per capita personal income is the income that is received by

[7] U.S. Census Bureau. Poverty Thresholds for 2019 by Size of Family and Number of Related Children Under 18. Excel spreadsheet. https://www.census.gov/data/tables/time-series/demo/income-poverty/historical-poverty-thresholds.html
[8] U.S. Environmental Protection Agency, 2016. 30
[9] Congressional Research Service. Introduction of U.S. Economy: Unemployment. 2020.https://crsreports.congress.gov/product/pdf/IF/IF10443
[10] Congressional Research Service, 2020
[11] Congressional Research Service, 2020

persons from all sources divided by the total ACS population. [12] These sources of income are the sum of wages and salaries, supplements to wages and salaries, proprietors' income with inventory valuation and capital consumption adjustments, rental income of persons with capital consumption adjustment, personal dividend income, personal interest income, and personal current transfer receipts, less contributions for government social insurance. [13]

The average gross earnings per job is measure of hourly and weekly wage and salary works except for self-employed persons.[14] This metric is important because it affirms the average worker's earning power and availability of good paying jobs and earning potential. The figures for average earnings per job are higher than the per capita personal income. This occurs because per capita measures the sum of the incomes and divides them by the total population. Whereas earnings per job does not spread the income over the total population but instead it ties one income per person per job.

For each of these low-income categories Table 3-13 provides a comparison of the states of Arizona and New Mexico to the United States.

Table 3-13. Comparison of Low-Income Categories for the states of New Mexico and Arizona to the National Average.

State	Unemployment Rate, 2015-2019	Average Earnings Per Job, 2015-2019 (2020 $)	Per Capita Personal Income, 2015-2019 (2020 $)	Poverty Rate, 2015-2019	Low-Income Categories[1]
U.S.	3.7%	$64,822	$57,055	13.4%	-
Arizona	4.7%	$57,795	$46,519	15.1%	4
New Mexico	4.9%	$52,699	$43,759	19.1%	4

(Source: Headwaters Economics, Economic Profile System 2021, https://headwaterseconomics.org/apps/economic-profile-system/, U.S. Census American Community Survey 2015-2019, https://data.census.gov/cedsci/, Bureau of Economic Analysis, https://www.bea.gov/sites/default/files/2020-11/lapi1120.xlsx. [1]Summarizes number of low-income categories met compared to national average

3.7.2 The MWEPA including the Mexican Wolf Home Range Focal Counties

Chapter 3.2 defines the project study area and identifies those counties and tribal trust lands with suitable habitat for wolves and which therefore may be affected by our proposed action and alternatives. Counties with Minority (Race or Ethnic) Population Groups of Concern.

The White House Office of Management and Budget (OMB) defines six race and ethnic

[12] U.S. Bureau of Economic Analysis. Local Area Personal Income Methodology. 2020. II-6 https://www.bea.gov/system/files/methodologies/LAPI.pdf

[13] U.S. Bureau Economic Analysis, 2020. I-1

[14] U.S. Bureau of Labor Statistics. Labor Force Statistics from the Current Population Survey. 2021. https://www.bls.gov/cps/earnings.htm

categories:[15]

- American Indian or Alaska Native;
- Asian;
- Black or African American;
- Native Hawaiian or Other Pacific Islander;
- White; and
- Hispanic or Latino

The populations of both Arizona and New Mexico are predominately white with a high percentage of whites being persons of ethnic Hispanic or Latino origin. Both states have large minority population of American Indians. Blacks and Asians make up smaller percentages of the population and are largely concentrated in the urban centers which are not part of the project study area. A minority population can be identified if it: "either (a) the minority population of the affected area exceeds 50 percent and (b) the minority population percentage of the affected area is meaningfully greater than the minority population percentage in the general population or other appropriate unit of geographic analysis."[16] "Meaningfully greater" is not concretely defined by EPA guidance.

CEQ's foundational *Environmental Justice Guidance Under NEPA* (1997) also notes that a minority population exists "if there is more than one minority group present and the minority percentage, as calculated by aggregating all minority persons, meets one of the above-stated thresholds."[17] The analysis "consider identifying the presence of transient and/or geographically dispersed populations and whether there is a potential for any unique or amplified impacts to these populations. American Indians, farm workers, and other transient laborer and/or geographically dispersed populations are potentially more susceptible to environmental and health impacts.[18] In accordance with this guidance, Table 3-20 provides the percentage of American Indians and Hispanics in the population within the Mexican wolf home range focal counties and within the greater project study area with Mexican wolf habitat. The table identifies those counties where the percentage of these minority groups is meaningfully greater than the respective state rates. Both the fifty percent analysis and the meaningfully greater analysis are used in concert to clearly define the existence of minority populations.[19]

The individual counties of the affected focal counties and greater study area counties are used as the geographic units with this this environment. The breakdown of the nine focal counties in Arizona and New Mexico and the greater study area's American Indian, Hispanic, and combined populations are shaded in Table 3-14.

Apart from Greenlee County, all the focal Arizona counties' American Indian populations are significantly higher than both the national and Arizona state proportions. Apache and Navajo

[15] Office of Management and Budget. Revisions to the Standards for the Classification of Federal Data on Race and Ethnicity. 1997. https://www.govinfo.gov/content/pkg/FR-1997-10-30/pdf/97-28653.pdf
[16] Council on Environmental Quality, 1997. 25
[17] Council on Environmental Quality, 1997. 25-26.
[18] U.S. Environmental Protection Agency, 2016. 29-30.
[19] U.S. Environmental Protection Agency, 2016. 23-25

counties have most of their populations identifying solely as American Indian, 73.8 percent and 42.6 percent respectively. In Graham County the American Indian population has dropped 1.6 percentage points since 2008-2012. The other four Arizona focal counties have seen increases of 1.4 percent to 2.1 percent.

Of the four New Mexico focal counties, only Socorro County has a higher proportion of American Indians than both U.S. and New Mexico. New Mexico's population is comprised 9.3 percent American Indian, while Socorro has 10.7 percent of its population identifying as American Indian. While Catron's American Indian population has dropped off significantly since 2012, Grant's has remained steady, while Sierra and Socorro's American Indian population has grown.

Greenlee and Graham counties' Hispanic populations are at a higher rate than that of both the U.S. and Arizona. The five counties have seen their Hispanic populations grow at a nearly identical rate as their American Indian populations. New Mexico has a higher proportion, nearly half, of its population identifying as Hispanic than both the U.S. and Arizona. While Grant and Socorro at approximately the state average of Hispanics, Sierra and Catron are nearly 20 percentage points below that average.

Table 3-14: Change in Percentage of American Indians or Hispanics in Counties within the Project Study Area and Focal Counties (CENSUS 2012 and 2019)

County[1]	% American Indian 2008-2012	% American Indian 2015-2019	Change	% Hispanic 2008-2012	% Hispanic 2015-2019	Change	% Combined American Indian and Hispanic 2008-2012	% Combined American Indian and Hispanic 2015-2019	Change
U.S.	0.8%	0.8%	0.0%	16.1%	18.0%	1.9%	16.9%	18.8%	1.9%
Arizona	4.4%	4.5%	0.1%	29.4%	31.3%	1.9%	33.8%	35.8%	2.0%
Apache	72.4%	73.8%	1.4%	6.1%	6.3%	0.2%	78.5%*	80.1%*	1.6%
Cochise	1.0%	1.2%	0.2%	32.1%	35.5%	3.4%	33.1%	36.7%	3.6%
Coconino	27.1%	26.5%	-0.6%	13.4%	14.1%	0.7%	40.5%	40.6%	0.1%
Gila	14.7%	16.3%	1.6%	17.8%	18.7%	0.9%	32.5%	35.0%	2.5%
Graham	14.2%	12.6%	-1.6%	30.1%	33.0%	2.9%	44.3%	45.6%*	1.3%
Greenlee	1.8%	3.9%	2.1%	46.4%	46.8%	0.4%	48.2%*	50.7%*	2.5%
Maricopa	1.8%	2.0%	0.2%	29.4%	31.0%	1.6%	31.2%	33.0%	1.8%
Mohave	1.8%	2.3%	0.5%	14.7%	16.4%	1.7%	16.5%	18.7%	2.2%
Navajo	42.6%	44.7%	2.1%	10.7%	11.4%	0.7%	53.3%*	56.1%*	2.8%
Pima	3.2%	3.9%	0.7%	34.1%	37.2%	3.1%	37.3%	41.1%	3.8%
Pinal	5.4%	5.0%	-0.4%	28.8%	30.2%	1.4%	34.2%	35.2%	1.0%
Santa Cruz	0.6%	0.8%	0.2%	82.3%	83.5%	1.2%	82.9%*	84.3%*	1.4%
Yavapai	1.9%	1.7%	-0.2%	13.4%	14.5%	1.1%	15.3%	16.2%	0.9%
New Mexico	9.3%	9.6%	0.3%	45.9%	48.8%	2.9%	55.2%*	58.4%*	3.2%
Bernalillo	4.6%	4.9%	0.3%	47.3%	50.0%	2.7%	51.9%*	54.9%*	3.0%
Catron	4.6%	0.1%	-4.5%	17.3%	19.0%	1.7%	21.9%	19.1%	-2.8%
Chaves	1.7%	1.7%	0.0%	51.2%	56.7%	5.5%	52.9%*	58.4%*	5.5%
Cibola	42.5%	41.5%	-1.0%	36.3%	38.4%	2.1%	78.8%*	79.9%*	1.1%
Doña Ana	1.1%	1.1%	0.0%	65.5%	68.0%	2.5%	66.6%*	69.4%*	2.8%
Eddy	0.8%	1.7%	0.9%	43.5%	49.1%	5.6%	44.3%	50.8%*	6.5%
Grant	2.0%	2.1%	0.1%	48.0%	50.5%	2.5%	50.0%*	52.6%*	2.6%

County[1]	% American Indian 2008-2012	% American Indian 2015-2019	Change	% Hispanic 2008-2012	% Hispanic 2015-2019	Change	% Combined American Indian and Hispanic 2008-2012	% Combined American Indian and Hispanic 2015-2019	Change
Hidalgo	0.5%	1.5%	1.0%	56.5%	58.1%	1.6%	57.0%*	59.6%*	2.6%
Lincoln	1.2%	0.6%	-0.6%	29.4%	33.2%	3.8%	30.6%	33.8%	3.2%
Luna	1.1%	0.9%	-0.2%	60.8%	67.1%	6.3%	61.9%*	68.0%*	6.1%
McKinley	74.3%	75.9%	1.6%	13.6%	14.2%	0.6%	87.9%*	90.1%*	2.2%
Otero	6.7%	6.8%	0.1%	34.3%	38.3%	4.0%	41.0%	45.1%	4.1%
Sierra	1.9%	4.4%	2.5%	27.1%	30.4%	3.3%	29.0%	34.8%	5.8%
Socorro	10.7%	12.2%	1.5%	47.9%	49.8%	1.9%	58.6%*	62.0%*	3.4%
Torrance	1.9%	0.3%	-1.6%	38.6%	43.1%	4.5%	40.5%	43.4%*	2.9%
Valencia	3.8%	4.3%	0.5%	57.7%	60.6%	2.9%	61.5%*	64.9%*	3.4%

Source: U.S. Census, American Community Survey 2008-2012 & 2015-2019. https://data.census.gov/cedsci/

[1]Focal counties shaded in grey

*Denotes majority-minority population when adding other ethnic groups (African American, Asian, Hawaiian/Pacific Islander, other, or two or more ethic groups)

3.7.2.2 Majority-Minority Counties and Meaningfully Greater Minority Populations

When a selected population has a majority of its population identifying themselves as a race other than white or addition to identifying ethically as Hispanic, it is classified as a "majority-minority" population. With the Hispanic and American Indian populations factored in with other races (African American, Asian, Hawaiian/Pacific Islander, other, or two or more ethic groups), four of the five Arizona focal counties, with Gila being the exception, have majority-minority populations. Over the span of the two periods (2008-2012 and 2015-2019), Graham County in Arizona has become majority-minority county. Neither the U.S. nor the State of Arizona have majority-minority populations. New Mexico is a majority-minority state. Grant and Socorro counties mirror New Mexico's growing minority-majority population. Catron and Sierra counties remain majority White and non-Hispanic. Torrance and Eddy counties with the greater New Mexico study area have become majority-minority over this period.

With the establishment of majority-minority populations with the focal counties and greater study area, counties that are what EPA guidance refers to as "meaningfully greater" minority populations than the reference can be identified in conjunction with the majority-minority counties. A "reasonable, subjective threshold" is used to define a "meaningfully greater" basis for comparison and analysis.[20] For this analysis any minority population that exceeds the reference population percentage will be considered a meaningfully greater minority population. Some American Indian and Hispanic areas within the Arizona and New Mexico exceed this threshold greatly. With Gila and Graham counties in Arizona nearly tripling the proportion (4.5%) of American Indian than Arizona, and Apache and Navajo counties overwhelmingly exceeding the state proportion; it can be reasonably established that the large area encompassing four out of the five focal counties pass the reasonably greater threshold for analysis. Furthermore, Hispanic populations exceed the state reference community standard in two counties. Greenlee County is significantly greater than that of Arizona by nearly one-and-one-half times, while Graham exceeds the Arizona reference by nearly two percentage points. Socorro County in New Mexico has a narrowly, but meaningfully greater population of both Hispanics and American Indian than the state reference population.

In the greater Arizona study area, Santa Cruz and Coconino counties have significantly greater populations of Hispanics (83.5%) and American Indians (27.1%) respectively. Both Cochise and Pima counties also, have meaningfully greater Hispanic populations. In New Mexico, the American Indian population proportion (75.9 percent) in McKinley County is the largest in the study area. Bernalillo, Chaves, Doña Ana, Eddy, Hidalgo, Luna, and Valencia counties in New Mexico all have Hispanic populations comprising over 50 percent of their populations, higher than the 2019 New Mexico rate of 48.8 percent.

The number of minority county populations identified by the 2015-2019 ACS as minority populations of concern in the bistate focal counties, as well as the greater study area, have expanded since the 2008-2012 data was collected. Over the studied time period, Graham County in Arizona has become a majority-minority state, as have Torrance and Eddy in the greater study area of New Mexico. Arizona and New Mexico's Hispanic and American Indian populations are mapped in Figures 3-22 and 3-23 with their respective focal counties and greater study area counties highlighted.

[20] U.S. Environmental Protection Agency, 2016. 25.

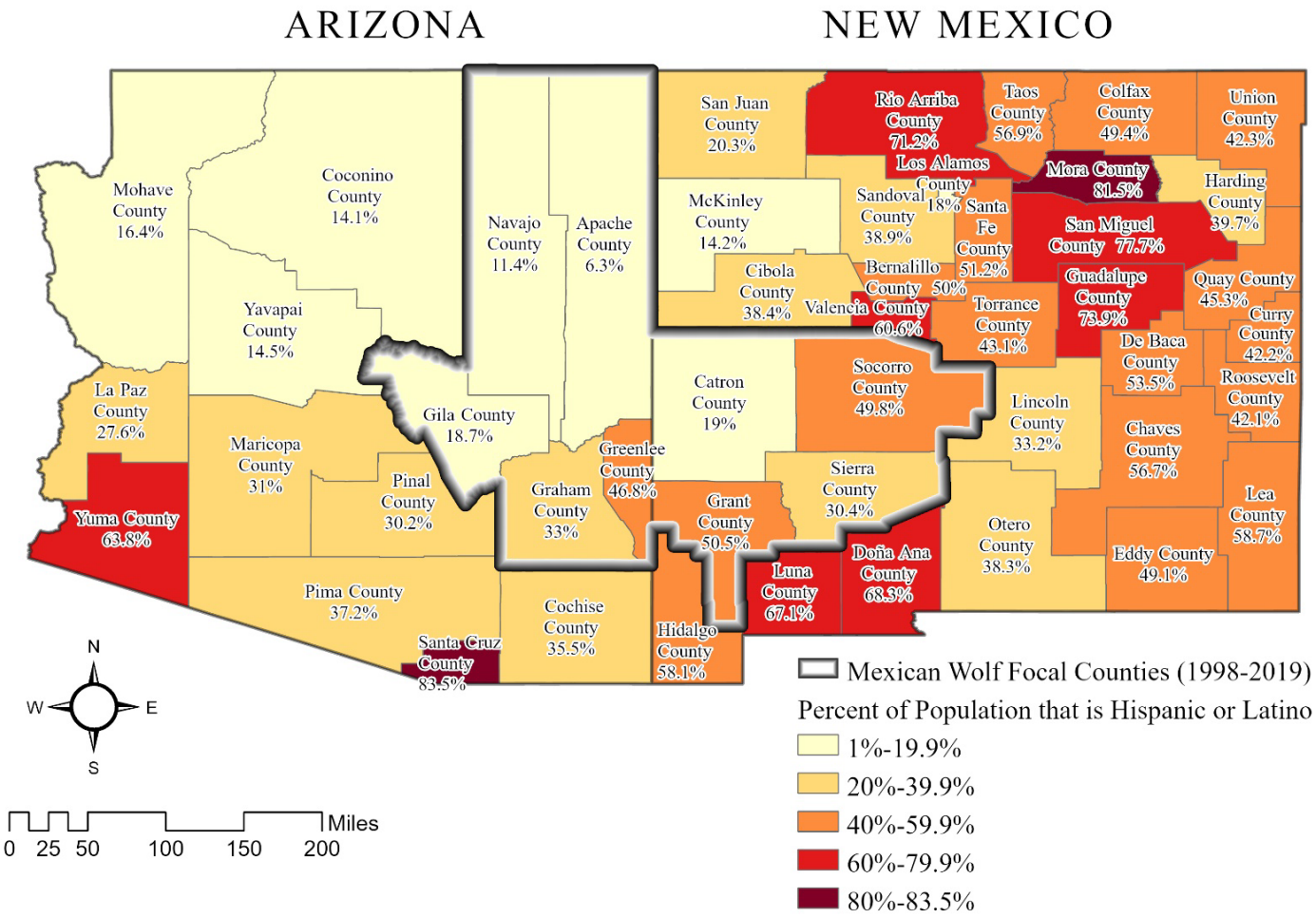


Figure 3-22. Arizona and New Mexico Hispanic Population by County with Focal Counties. (Source: ESRI, U.S. Census Bureau ACS 2015-2019.)

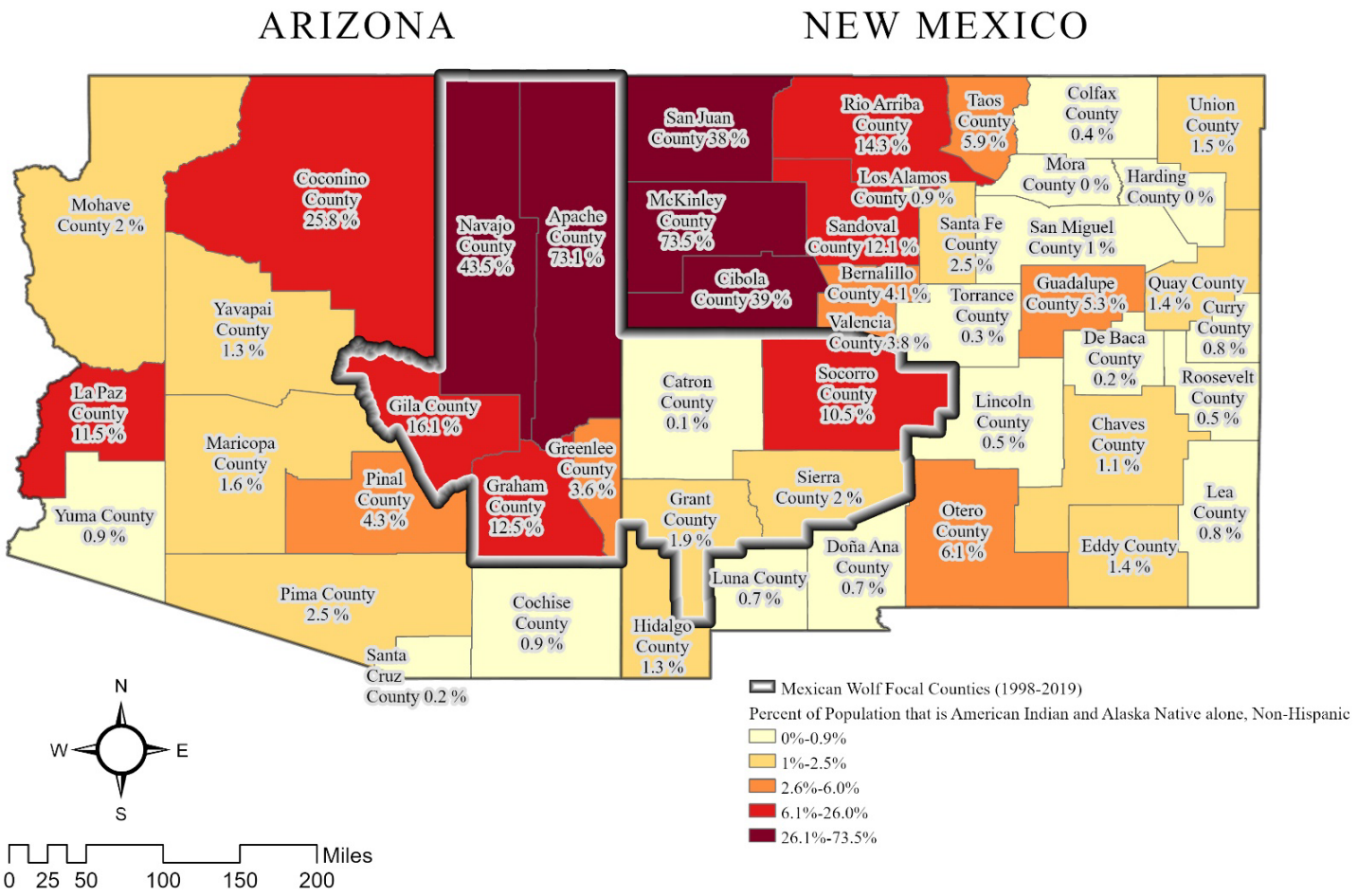


Figure 3-23. Arizona and New Mexico American Indian Population by County with Focal Counties. (Source: ESRI, U.S. Census Bureau ACS 2015-2019.)

3.7.2.3 Counties with Low-income Population Groups of Concern

This section uses the same geographical method of identifying the reference communities and low-income populations of concern as was used in identifying minority populations in Chapter 3.7.2.1. This section discerns the presence of low-income populations within the focal counties and greater study area by using the low-income threshold criteria analysis.[21] In doing this, not only are low-income populations identified, but also a meaningful difference from the reference community.[22] Of the nine focal counties, six fell below all low-income category levels set by their states. The low-income categories analyzed in this section are low unemployment, low job earnings, low per capita personal income, and high rates of poverty. The presence of at least one of these categories is indicative of a problem within the local economies. The threshold of three set by low-income threshold analysis demonstrates significant and contrasting economic difficulty within these communities. The summary of low-income data is presented in Table 3-21 below.

The state of Arizona fell below all four low-income category thresholds in comparison to the U.S. four of the Arizona focal counties fell below the low-income category standards set by the state.

In 2007-2011 and 2015-2019 every county in Arizona, except for Greenlee, exceeded the state's four low-income categories. Except for per capita personal income, Greenlee County is above the state levels and has a significantly higher average earnings per job. There is a meaningful difference between Arizona's low-income category levels and those of Apache and Navajo counties. Apache County exceeded every one of Arizona's low-income categories. In Apache County both 2007-2011 and 2015-2019, the poverty and unemployment rates were more than double that of Arizona in both years. To a lesser extent, Navajo County exceeded all four of Arizona's levels. In both time periods, the county's levels of poverty and unemployment were nearly one-and-one half times greater than Arizona's average. Both Apache and Navajo's 2015-2019 unemployment rates could be indicative of high, long-tern structural unemployment. Both Graham and Gila counties exceeded all four of the low-income categories set by Arizona, with levels of unemployment closer to the state average and with higher job earnings.

Like Arizona, New Mexico's metrics for the low-come categories fall below that of the U.S. population. Of the four focal counties in New Mexico, in 2015-2019, all met at least two low-income categories. Sierra and Socorro counties have all the four low-income categories. Grant, Sierra, and Socorro all share high rates of poverty. Sierra and Socorro twice the rates of the national average and are nearly one-and-one half greater than the state level. In Sierra County, poverty has risen 33 percent to a rate of 26.7 percent from 2007-2011 to 2015-2019. Grant County's poverty rate is 25 percent higher than that of New Mexico. In 2015-2019 in Catron County, average job earnings were $25,745, 9 percent less than it did in real dollars in 2011. This is less than half of the 2015-2019 state average of $52,696. Of note, while unemployment fell nationally and in New Mexico, due to the unemployment's cyclical nature, from 2007-2011 to 2015- 2019. Unemployment rose to 6.8 percent and 5.8 percent, in Sierra and Socorro counties respectively.

Outside of the focal counties, within the MWEPA greater study area there are additional counties of concern. Within the remaining study area counties in Arizona, the employment rate ranges from below the 2015-2019 state average of 4.7 percent to 8.5 percent in Santa Cruz. Santa Cruz is of concern due to its meaningful difference in poverty at 23.3 percent compared to Arizona's 2015-

[21] U.S Environmental Protection Agency, 2016. 27-28
[22] U.S. Environmental Protection Agency, 2019. 35

2019 rate of 15.3 percent. Cochise County is also of concern due its addition of all four low-income categories from 2015-2019 with average job earnings have dropping 9.4 percent from 2007-2011. While Yavapai County has two low-income categories from 2015-2019, down from 3 from 2007-2011, its residents have the lowest earnings per job and per capita personal income in the state. Although New Mexico's poverty rate is at 19.1 percent, there are still five (Cibola, Doña Ana, Hidalgo, Luna, and McKinley) of the twelve greater study area counties within this part of the greater study area that have poverty rates above 25 percent.

In Arizona four of the five Mexican wolf home range focal counties met all four of Arizona's low-income categories under the low-income threshold analysis for identifying counties of concern. The number of low-income categories met for these counties has not changed since 2007-2011. Seven of the eight Arizona greater reference area counties can be described as low-income as compared to the state under this analysis.

New Mexico is less prosperous than Arizona with higher unemployment, lower job earnings and per capita income, as well significantly higher rate of poverty. Compared to the state's reference low income-categories, every focal county is defined as low-income under our low-income threshold parameters; Catron and Grant meet three according to most recent data, this has not changed since 2007-2011. Sierra and Socorro met all the low-income categories. Since the 2007-2011 data were collected, the 2015-2019 data indicates that both counties acquired an additional low-income category. Eight out of twelve greater study area counties are considered low-income in New Mexico according to the 2015-2019 data. This has not changed since the data from 2007-2011 was collected.

Mostly strikingly, of the four low-income categories, the most fundamental; persons living below the poverty line, is increasing despite improving national and state economies. Seven of the nine focal counties have poverty rates of 20 percent or higher. Of these affected focal Mexican wolf home range counties, eight of the nine can be classified as low-income counties of concern meeting the low-income threshold hold analysis benchmarks set by the reference states.

1 Table 3-21: Comparison of Low-Income Categories for New Mexico and Arizona counties within the project study area to State averages
2

County	Unemployment Rate			Average Earnings Per Job, 2019 (2020 $)			Per Capita Personal Income, 2019 (2020 $)			Poverty Rate, 2019			Low- Income Categories[1]		
	2015 - 2019	2007-2011	Change	2019	2011	Change	2019	2011	Change	2015-2019	2007-2011	Change	2015 - 2019	2007 - 2011	Change
U.S.	3.7%	8.9%	-5.2%	$64,822	$62,099	4.4%	$57,055	$48,000	18.9%	13.4%	14.3%	-0.9%	-	-	-
Arizona	4.7%	9.4%	-4.7%	$57,795	$56,877	1.6%	$46,519	$40,495	14.9%	15.1%	16.2%	-1.1%	-	-	-
Apache	9.9%	18.8%	-8.9%	$43,708	$43,728	0.0%	$35,541	$29,813	19.2%	35.5%	34.7%	0.8%	**4**	**4**	0
Cochise	5.7%	8.8%	-3.1%	$55,878	$61,653	-9.4%	$42,184	$41,275	2.2%	17.6%	16.2%	1.4%	**4**	0	4
Coconino	5.5%	9.2%	-3.7%	$51,529	$45,924	12.2%	$49,681	$39,676	25.2%	22.6%	19.8%	2.8%	**3**	2	1
Gila	5.5%	10.5%	-5.0%	$46,715	$44,147	5.8%	$41,629	$36,781	13.2%	21.6%	20.9%	0.7%	**4**	**4**	0
Graham	4.8%	10.4%	-5.6%	$47,631	$45,085	5.6%	$32,214	$29,123	10.6%	22.6%	21.6%	1.0%	**4**	**4**	0
Greenlee	3.9%	8.2%	-4.3%	$82,838	$72,983	13.5%	$42,719	$36,188	18.0%	13.3%	17.2%	-3.9%	1	1	0
Maricopa	4.0%	8.4%	-4.4%	$60,599	$60,080	0.9%	$50,201	$43,970	14.2%	13.8%	14.9%	-1.1%	0	0	0
Mohave	5.7%	11.0%	-5.3%	$43,422	$43,652	-0.5%	$34,737	$30,196	15.0%	16.4%	16.8%	-0.4%	**4**	**4**	0
Navajo	7.3%	15.8%	-8.5%	$43,096	$43,975	-2.0%	$33,601	$29,514	13.8%	27.9%	26.2%	1.7%	**4**	**4**	0
Pima	4.4%	8.3%	-3.9%	$54,168	$52,470	3.2%	$45,911	$40,378	13.7%	16.8%	17.4%	-0.6%	**3**	**3**	0
Pinal	4.9%	10.3%	-5.4%	$45,589	$50,058	-8.9%	$32,504	$28,050	15.9%	13.2%	14.3%	-1.1%	**3**	**3**	0
Santa Cruz	8.5%	17.0%	-8.5%	$57,383	$51,665	11.1%	$39,821	$28,917	37.7%	23.3%	26.2%	-2.9%	**4**	**4**	0
Yavapai	4.4%	9.7%	-5.3%	$41,680	$39,978	4.3%	$41,807	$34,059	22.7%	13.0%	14.9%	-1.9%	2	**3**	-1

County	Unemployment Rate			Average Earnings Per Job, (2020 $)			Per Capita Personal Income, (2020 $)			Poverty Rate			Low- Income Categories[1]		
	2015-2019	2007-2011	Change	2015-2019	2007-2011	Change	2015-2019	2007-2011	Change	2015-2019	2007-2011	Change	2015-2019	2007-2011	Change
U.S.	3.7%	8.9%	-5.2%	$64,822	$62,099	4.4%	$57,055	$48,000	18.9%	13.4%	14.3%	0.9%	-	-	-
New Mexico	4.9%	7.5%	-2.6%	$52,699	$53,114	-0.8%	$43,759	$39,422	11.0%	19.1%	19.0%	-0.1%	-	-	-
Bernalillo	4.4%	7.6%	-3.2%	$55,657	$55,446	0.4%	$45,885	$41,848	9.6%	16.7%	16.6%	0.1%	0	0	0
Catron	6.2%	8.4%	-2.2%	$25,745	$28,303	-9.0%	$33,195	$33,624	-1.3%	16.4%	15.0%	1.4%	**3**	**3**	0
Chaves	4.9%	7.0%	-2.1%	$50,814	$48,833	4.1%	$42,163	$35,017	20.4%	19.4%	20.3%	-0.9%	**3**	**3**	0
Cibola	6.3%	7.1%	-0.8%	$42,139	$46,195	-8.8%	$29,678	$29,988	-1.0%	26.1%	25.9%	0.2%	**3**	**4**	-1
Doña Ana	5.7%	7.6%	-1.9%	$48,223	$49,755	-3.1%	$38,134	$34,606	10.2%	26.4%	25.6%	-0.8%	**4**	**4**	0
Eddy	3.1%	4.6%	-1.5%	$72,887	$64,949	12.2%	$60,258	$47,975	25.6%	14.6%	12.8%	1.8%	0	0	0
Grant	4.8%	7.8%	-3.0%	$47,337	$44,655	6.0%	$43,389	$37,945	14.3%	24.0%	16.6%	7.4%	**3**	**3**	0
Hidalgo	4.3%	6.6%	-2.3%	$53,186	$46,174	15.2%	$45,163	$37,450	20.6%	25.8%	23.7%	2.1%	1	**3**	-2
Lincoln	4.6%	5.7%	-1.1%	$34,878	$33,840	3.1%	$43,329	$37,315	16.1%	10.6%	12.4%	-1.8%	**3**	**3**	0
Luna	12.2%	17.9%	-5.7%	$49,322	$49,129	0.4%	$34,266	$33,884	1.1%	27.7%	30.8%	-3.1%	**4**	**4**	0
McKinley	7.0%	9.2%	-2.2%	$42,967	$39,733	8.1%	$30,011	$27,811	7.9%	34.8%	30.7%	4.1%	**4**	**4**	0
Otero	4.9%	6.6%	-1.7%	$51,521	$56,177	-8.3%	$36,248	$34,826	4.1%	22.1%	20.8%	1.3%	2	1	1
Sierra	6.8%	6.4%	0.4%	$37,896	$36,933	2.6%	$42,678	$38,083	12.1%	26.7%	20.0%	6.7%	**4**	**3**	1
Socorro	5.8%	5.6%	0.2%	$43,347	$44,955	-3.6%	$36,226	$35,183	3.0%	29.7%	27.4%	2.3%	**4**	**3**	1
Torrance	6.8%	9.7%	-2.9%	$41,159	$35,920	14.6%	$33,780	$35,155	-3.9%	23.7%	25.2%	-1.5%	**4**	**4**	0
Valencia	5.3%	8.8%	-3.5%	$40,047	$39,252	2.0%	$35,314	$33,402	5.7%	16.9%	21.1%	-4.2%	**3**	**4**	-1

(Source: Headwaters Economics: Economic Profile System (https://headwaterseconomics.org/apps/economic-profile-system/), U.S. Census Bureau, American Community Survey 2007-2011 & 2015-2019, https://data.census.gov/cedsci/ Bureau of Economic Analysis, https://www.bea.gov/sites/default/files/2020-11/lapi1120.xlsx

[1] Summarizes number of low-income categories met when compared to respective state figures)

3.7.2.4 Indian Tribes as Population Groups of Concern

For issues of environmental justice all American Indian tribes are considered as population groups of concern.[23] Counties with high American Indian populations are identified above as areas with population groups of concern since many tribal members may not live on the reservation. Chapter 3.2.4 identifies those tribes with tribal trust land within the project study area that either have a substantial amount of suitable wolf habitat on their reservation or are adjacent to larger contiguous blocks of habitat on Federal or non-federal land. In accordance with the discussion in Chapter 3.2.4, we consider that White Mountain Apace Tribe, San Carlos Apache Tribe, the Navajo Nation (including Ramah Navajo and the Alamo Band), Mescalero Apache Tribe, Pueblo of Zuni, Pueblo of Acoma, Pueblo of Isleta, and the Pueblo of Laguna could potentially be affected by our proposed action or alternatives, including the no action alternative. These tribes are mapped in Figure-3-2. Many of these tribes are engaged in ranching/livestock production, big game hunting, and tourism, which are the economic components we consider to be potentially affected by the proposed action and alternatives. Table 3-22 summarizes population and labor forces statistics for these tribes.

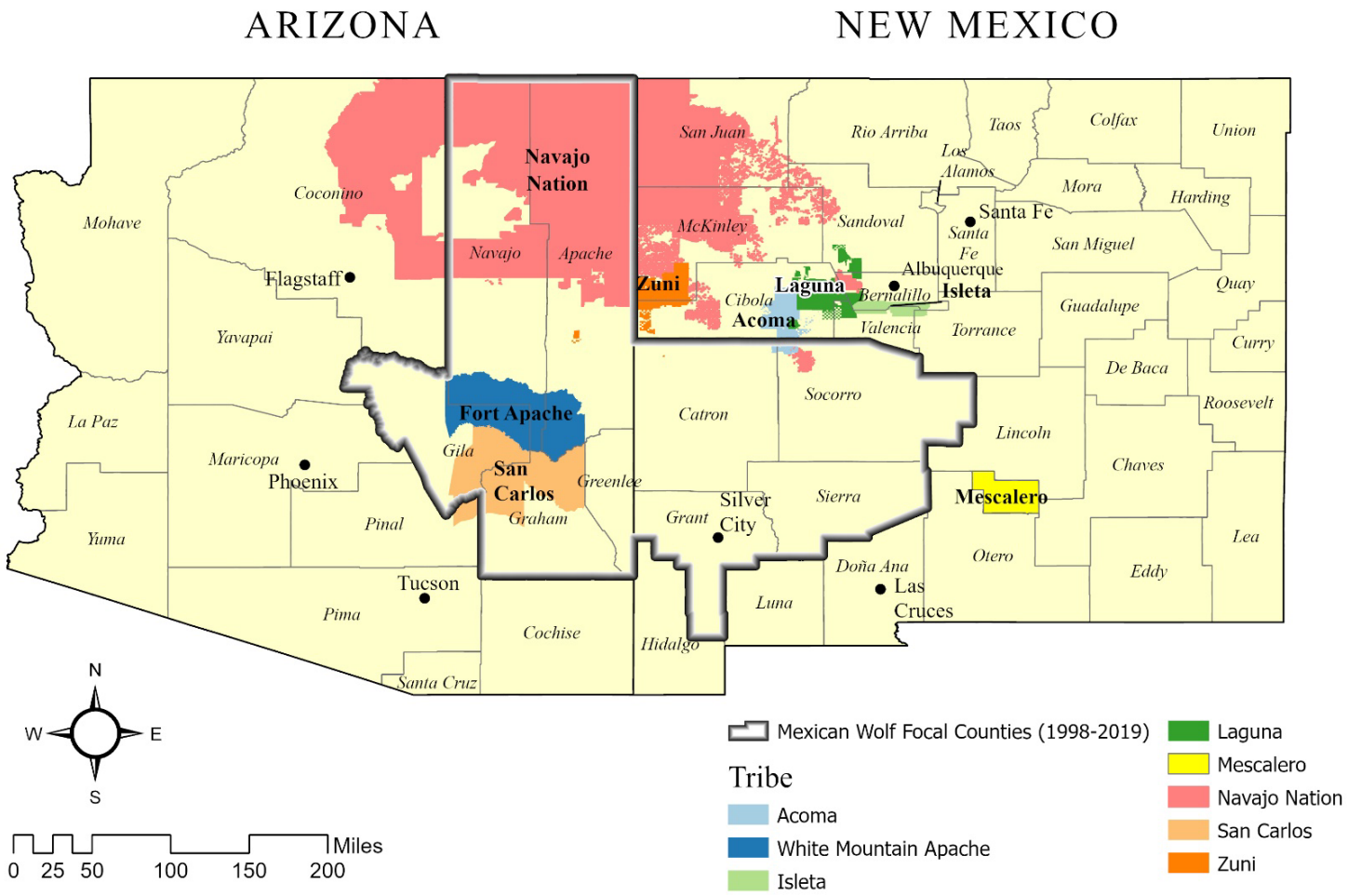
In the 2014 FEIS data was taken from the Bureau of Indian Affairs (BIA) *2005 American Indian Population and Labor Force Report*. This report which uses 2005 data, the most recent and complete edition in the now discontinued series. This EIS update uses the best available date from the U.S. Census five-year American Community Survey for 2008-2012 and 2015-2019. These years are the same used in Chapter 3.7.2.1 as the best for comparison for the 2014 FEIS data. The BIA report captures the American Indians who are living on the reservation, on trust lands, or are eligible to receive BIA services. The ACS Census data counts only those American Indians who live on the reservations or on trust lands. The methods for counting the service population, as well as discerning unemployment are different.

The U.S. Census Bureau defines unemployment as those who were not employed during the reference week but were available for work (excluding temporary illness) and had made specific efforts to find employment at some time during the 4-week period ending with the reference week.[24] The BIA report defines unemployment as not only the U.S. Census Bureau definition, but also those who would like to work but are no longer actively looking.[25] This difference in definition causes the BIA unemployment figures to be significantly higher. Figure 3-24 shows the original data used in the 2014 FEIS from the BIA.

[23] Executive Order 12898. §6-606

[24] U.S. Census Bureau. Glossary: Unemployed. https://www.census.gov/programs-surveys/cps/technical-documentation/subject-definitions.html#unemployedpeople

[25] U.S. Bureau of Indian Affairs. 2005 American Indian Population and Labor Force Report. 2005. viii. https://www.bia.gov/sites/bia.gov/files/assets/public/pdf/idc-001719.pdf



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2 **Figure 3-24. American Indian Tribal and Off-Trust Lands within the Focal Counties.** (Source: U.S. Census Bureau.)

Table 3-22: 2005 Population and Labor Force statistics for Tribes within project study with trust lands that have suitable habitat for wolves; Minority population groups of concern within economic sectors potentially affected by the proposed action and alternatives

Tribe	Total Service Population	Work force	Percent Unemployed	Employed and Below Poverty Guidelines
Tribes in U.S.	1,731,178	872,483	49%	29%
Tribes in Arizona	217,856	93,992	57%	10%
Tribes in New Mexico	130,523	45,257	32%	15%
San Carlos Apache Tribe	10,709	7,602	68%	36%
White Mountain Apache Tribe	12,213	7,815	51%	50%
Mescalero Apache Tribe	4,447	2,423	0%	0%
Navajo Nation	192,067	54,664	52%	9%
Pueblo of Acoma	4,819	*	*	*
Pueblo of Isleta	3,980	2,008	33%	25%
Pueblo of Laguna	8,092	*	*	*
Pueblo of Zuni	10,369	4,979	65%	24%

Source: U.S. Bureau of Indian Affairs, https://www.bia.gov/sites/bia.gov/files/assets/public/pdf/idc-001719.pdf

Notes:

1. Total Service Population: the tribe's estimate of all American Indians and Alaska Natives, members and non-members, who are living on or near the tribe's reservation during the 2005 calendar year and who are eligible to use BIA. -funded services. The aggregated sum of those reported as "Age Under 16", "Age 16-64", and "Age 65 and Over" sub-totals of a given tribe equals the tribe's "Total Service Population". Typically, Indians included in a tribe's Service Population live within a reasonable distance of the reservation from where they can access the tribe's services. Such Indians typically do not live in distant cities, towns, or foreign countries.
2. * denotes no information available.
3. Mescalero Apache Tribe reported a zero percent unemployment rate and zero percent employed and in poverty rate. This official data is presented above.

Table 3-23 shows the most recent data from the Census ACS for all tribes within the Mexican wolf study area. The tribes within the focal counties in the Mexican Wolf habitat are highlighted in grey: San Carlos Apache Tribe, White Mountain Apache Tribe, Navajo Nation, Pueblo of Acoma, and Pueblo of Zuni. Tribes have had differing trends in their populations, labor force, unemployment rate, and percentage of those working and below the poverty line. When comparing these tribes to the total populations of all Arizona and New Mexico tribes, data were not available for 2008-2012 for all categories and for the employment below poverty level for 2019.

Table 3-23: Population and Labor Force Statistics for Tribes within the Mexican Wolf home range focal counties and greater project study area

	Total Service Population			Work Force			% Unemployed			Employed and Below Poverty Guidelines		
Tribe	2008-2012	2015-2019	Change	2008-2012	2015-2019	Change	2008-2012	2015-2019	Change	2008-2012	2015-2019	Change
Tribes in U.S.	1,011,661	1,034,593	2.3%	422,422	419,638	-0.7%	14.8%	11.1%	-3.7%	11.6%	10.4%	-1.2%
Tribes in Arizona	*	185,988	*	*	61,101	*	*	20.4%	*	*	*	*
Tribes in New Mexico	*	142,441	*	*	56,826	*	*	16.4%	*	*	*	*
San Carlos Apache Tribe	10,426	10,710	2.7%	2,688	3,663	36.3%	20.5%	26.9%	6.4%	17.6%	20.4%	2.8%
White Mountain Apache Tribe	13,841	15,487	11.9%	5,537	4,703	-15.1%	38.0%	25.7%	-12.3%	20.0%	15.9%	-4.1%
Mescalero Apache Tribe	3,834	3,834	0.0%	1,538	1,669	8.5%	24.4%	16.9%	-7.5%	16.5%	14.9%	-1.6%
Navajo Nation	172,695	172,813	0.1%	55,741	48,208	-13.5%	20.2%	16.8%	-3.4%	15.3%	15.5%	0.2%
Pueblo of Acoma	3,591	2,788	-22.4%	1,600	1,281	-19.9%	31.3%	14.3%	-17.0%	26.5%	10.8%	-15.7%
Pueblo of Isleta	3,551	3,881	9.3%	1,686	1,851	9.8%	7.5%	12.1%	4.6%	8.6%	8.2%	-0.4%
Pueblo of Laguna	4,284	3,901	-8.9%	1,823	1,657	-9.1%	27.3%	19.6%	-7.7%	12.1%	21.3%	9.2%
Pueblo of Zuni	11,401	9,002	-21.0%	4,555	4,016	-11.8%	8.1%	19.7%	11.6%	25.7%	24.2%	-1.5%

Source: U.S. Census Bureau, American Community Survey 2008-2012 & 2015-2019, https://data.census.gov/cedsci/

While tribes across the United States saw a modest 2.3 percent increase in population, the White Mountain Tribe had a 11.9 percent increase while seeing a 15.1 percent decrease in its work force from 2008-2012 to 2015-2019. Pueblo of Acoma and Pueblo of Zuni saw large decreases in population on reservation and off-reservation trust lands, dropping 22.4 percent and 21.0 percent respectively from 2008-2012 to 2015-2019. San Carlos Apache Tribe saw modest growth in its population of 2.7 percent from 2008-2012 to 2015-2019 with a 36.3 percent increase in its workforce.

Unemployment ranged 12.1 percent during 2015-2019 for the Pueblo of Isleta in the greater study area to 25.7 percent in the focal county White Mountain Apache Tribe, which was a 12.3 percentage point drop from 2008-2012. The Pueblo of Acoma have seen their unemployment rate more than cut in half from 2012 to 2017, 31.3 percent to 14.3 percent. Corresponding with this drop in unemployment, the Pueblo of Acoma have seen a sharp reduction on the population that is employed and living in poverty, 26.5 percent to 10.8 percent from 2012 to 2019. Except for the Pueblo of Zuni, the focal tribes have seen a stagnating to slightly improving unemployment rate from 2008-2012 to 2015-2019, still well below the national tribal average.

In Chapter 3.5 we address those economic sectors, specifically ranching activities/livestock production, big game hunting and tourism (outdoor recreation) that could be potentially affected by the proposed action and alternatives. Data on the prevalence of low-income persons as principal operators of beef cattle ranching, hunting/guiding or tourism enterprises are not available. Data on the number of minority groups engaged in the hunting/guiding and tourism industries were not available. Quantitative data are not available for American Indian tribes and their involvement in the beef cattle ranching industry, although most tribes in the region are involved in ranching and livestock production to some extent. Guiding for trophy big game hunts is also an economic enterprise in which many tribal members are engaged. In 2017 the nine focal counties in Arizona and New Mexico, 88.5 percent of the beef cattle ranches had fewer than 50 head. This is a three and a half percent increase since 2012. There has been little change since 2012 in the percentage of ranches in Arizona and New Mexico that are small scale operations with fewer than 50 head raised.

Data are available for the number and percentage of the focus minority groups (i.e., American Indian, and Hispanic) who are the principal operators of businesses engaged in beef cattle ranching (Table 3-24). The principal operator is the person primarily responsible for the on-site, day-to-day operation of the ranch business. There is only one principal operator per ranch, but a person can be the principal operator of multiple ranches. This person may be a hired manger, business manager, and/or proprietor. Compared to national statistics both Arizona and New Mexico have a significantly greater number of principle operators as either American Indian or Hispanic. In 2017, Arizona still had three-fifths of total operators being American Indian, while nearly a quarter of New Mexico's operators are American Indian, this has changed little since 2012. Nearly a third of beef cattle farm principal operators were Hispanic in New Mexico. This has increased by three percentage points since 2012. While Hispanics make up 30.8 percent of New Mexico's principal beef cattle farm operators, this figure had dropped nearly 16 percent from 2012 to 2017.

Table 3-24 Minorities in Beef Cattle Farms: Principal Operator (USDA 2017)

	All	American Indian	Percent	Hispanic	Percent
U.S.	649,294	16,598	2.6%	28,298	4.4%
Arizona	5,614	3,525	62.8%	294	5.2%
New Mexico	9,602	2,308	24.0%	2,959	30.8%

Source: USDA, U.S. Census of Agriculture, 2017. https://quickstats.nass.usda.gov/

4.0 ENVIRONMENTAL CONSEQUENCES / IMPACT ANALYSIS

This chapter details the environmental consequences (i.e., effects or impacts) that may occur from implementation of the proposed action and alternatives. An environmental impact is a modification in the status of the human environment as it presently exists, or as it is anticipated to exist in the future, because of the proposed action and alternatives. Effects may occur directly because of the action or indirectly as a secondary result. Direct effects are caused by the action and occur at the same time and place. Indirect effects are reasonably foreseeable and may be attributable to a particular action, but they occur later in time or are farther removed in distance from the action than a direct effect (40 CFR 1508.8).

In accordance with Council on Environmental Quality regulations (40 CFR 1500-1508) the determination of a significant impact is based on the twin criteria of *context* and *intensity* (40 CFR 1508.27). In accordance with this guidance "the significance of an action must be analyzed in several contexts such as society as a whole (human, national), the affected region, the affected interests and the locality." Significance varies with the setting (i.e., context) of the proposed action. For instance, in the case of a site-specific action, significance would usually depend upon the effects in the locale rather than in the world as a whole. Both short- and long-term effects are relevant. We address the significance of impacts and the affected interests within a regional and local context as defined by the project study area (i.e., the states of Arizona and New Mexico between Interstate-40 south to the international border with Mexico, not including those areas of the MWEPA that do not have suitable habitat for wolves).

"Intensity" refers to the severity of the impact on the human environment. To determine significance, the severity of the impact must be examined in terms of the type, quality and sensitivity of the resource involved; the location of the proposed project; the direction of the effect (short- or long-term) and other considerations of context. The following should be considered in evaluating intensity:

- Impacts that may be both beneficial and adverse. A significant effect may exist even if the Federal agency believes that on balance the effect will be beneficial.
- The degree to which the proposed action affects public health or safety.
- Unique characteristics of the geographic area such as proximity to historic or cultural resources, park lands, prime farmlands, wetlands, wild and scenic rivers, or ecologically critical areas.
- The degree to which the effects on the quality of the human environment are likely to be highly controversial.
- The degree to which the possible effects on the human environment are highly uncertain or involve unique or unknown risks.
- The degree to which the action may establish a precedent for future actions with significant effects or represents a decision in principle about a future consideration.
- Whether the action is related to other actions with individually insignificant but cumulatively significant impacts. Significance exists if it is reasonable to anticipate a cumulatively significant impact on the environment. Significance cannot be avoided by

terming an action temporary or by breaking it down into small component parts.

- The degree to which the action may adversely affect districts, sites, highways, structures, or objects listed in or eligible for listing in the National Register of Historic Places or may cause loss or destruction of significant scientific, cultural, or historical resources.
- The degree to which the action may adversely affect an endangered or threatened species or its habitat that has been determined to be critical under the Endangered Species Act of 1973.
- Whether the action threatens a violation of Federal, State, or local law or requirements imposed for the protection of the environment (40 CFR 1508.27).

We evaluate the level of significance (i.e., no significant impacts, less than significant, or significant impacts) of our proposed action and alternatives, using the following questions for each resource area as guidelines for this evaluation:

Land Use

- Will our proposed action and alternatives lead to (no significant impacts, less than significant, or significant) impacts on Federal or non-Federal land use in the MWEPA?
- Will any impacts be cumulatively significant when related to other actions within the project study area?

Biological Resources

- Will our proposed action and alternatives lead to (no significant impacts, less than significant, or significant) impacts on native ungulate herds or populations in the MWEPA?
- Will our proposed action and alternatives lead to (no significant impacts, less than significant, or significant) impacts on the Mexican wolf, both at the subspecies level and in the MWEPA?
- Will any impacts be cumulatively significant when related to other actions within the project study area?

Economic Activity

- Will our proposed action and alternatives lead to (no significant impacts, less than significant, or significant) impacts on livestock production in the MWEPA?
- Will our proposed action and alternatives lead to (no significant impacts, less than significant, or significant) impacts on hunting activity in the MWEPA?
- Will any impacts be cumulatively significant when related to other actions within the project study area?

Human Health/Public Safety

- Will our proposal lead to (no significant impacts, less than significant, or significant) impacts in the transmission of disease and parasites to humans in the MWEPA?

- Will our proposal lead to (no significant impacts, less than significant, or significant) impacts to the safety of humans in the MWEPA?
- Will any impacts be cumulatively significant when related to other actions within the project study area?

Environmental Justice

- Will any of the impacts on land use, biological resources, economic activity or human health and public safety lead to disproportionately high and adverse environmental effects on a low-income population, minority population, or Indian tribe within the MWEPA?

Our evaluation assumes the potential for impacts primarily or wholly to occur in Zones 1 and 2, as these areas contain suitable habitat and are the most likely areas for continuing and future Mexican wolf occupancy. Any impacts associated with Zone 3 will be specifically identified, otherwise it is assumed that impacts are negligible (too small to quantify) in this zone due to lack of current or future expected wolf presence. Further, to evaluate impacts across the alternatives, we project that a maximum population of just over 500 wolves could be possible under the proposed population objective (see Table 2.1), however with the understanding that our management would likely stabilize the population at a size range of the mid-300s to low 400s and therefore analyzing impacts at around 500 wolves is an overestimate. Further, we assume the majority of wolf releases from captivity to improve gene diversity in the MWEPA would be conducted as cross-foster events, although we retain the regulatory authority to conduct initial releases of adults and family groups and may choose to do so for specific management reasons. Finally, we assume that some take of Mexican wolves from the issuance of take permits on Federal and non-Federal land or wolf removal due to unacceptable impacts to a wild ungulate herd would result in take that otherwise may not have occurred. Last, as in the alternatives in the 2014 FEIS, Mexican wolves will be present in the MWEPA under all three of the alternatives under consideration in this FSEIS, but abundance and distribution may differ between them. We recognize that the growth of the MWEPA population is variable from year to year and difficult to predict due to natural fluctuations as well as the effects of future management decisions that may not be anticipated today. This uncertainty carries through to our analysis of impacts on all identified resource areas.

4.1 Land Use

We assessed the potential impacts to land use from implementation of the proposed action and alternatives based on the categories of land ownership within the project study area and the distribution of suitable habitat. We incorporate by reference (40 C.F.R. 1502.21) Chapter 4.2 Land Use from the 2014 FEIS to provide relevant background information on the compatibility of Mexican wolf occupancy on Federal and non-Federal land in the MWEPA.

4.1.1 Potential Environmental Impacts and Proposed Mitigation Measures

Alternative One

Impact of Proposed Population Objective

The proposed population objective has the potential to impact land use because it will result in an increase in the number of wolves we would manage in the MWEPA in the future compared to the population objective of 300-325 wolves established by the 2015 10(j) rule. We expect that as the

MWEPA population grows and reaches the proposed population objective, Mexican wolves will primarily occupy suitable habitat on Federal land in Zones 1 and 2 in the MWEPA, which accounts for approximately 63% of suitable habitat. As described in the 2014 FEIS (Chapter 4.2), Mexican wolf occupancy is generally compatible with land use in areas of suitable habitat on Federal land, which tends to have low human density and be managed in accordance with statutes that allow for or integrate conservation and management activities. For example, Federal land management agencies incorporate Best Management Practices and other management activities into their operating procedures and management plans to provide for wolf conservation pursuant to their missions and mandates, and military installations integrate natural resource management into their operations. In addition, the experimental designation of the MWEPA allows for unintentional take under specific circumstances, such as otherwise lawful military training and testing, that provides compatibility between certain types of Federal land management and Mexican wolf recovery. Under the 2015 10(j) rule, we expected insignificant short-term impacts to public users on public land when wolf management would require temporary land use closures for disturbance-causing land-use activities; these closures restrict human access to areas where release pens, active dens, and rendezvous sites occur. We also expected that commercial uses such as forest management, mineral extraction, grazing, and oil and gas development would be expected to continue as permitted by the managing Federal agency (USFWS 2014).

Under the proposed population objective of Alternative One, we would expect slight variations in the types and numbers of closures that could occur on Federal land from disturbance-causing land-use activities compared to those we would expect under the 2015 10(j) rule. Closures are regulated on Federal land to ensure that adverse effects to reproductive success, natural behavior, or persistence of Mexican wolves will not occur (80 FR 2562, 17.84(k)(8)). Based on the increase in the number of wolves that would be on the landscape under the proposed population objective compared to the population objective of the 2015 10(j) rule, temporary closures around active dens or rendezvous sites (a gathering and activity areas regularly used by Mexican wolf pups after they have emerged from the den) may increase under Alternative One because there may be more active den sites, assuming that a larger population had more breeding pairs and that those breeding pairs occurred mostly on Federal land. These restrictions are small (one-mile radius) and temporary (several weeks to several months in the spring or summer, depending on the activity), resulting in little or no expected impact to the public. Since we began implementing the 2015 10(j) rule, during which time the MWEPA population has almost doubled in size, no closures related to Mexican wolves have occurred on BLM land in the MWEPA (J. Freeman, BLM, pers. comm. 2021). On National Forests, closures have rarely occurred around dens or rendezvous sites because they are typically located in remote areas of the forest. One den site near Winn Campground on the Apache-Sitgreaves National Forest resulted in a 300-acre closure in a steep canyon that had little public use because of the severe terrain. This closure was in place for three months. On the Gila Forest, a Mexican wolf den near an active timber sale resulted in the Gila National Forest requesting the timber company focus its timber harvest in areas that were not near the den; this allowed harvesting to continue while minimizing disturbance to denning wolves (V. Ordonez, USDA-FS, pers. comm. 2021).

We would expect that as population growth continues and wolf density in suitable habitat increases from its current density of 3.57 wolves per 1000 km^2 up to twice that density, closures could become more common, in the range of several a year. We do not expect public recreational use to be curtailed due to these types of infrequent closures, and commercial uses such as forest

management, mineral extraction, and oil and gas development would still be expected to largely continue as permitted by the managing Federal agency with at most temporary delays due to closures. Livestock grazing and hunting are prevalent land uses on Federal land in Zones 1 and 2 of the MWEPA; these activities would not be restricted under Alternative One, but additional potential for impacts is analyzed in Chapter 4.4. Economic Impacts.

To the extent that Mexican wolves inhabit tribal trust lands in the MWEPA (approximately 17.5% of suitable habitat occurs on tribal trust lands), the Service can develop management actions in cooperation with the tribal government to allow or prohibit wolf establishment. As we state in the 2014 FEIS, we would expect wolf occupancy to be most likely on reservations such as the Fort Apache Indian Reservation that have large amounts of suitable habitat or on tribal land that borders National Forests or BLM land with suitable habitat (USFWS 2014). The increase in the number of wolves that would occur in the MWEPA under the proposed population objective of Alternative One does not affect the ability of a tribe to determine whether wolves are allowed on tribal trust land. Temporary closures would not occur on tribal land unless desired by a tribe nor would recreational or commercial uses be curtailed in any way unless such action was directed by a tribe.

Private and state land, which accounts for approximately 20% of suitable habitat in the MWEPA, may also see a small increase in the number or density of wolves in Zone 2 due to the proposed population objective of Alternative One. Mexican wolves are allowed to disperse onto and occupy suitable habitat on these land ownership types except in the case of nuisance or depredation behavior, in which case they may be removed by the Service or a designated agency. Additional consideration of private land use is discussed below under *Impact of Proposed Revised Take Provisions*. Like Federal land, livestock grazing and hunting on non-Federal land may be affected by the presence of Mexican wolves, although no restriction on these activities would occur under Alternative One; additional consideration of these land uses is analyzed in Chapter 4.4. Economic Impacts.

Impact of Proposed Genetic Objective

The proposed genetic objective of at least 22 released wolves surviving to breeding age in Alternative One could impact land use because it would result in an increase in the number of Mexican wolf releases we would conduct compared to the 2015 10(j) rule, which could result in additional temporary closures around release pen sites on Federal land. However, based on the success we have had in recent years with the cross-fostering technique and the higher level of support from some stakeholders for this release technique, we intend to achieve our genetic objective primarily through the cross-fostering of captive pups into wild dens rather than by the release of adults pairs or family groups. Because we do not establish temporary pens when we conduct cross-fostering as we do when releasing adult wolves, our preferred release strategy may lead to fewer temporary pens, and corresponding closures around those pens, than envisioned with the release of family groups or adult pairs as under the 2015 10(j) rule. And, because this release strategy places wolf pups into established active dens, it does not result in releasing Mexican wolves into areas currently unoccupied, as it could if we conducted a release of adult wolves or a family group into unoccupied habitat; regardless, wolf occupancy is generally compatible with Federal agency land management for the reasons described above. More likely, protecting active dens sites regardless of whether cross-fostering had occurred in the den with small, temporary closures, as described above in *Impact of Proposed Population Objective*, would occur. If we chose to conduct adult or family group releases to achieve our proposed genetic objective, the additional

releases would result in additional temporary closures occurring for a short duration while the wolves were in the pens. Releases on private, state, or tribal land would continue to be allowable under the zone management provisions of the 10(j) rule. Establishing the proposed genetic objective in the regulatory part of the 10(j) rule as opposed to the placement of the current release recommendation in the preamble section of the 2015 10(j) rule would not have any impact on Federal or non-Federal land use.

Impact of Proposed Revised Take Provisions

Under Alternative One, we are proposing revision to three take provisions, two of which may temporarily reduce our issuance of permits to a domestic animal owner or their agent (on non-Federal land) or livestock owner or their agent (on Federal land) to take a Mexican wolf on non-Federal or Federal land in certain situations, and one of which will temporarily prohibit the Service from authorizing the states of Arizona and New Mexico or a designated agency to remove Mexican wolves in response to unacceptable impacts to a wild ungulate herd. These proposed revisions reduce our overall management flexibility in specific situations because the Service or a designated agency would not issue take permits or authorize take to individuals or agencies in certain situations that are currently allowable under the 2015 10(j) rule, but these revisions would not impose any restriction or constraint on Federal or non-Federal land use. Even with the proposed revisions, the Service and designated agencies retain the ability to manage conflict situations between Mexican wolves and livestock or to address nuisance or problem behavior of Mexican wolves using other management provisions in the 10(j) rule.

Summary

We do not expect implementation of Alternative One to restrict any activities on Federal, state, private, or tribal trust lands in the MWEPA. Under this alternative, which includes a proposed population objective, proposed genetic objective, and proposed temporary restriction of three take provisions, Federal land use would remain consistent with current uses; no change in land use plans or practices would be necessary, and only temporary small-scale restrictions to public use or access would occur to protect release pens when wolves are in them, active den sites, and rendezvous sites from human disturbance. Management flexibility would decrease in specific instances due to restrictions on the issuance of take permits or authorizations, but these restrictions would not alter land use. Based on these findings, we expect implementation of Alternative One to result in no significant direct or indirect adverse or beneficial impacts to land use on Federal or non-Federal land and no mitigation measures are necessary to ensure the continuation of current land uses.

Alternative Two

Impact of Proposed Population Objective

Alternative Two shares the proposed population objective feature of Alternative One and we expect the same population growth and management under the two alternatives. Therefore, the potential impacts to land use of the proposed population objective under Alternative Two are identical to Alternative One.

Impact of Proposed Genetic Objective

Alternative Two shares the proposed genetic objective feature of Alternative One. As described in Chapter 4.2.3 – **Alternative Two**, we expect the time and effort it may take to achieve the genetic

objective under Alternative Two to be slightly greater than Alternative One due to the potential for take of released wolves that could count toward the proposed genetic objective to occur under this alternative from the three 2015 10(j) take provisions. Therefore, additional temporary closures around active dens or release pens could increase by a very small number compared to Alternative One commensurate with additional releases we would conduct to reach the genetic objective (likely only a few releases). However, we would not expect these additional closures to affect land use any differently than previously discussed under Alternative One; they may result in occasional, short-term, small-scale restrictions to public use and access on Federal land.

Impact of Maintaining the 2015 10(j) Take Provisions

Under Alternative Two, we are not proposing to revise the provisions for take on Federal land, non-Federal land, or in response to an unacceptable impact to a wild ungulate herd, thereby maintaining the current management flexibility of the 2015 10(j) rule which allows the Service or a designated agency to issue a permit to a domestic animal owner or their agent (on non-Federal land) or livestock owner or their agent (on Federal land) to take a Mexican wolf on non-Federal or Federal land in certain situations or to authorize the states of Arizona and New Mexico or a designated agency to remove Mexican wolves in response to unacceptable impacts to a wild ungulate herd. Maintaining these flexibilities does not alter or constrain land use on Federal or non-Federal land in any way.

Summary

We do not expect implementation of Alternative Two to restrict any activities on Federal, state, private, or tribal trust lands in the MWEPA. Under this alternative, which includes a proposed population objective, proposed genetic objective, and maintaining the provisions of the 2015 10(j) rule for take on Federal land, non-Federal land, and in response to an unacceptable impact to a wild ungulate herd, temporary small-scale restrictions to public use or access may occur, while current management flexibility related to the issuance of take permits in certain situations would be maintained. These effects do not alter land use on Federal or non-Federal land. Based on these findings, we expect implementation of Alternative Two to result in no significant direct or indirect adverse or beneficial to land use and no mitigation measures are necessary to ensure the continuation of current land uses.

Alternative Three (No Action Alternative)

Impact of Maintaining the 2015 10(j) Population Objective

Under Alternative Three, the MWEPA population would increase from its current population size of a minimum of 186 wolves to the population objective of 300-325 Mexican wolves. When it reaches this objective, we would manage the population to maintain it within that range. Therefore, we would expect the MWEPA population under this alternative to be smaller, with a lower density of Mexican wolves in suitable habitat (on mostly Federal land), than in the other two alternatives. Therefore, we would expect a lower number of temporary closures on Federal land around release pens when wolves are in them, active dens, and rendezvous sites than under Alternatives One or Two. Maintaining the 2015 10(j) population objective will not result in any impacts to state, private, or tribal land use, as previously assessed for Alternative One in the 2014 FEIS (USFWS 2014).

Impact of Maintaining the 2015 10(j) Release Recommendation

Under Alternative Three, the number of releases we would conduct to improve the gene diversity of the MWEPA population and reduce genetic threats would be less than the number of releases we would conduct under Alternatives One and Two. In the 2014 FEIS and 2015 10(j) rule, we envisioned the release of one to two family groups approximately every four years to achieve our release recommendation of one to two migrants entering the population, for a total of 7-10 effective migrants over five generations (USFWS 2014). However, due to our success using the cross-foster release technique, we have not released family groups or adult wolves from captivity under the 2015 10(j) rule, therefore we have not established any temporary release pens and there have been no associated release pen closures during this time. Whether we were to continue with cross-fostering or instead conduct adult or family group releases or a combination of the two techniques, the impacts associated with temporary closures to protect active den or rendezvous sites or temporary release pens would be the same as described for Alternative One, but fewer in number.

Impact of Maintaining the 2015 10(j) Take Provisions

Under Alternative Three we would not revise the provisions for take on Federal land, non-Federal land, or in response to an unacceptable impact to a wild ungulate herd. This feature is identical to Alternative Two, and we would expect the same affects to land use under this alternative as Alternative Two.

Summary

We do not expect implementation of Alternative Three to restrict any activities on Federal, state, private, or tribal trust lands in the MWEPA. This alternative results in a smaller Mexican wolf population in the MWEPA than Alternatives One or Two with fewer releases to improve gene diversity, resulting in a lower potential for temporary closures to restrict human access near sensitive areas. We would not revise any take measures from the 2015 10(j) rule, and while this would maintain management flexibility in certain situations, it would not affect land use in any way. Based on these findings, we expect implementation of Alternative Three to result in no significant direct or indirect adverse or beneficial impacts to land use and no mitigation measures are necessary to ensure the continuation of current land uses.

4.2 Biological Resources

We assessed the potential impacts to biological resources (wild ungulate prey and Mexican wolves) from implementation of the proposed action and alternatives. We incorporate by reference (40 C.F.R. 1502.21) Chapter 4.3 Biological Resources from the 2014 FEIS to provide relevant background information, with emphasis on the subsections on *Wolf numbers and distribution*, *Wolf-prey relationships, Wolf occupancy and the human environment*, *Ungulates*, and *Current and predicted wolf impacts to ungulates*.

4.2.1 Potential Environmental Impacts and Proposed Mitigation Measures – Wild Ungulates

Alternative One

Impact of Proposed Population Objective

As the MWEPA population grows from its current size of a minimum of 186 wolves toward the proposed population objective, we expect wolves to continue to expand into suitable habitat in Zones 1 and 2, where adequate prey is available to support them. The increased population size under this proposed population objective will likely result in increased Mexican wolf density in suitable habitat (Table 2.1). At our maximum expectation of a population of just over 500 wolves,

wolf density in suitable habitat could reach around eight wolves per 1000 km^2, with wolf to elk ratio of approximately 5.95 wolves per 1000 elk, although we expect a more realistic wolf density of six to seven wolves per 1000 km^2, with wolf to elk ratio of 4 to 5 wolves per 1000 elk, if the population is managed in a range of the mid-300s to low 400s (Table 2-1).(For example, at a wolf population of 375 wolves, the wolf to 1000 elk ratio would be 4.16).

In the 2014 FEIS (Chapter 4), we speculated that ungulates could decline in localized areas where wolves become numerous or that habitat use by ungulates could be altered in the presence of wolves as prey try to avoid direct predatory interactions. We expected that wolf predation would be most likely to affect small, distinct, isolated populations of ungulates, which often have a limited capacity to increase, rather than causing widespread declines across larger, more resilient elk populations in Zones 1 and 2. We redeveloped the take provision for an unacceptable impact to a wild ungulate herd in the 2015 10(j) rule to address smaller spatial scales (localized herds) rather than general ungulate population levels across the MWEPA for this reason (USFWS 2014).

Based on our current observations in the MWEPA and available ungulate data for elk and deer populations in the MWEPA, we continue to speculate similar generalized impacts. We do not have any data suggesting that Mexican wolves are currently having a significant or observable negative impact on prey populations, therefore we expect that such impacts may occur at larger Mexican wolf population sizes, and higher wolf densities than the current situation. Based on information from the Northern Rockies suggesting that impacts to elk may occur above a wolf to elk ratio of 4 wolves to a 1000 elk and based on our projected population growth for the MWEPA population, we may start to see impacts within three years (2024), although this is speculative. Although difficult to quantify, we anticipate that the proposed population objective, by resulting in more Mexican wolves in the MWEPA, has the potential to result in higher predation pressure and impacts to ungulates (as conceptualized by the wolf to elk ratio) than those we anticipated from the population objective established in the 2015 10(j) rule.

Impact of Proposed Genetic Objective

Under this alternative, we will release more captive Mexican wolves into the MWEPA than under the current release recommendation in the 2015 10(j) rule. This will result in achieving a level of gene diversity that we expect will alleviate genetic threats to the Mexican wolf in the MWEPA. However, we do not expect improved gene diversity to alter the fundamental predator-prey relationships in the MWEPA or the predation pressure on elk or other ungulates by Mexican wolves. Regardless of whether we release cross-fostered pups or adult wolves, any surviving released wolves would incrementally increase the predation pressure on ungulates at similar rates as other wild Mexican wolves in the MWEPA.

Based on these considerations, we do not anticipate that the direct action of releasing cross-fostered pups, family groups, or adult wolves would affect the abundance or distribution of ungulates, specifically elk, in suitable habitat in the MWEPA. Indirectly, an incremental increase in predation pressure from surviving released wolves would occur over time. We assess predation pressure for this alternative under *Impact of Proposed Population Objective*, above. Our proposal to include the proposed genetic objective in the regulatory part of the 10(j) rule would not have an impact on wild ungulates.

Impact of Proposed Revised Take Provisions

Two of the take provision revisions (take on Federal land and take on non-Federal land) are not relevant to wild ungulate prey because they relate to wolf-livestock interactions. Therefore, we will focus our discussion on the third take provision that we are proposing to revise, take in response to an unacceptable impact to a wild ungulate herd.

Under Alternative One, we would restrict this take provision by delaying requests from a state game and fish agency, or authorization by the Service to a state game and fish agency or designated agency, to remove wolves due to an unacceptable impact to a wild ungulate herd until the genetic objective of at least 22 released wolves surviving to breeding age has been achieved. We anticipate reaching our genetic objective around 2030; therefore, we anticipate that this take provision could be restricted for approximately eight years, from 2022-2030. Over those eight years, we expect the Mexican wolf population size in the MWEPA to increase, resulting in higher wolf densities in suitable habitat and higher estimated wolf to elk ratios (Table 2.1). While we do not know the exact ratio at which impacts to ungulates will begin to occur, we expect that some impacts may be observable toward the higher end of the ratios we could see over the eight-year period during which the take provision for take in response to an unacceptable impact to a wild ungulate herd would not be authorized under this alternative. Restricting this take provision would reduce our management response to alleviate unacceptable impacts to a wild ungulate herd, and impacts could be expected to occur until such time as the proposed genetic objective is reached and the restriction on this take provision is lifted.

Summary and Mitigation of Effects

Under Alternative One, which includes a proposed population objective, proposed genetic objective, and proposed revision to three take provisions, we would expect that a larger Mexican wolf population than under our current population objective from the 2015 10(j) rule could result in increased predation pressure on wild ungulate prey, particularly elk in Zones 1 and 2 of the MWEPA. We would expect to see wolf densities in suitable habitat ranging from six to eight wolves per 1000 km^2 under this alternative, as opposed to our projection of not more than 4.72 wolves per 1000 km^2 under the 2015 10(j) rule, and wolf to elk ratios as high as 5.95 wolves to 1,000 elk, compared to our previous projection of 3.94 wolves per 1000 elk (Table 2.1). (However, we note that with our updated projection of average annual growth of the wolf population of ~14%, the wolf population would reach the 2015 10(j) population objective around 2024 rather than 2027, while still in Phase 1, resulting in a wolf density of just over 6 wolves per 1000 km^2 in suitable habitat and 4.3 wolves to 1,000 elk; at full implementation after phasing ends wolf density would decrease to 4.73 wolves per 1,000 km^2 and the wolf to 1,000 elk ratio would decrease to 3.5 wolves per 1,000 elk). Without the ability to authorize wolf removal in response to an unacceptable impact to a wild ungulate herd until the proposed genetic objective is reached, we could expect some localized impacts to ungulates for up to six years. However, after the proposed genetic objective is reached, this take provision would again be available to mitigate such impacts for the duration of the continued recovery effort. Therefore, although direct impacts to localized ungulate herds may occur, the length of time during which the take provision for an unacceptable impact to a wild ungulate herd would be restricted (six years) reduces the likelihood of severe impacts. For this reason, we predict less than significant direct adverse impacts on wild ungulates, particularly elk, from implementation of Alternative One. We note that the provision of a phased approach of wolf occupancy in western Arizona would still be in effect under this alternative, as it is a provision of the 2015 10(j) rule that we are not proposing to revise (50 CFR 17.84(k)(iv)). This provision was developed to protect sensitive wild ungulate herds in the western portion of Zone 2 of the MWEPA

and is in effect for not more than 12 years from the effective date of the 2015 10(j) rule (February 17, 2015).

Alternative Two

Impact of Proposed Population Objective

This alternative shares the proposed population objective feature of Alternative One, and we would expect the effects of this feature on elk to be the same under both alternatives (see Alternative One – *Impact of Proposed Population Objective*, above).

Impact of Proposed Genetic Objective

This alternative shares the proposed genetic objective feature of Alternative One. As described in Chapter 4.2.3 – Potential Environment Impacts and Proposed Mitigation Measures – Mexican wolves, **Alternative Two**, we expect the time and effort it may take to achieve the genetic objective under Alternative Two to be slightly greater than Alternative One due to the potential for take of released wolves that could count toward the proposed genetic objective to occur under this alternative from the three 2015 10(j) take provisions. However, we would expect the effects of this feature on wild ungulates to be relatively consistent between the two alternatives even if we conducted several more releases under Alternative Two than Alternative One, as the direct effect of releases does not impact ungulates. Indirect impacts from wolf releases could occur in the form of an increase in localized predation pressure over time from released wolves that survive. Predation pressure from wolves on wild ungulates is discussed under the proposed population objective in Alternative One – *Impact of Proposed Population Objective*.

Impact of Maintaining the 2015 10(j) Take Provisions

As described under Alternative One – *Impact of Proposed Revised Take Provisions*, the take provision of relevance to this resource area is take in response to an unacceptable impact to a wild ungulate herd. Under Alternative Two, we would not revise this take provision from the 2015 10(j) rule and would therefore maintain our ability to authorize the state game and fish agency in Arizona or New Mexico, or any designated agency, to remove wolves from an area where Mexican wolf predation was resulting in an unacceptable impact to a wild ungulate herd. We have not been requested by the state of Arizona or New Mexico to authorize the removal of wolves under this take provision since the 2015 10(j) rule went into effect, and we generally do not expect to use it until the Mexican wolf population is substantially larger and exerting more predation pressure on wild ungulates, particularly elk. Under this alternative, which includes a proposed population objective that would lead to a larger population size than under the 2015 10(j) rule, there is a reasonable likelihood that impacts to wild ungulates may occur. However, if impacts led to a request by a state game and fish agency in the near future or at any time during the remaining recovery effort for the Mexican wolf, the Service would have the latitude to consider the request and mitigate impacts by removing or translocating wolves.

Summary and Mitigation of Effects

Similar to Alternative One, predation pressure would increase on wild ungulate prey, particularly elk, under Alternative Two, in Zones 1 and 2 of the MWEPA due to a larger population of Mexican wolves than under the 2015 10(j) rule. We would expect to see wolf densities in suitable habitat ranging from six to eight wolves per 1000 km^2 under this alternative and wolf to elk ratios as high as 5.95 wolves to 1,000 elk (Table 2.1). We do not know the exact wolf to elk ratio at which

impacts will begin to occur, but we expect that some impacts may be observable toward the higher end of the ratios. However, under this alternative, the take provision for take in response to an unacceptable impact to a wild ungulate herd would not be restricted until the proposed genetic objective is met, therefore impacts could be halted or mitigated through the removal or translocation of wolves in a localized area according to the specifications of this take provision. We predict less than significant direct adverse impacts on wild ungulates, particularly elk, from implementation of Alternative Two, but once mitigation measures are implemented through the use of the take provision for take in response to an unacceptable impact to a wild ungulate herd, we predict no significant direct or indirect adverse impacts on wild ungulate prey from implementation of this alternative.

Alternative Three

Impact of Maintaining the 2015 10(j) Population Objective

Under this alternative, we would not alter the current population objective from the 2015 10(j) rule of 300-325 Mexican wolves in the MWEPA. Therefore, the largest population size under this alternative would be 300-325 wolves, which results in a maximum wolf density ranging from 4.73-6.01 wolves per 1000 km^2 and an estimated wolf to elk ratio ranging from 3.5 to 4.3 wolves per 1000 elk (depending on phasing in western Arizona, that is, this population objective would be reached while in Phase 1, resulting in a wolf to 1,000 elk ratio of 4.3 and would be maintained after phasing ends, at which time it would drop to 3.5). Although we do not know the exact wolf to elk ratio at which impacts to wild ungulates may be measurable, wolf to elk ratios resulting in impacts to ungulates in other ecosystems suggest that the wolf to elk ratio that would be reached under this alternative would have a relatively low likelihood of resulting in impacts. Based on the wolf population size, density, and wolf to elk ratios projected for the other two alternatives, we would expect lower predation pressure in suitable habitat and lower likelihood of negative impacts to localized elk herds from the feature to maintain the 2015 10(j) population objective under Alternative Three.

Impact of Maintaining the 2015 10(j) Release Recommendation

As described under Alternative One – *Impact of Proposed Revisions to Take Provisions* - changes in gene diversity in the MWEPA resulting from differing numbers of wolf releases would not affect predator-prey dynamics between Mexican wolves and elk, nor we do not anticipate that the action of releasing cross-fostered pups, family groups, or adult wolves would directly affect the abundance or distribution of ungulates, specifically elk, in suitable habitat in the MWEPA. To the extent that our releases lead to adult wolves surviving in suitable habitat, adult wolves could exert predation pressure on localized herds; predation pressure is addressed under the proposed population objective feature of this alternative.

Impact of Maintaining the 2015 10(j) Take Provisions

Under this alternative, we would maintain the 2015 10(j) take provision for take in response to an unacceptable impact to a wild ungulate herd, which means that the Service could authorize a state or designated agency to remove Mexican wolves in areas of localized ungulate impacts in specific situations. We have not been requested by the state of Arizona or New Mexico to authorize the removal of wolves under this take provision since the 2015 10(j) rule went into effect, and we generally do not expect to use it until the Mexican wolf population is substantially larger and exerting more predation pressure on wild ungulates, particularly elk. Under this alternative, the

population objective of 300-325 wolves and the resultant wolf to elk ratios that could occur may mean that impacts never rise to an unacceptable level. However, if impacts led to a request by a state game and fish agency in the near future or at any time during the remaining recovery effort for the Mexican wolf, the Service would have the latitude to consider the request and mitigate impacts.

Summary and Mitigation of Effects

Under this alternative, we would maintain the population objective of the 2015 10(j) rule. Based on a wolf population of 300-325 and the correspondingly low expected wolf density in suitable habitat under this alternative, we would not foresee widespread reduction of prey populations. We would expect implementation of this alternative to have a less than significant direct adverse impact on ungulates in Zones 1 and 2 of the MWEPA, and specifically for those impacts to affect small, distinct, or isolated herds rather than the ungulate populations across the MWEPA. To mitigate ungulate declines of concern to the states of Arizona or New Mexico, the Service could authorize the removal of wolves using the take provision for an unacceptable impact to a wild ungulate herd. Once mitigation measures are implemented, we predict no significant direct or indirect adverse impacts on wild ungulate prey from implementation of Alternative Three in the MWEPA.

4.2.3 Potential Environment Impacts and Proposed Mitigation Measures – Mexican wolves

Alternative One

Impact of Proposed Population Objective

Under Alternative One, we would manage the MWEPA population for a population average over an 8-year period of greater than or equal to 320 wolves, exceeding 320 wolves in the last three years of the 8-year period, with an annual growth rate averaged over the 8-year period that is stable or increasing. After we achieve the 8-year average, we would continue to manage the population for an average of at least 320 Mexican wolves until recovery is achieved in the MWEPA and Mexico. As the MWEPA population grows, wolves will expand into unoccupied areas of suitable habitat and may also become more densely population throughout suitable habitat (Table 2.1).

The population objective we are proposing for the MWEPA is consistent with the demographic recovery criteria for the Mexican wolf in the revised recovery plan. These recovery criteria ensure that a population of Mexican wolves in the United States has at least a 90% probability of persistence over 100 years, resulting in a resilient population with a low risk of extinction (USFWS 2017a and see Chapter 2 of this FSEIS). Therefore, this proposed population objective will ensure the MWEPA population has a 90% probability of persistence over 100 years, and by doing so will ensure that a resilient population will persist in one of the two focal geographic areas needed to achieve range-wide recovery of the Mexican wolf (USFWS 2017a). The proposed population objective will contribute substantially to the long-term conservation and recovery of the Mexican wolf by alleviating a significant threat to the Mexican wolf in the MWEPA.

Impact of Proposed Genetic Objective

Under Alternative One, we would release a sufficient number of captive Mexican wolves to the MWEPA to ensure that at least 22 released wolves survived to breeding age. The proposed genetic objective we are proposing for the MWEPA is consistent with the genetic recovery criterion for the Mexican wolf in the revised recovery plan. This recovery criterion ensures that a population of

Mexican wolves in the United States represents approximately 90% of the gene diversity retained by the captive population, which we expect to reduce the near-term risk of inbreeding depression as well as to aid the Mexican wolf's ability to respond and adapt to various and changing environmental conditions. Therefore, this proposed genetic objective will improve the gene diversity of the MWEPA population sufficient to alleviate significant genetic threats, and by doing so will ensure that a population with adequate genetic representation contributes to the long-term conservation and recovery of the Mexican wolf (USFWS 2017a). Codifying this proposed genetic objective in the 10(j) rule, as compared to the location of the release recommendation in the preamble of the 2015 10(j) rule, strengthens our commitment to alleviating genetic threats to the Mexican wolf by improving gene diversity in the MWEPA.

Impact of Proposed Revision of 2015 10(j) Take Provisions

Under Alternative One, our proposed revisions to three take provisions from the 2015 10(j) rule could reduce the take of Mexican wolves, including reducing the potential for take of released wolves that could count toward the proposed population objective, compared to that which would occur from these provisions under the 2015 10(j) rule. Take of released wolves prior to reaching the proposed genetic objective would hinder our ability to achieve the proposed genetic objective.

Between 2022 and 2030, the time period within which we expect to reach the proposed genetic objective based on the benchmarks we are proposing to establish for the cumulative number of released wolves surviving to breeding age under this feature of Alternative One, estimated take from the permits we would expect to issue on Federal and non-Federal land could result in the take of approximately 18 wolves, ranging from one to three wolves per year (Table 2.1). It is difficult to predict the likelihood that any of these would be released wolves counting toward the proposed genetic objective but given that some released wolves will not be collared, we recognize the potential for this to occur, although at a fairly low level. The level of take of one to three wolves per year is insignificant demographically to the MWEPA population or the Mexican wolf subspecies, but the take of a released wolf prior to meeting the proposed genetic objective would be considered a setback in our progress toward recovery. Additional releases may be necessary to make up for the loss of a released wolf or wolves. Therefore, we estimate our proposed revisions to the take provisions for take on Federal and non-Federal land would lead to improvement in the gene diversity of the MWEPA population likely around one to two years more quickly than without the proposed revisions based on the potential for take of a released wolf to occur and additional releases to be necessary to achieve the proposed genetic objective.

Like the take provisions for take on Federal land and non-Federal land, we recognize the potential for the take in response to an unacceptable impact to a wild ungulate herd to result in the take of released wolves during the time in which we are trying to achieve the proposed genetic objective. By completely restricting the use of this take provision until we have achieved our objective, we strengthen our ability to reach the annual benchmarks we are proposing to establish for the cumulative number of released wolves surviving to breeding age relative to our proposed revisions for take on Federal land and non-Federal land, and ultimately to meet our proposed genetic objective. Therefore, our proposed revision to this take provision would also lead to improvements in the gene diversity of the MWEPA population slightly quicker than without the proposed revisions.

Summary

Alternative One will result in a population of Mexican wolves in the MWEPA that is robust demographically and genetically because current threats due to small population size and low gene diversity will be alleviated due to achieving the proposed population objective and proposed genetic objective. The temporary restriction of several take provisions while we focus on achieving the proposed genetic objective will help to ensure that our progress toward recovery advances consistently prior to allowing management flexibility that could detract from our progress, as well as ensuring that our progress to improve gene diversity keeps pace with the growth of the MWEPA. Once we have achieved the genetic objective, the population's condition will be robust enough to withstand removing our proposed restrictions on the three take provisions and doing so will ensure we have a range of management tools to address conflicts as we continue to the manage the MWEPA until delisting occurs. Based on the threat alleviation that will be achieved under this alternative, and the protective approach to ensure efficient progress is made toward recovery in the near-term, we predict a significant beneficial effect to the Mexican wolf subspecies and the MWEPA population.

Alternative Two

Impact of Proposed Population Objective

This alternative shares the proposed population objective feature of Alternative One, and we would expect the effects of this feature on the Mexican wolf to be the same under both alternatives (see Alternative One – *Impact of Proposed Population Objective*, above).

Impact of Proposed Genetic Objective

This alternative shares the proposed genetic objective feature of Alternative One, and we would expect the effects of this feature on the Mexican wolf to be the same under both alternatives. Under Alternative Two in this SEIS, we would expect gene diversity in the MWEPA population to improve over time, and genetic threats to decrease, due to at least 22 released wolves surviving to breeding age in the MWEPA, a level commensurate with 90% of the genes in captivity being represented in the MWEPA. However, we may achieve the proposed genetic objective one to two years later under Alternative Two compared to Alternative One, as explained below in *Impact of Maintaining the 2015 10(j) Take Provisions*, which would delay complete threat alleviation by that length of time.

Impact of Maintaining the 2015 10(j) Take Provisions

Under this alternative we would maintain the 2015 10(j) take provisions for take on Federal land, non-Federal land, and in response to an unacceptable impact to a wild ungulate herd. We would expect our issuance of permits for take on non-Federal and Federal land to occur at a rate of approximately 0.026 permits/wolf/year on non-Federal land and 0.033 permits/wolf/year on Federal land and for the take of one Mexican wolf to occur for every 12 permits issued. Between 2022 and 2030, the time in which we expect to achieve the proposed genetic objective, estimated take from the permits we would expect to issue on Federal and non-Federal land could result in the take of approximately 18 wolves, ranging from one to three wolves per year (Table 2.1), some portion of which could be released wolves. We are uncertain of the amount of take that could occur in response to an unacceptable impact to a wild ungulate herd, although we recognize a reasonable likelihood of taking one or more released wolves during these removals because one or more packs (rather than individual wolves), would be targeted for removal.

There is considerable uncertainty in quantifying the likelihood that a wolf taken via these take measures would be a released wolf, yet we recognize that any take of a released wolf that could have counted toward the proposed genetic objective will be a setback to achieving our recovery goals because additional releases may need to be conducted. If several additional releases were needed to achieve the genetic objective compared with Alternative One, we would expect to reach the genetic objective within one to two years later than in Alternative One depending on the type and success of releases conducted (cross-fosters, which take two years to reach breeding age and count toward the objective; or adult wolves, which could count toward the objective the breeding season following their year of release). It is difficult to determine the precise genetic impact of a delay of a few wolves reaching breeding age over a period of up to a few years in meeting the proposed genetic objective to the recovery of the Mexican wolf without knowing the genetic makeup of the population at that time; however, meeting the genetic objective sooner will alleviate threats more quickly by ensuring that at least 90% of the gene diversity in captivity is represented in the wild.

Summary

Alternative Two will result in a population of Mexican wolves in the MWEPA that is robust demographically and genetically because current threats due to small population size and low gene diversity will be alleviated due to achieving the proposed population objective and proposed genetic objective. Maintaining the 2015 10(j) three take provisions will allow us to continue to issue permits for take on Federal and non-Federal land and to authorize take in response to unacceptable impacts to ungulates. These take provisions could lead to the occasional take of one or more released wolves during the time in which we are trying to reach recovery criteria, which could result in a delay of one to a few years in achieving the proposed genetic objective. Based on the threat alleviation that will be achieved under this alternative, even with a slight delay of up to a few years, we predict a significant beneficial effect to the Mexican wolf subspecies and the MWEPA population.

Alternative Three

Impact of Maintaining the 2015 10(j) Population Objective

We previously expected the MWEPA population to grow at 10% annually under the 2015 10(j) rule until it achieved the population objective of 300-325 Mexican wolves around 2027, resulting in a density of approximately five wolves per 1000 km^2 of suitable habitat (USFWS 2014, Appendix D, Table D-2). We have revised our population growth expectations in this SEIS based on the actual population growth of the MWEPA population since 2015 and would now expect to reach the population of 300-325 Mexican wolves closer to 2024, with a similar density in suitable habitat as previously predicted (Table 2.1).

As we explained in the 2014 FEIS, we would expect for a population of this size to generally be a robust, self-sustaining, population (USFWS 2014). However, now that we have developed recommended standards for the level of persistence that we equate with recovery for the Mexican wolf (at least a 90% likelihood of persistence over 100 years) in the revised recovery plan, we would not consider demographic threats to the MWEPA population to be alleviated sufficiently at a population size of 300-325 wolves because the extinction risk would be unacceptably high for the long-term conservation and recovery of the Mexican wolf.

Impact of Maintaining the 2015 10(j) Release Recommendation

Under Alternative Three in this SEIS, we would expect gene diversity to improve over time as we achieve the effective migration recommendation from the 2015 10(j) rule. However, the increase in gene diversity from 7-10 effective migrants over five generations would not attain the standard we recommend in the revised recovery plan for 90% of the genes in captivity to be represented in the MWEPA. Therefore, genetic threats to the Mexican wolf would not be sufficiently alleviated for the long-term conservation and recovery of the Mexican wolf by maintaining the 2015 10(j) release recommendation.

Impact of Maintaining the 2015 10(j) Take Provisions

Under this alternative, we would maintain management flexibility to address wolf-livestock conflict by issuing permits for take of Mexican wolves on Federal and non-Federal land, and we would maintain management flexibility to address unacceptable impacts to a wild ungulate herd by authorizing the removal of Mexican wolves at the request of a state game and fish agency. As described under Alternative One and Two, there is the potential for take of released wolves to occur from these take provisions. Take of released wolves may be slightly less likely under Alternative Three because we would conduct fewer releases, although that may be negated by the smaller population size under this alternative, which would result in fewer take permits on Federal and non-Federal land compared to Alternative Two. For example, at a population size of 300 to 325 wolves we would expect to issue a total of around 18 permits per year, whereas at a population size in the mid-300s to low 400s we would expect to issue around 21 to 25 permits per year (see Table 2.1, for projected population sizes of 316, 361, and 412). With our projected take of one wolf for every 12 permits issued, the difference in take could be one to two wolves per year. The take of any released wolf could reduce the degree to which genetic threats would be alleviated, or additional releases would be necessary to compensate and achieve the 2015 10(j) release recommendation.

Summary

Alternative Three will result in a population with partially alleviated demographic and genetic threats. Although the population would be generally robust at a size of 300-325 Mexican wolves with improved gene diversity from 7-10 effective migrants having contributed to the gene diversity of the MWEPA, we recognize that additional security from threats is necessary for the recovery of the Mexican wolf through achieving a population that does not have an upper limit of 325 and has additional gene diversity representation from captivity. Based on this alternative moving the MWEPA population substantially, although not fully, toward recovery, we predict a significant beneficial effect to the Mexican wolf subspecies and the MWEPA population.

4.3 Economic Activity

We assessed the potential impacts to economic activity related to ranch operations and big game hunting from implementation of the proposed action and alternatives. We incorporate by reference (40 C.F.R. 1502.21) Chapter 4.4 Economic Resources from the 2014 FEIS to provide relevant background information. We provide data that are relevant across the proposed action and alternatives before providing additional synopsis by alternative.

4.3.1 Potential Environmental Impacts and Proposed Mitigation Measures – Ranch Operations

This section updates the estimated economic effects of the Mexican wolf reintroduction program on ranch operations. As discussed in the 2014 FEIS, ranch operations experience direct effects

from cattle depredations in addition to indirect effects undertaken to reduce the likelihood of depredations as well as physiological impacts on stressed cattle. This section looks at both the overall macro-economic effects attributable to depredations as well as estimated effects on typical ranch operations.

Table 4-1 summarizes confirmed wolf depredations between 1998 and 2019. Depredations are confirmed by the USDA's Animal and Plant Health Inspection Services (APHIS) and payments are then authorized by the USDA's Farm Services Administration (FSA) and/or the Mexican Wolf/Livestock Council or Arizona Livestock Loss Board.[26] Between 1998-2019 there have been a total of 650 confirmed depredations with a corresponding annual average of 30 depredations each year. Overall, for the entire period, there are 44 depredations per 100 wolves. In comparison, the 2014 FEIS calculated 28 depredations per 100 wolves. The increase can be attributed to a sharp increase in confirmed depredations in the last several years.

[26] Source: Mexican Wolf Recovery Program data, U.S. Fish and Wildlife Service https://www.fws.gov/southwest/es/mexicanwolf/pdf/FSACoexistenceCouncilCompensationGuidelinesNov2017_edits.pdf

Table 4-1. Confirmed Mexican Wolf Cattle Depredations 1998-2019.

Year	Minimum Wolf Population Count (observed)	Confirmed Wolf Killed Cattle	Number of Cattle Killed per 100 Wolves
1998	4	0	0
1999	15	5	33.3
2000	22	1	4.5
2001	26	5	19.2
2002	41	9	22.0
2003	55	3	5.5
2004	44-48 (46)	8	17.4
2005	35-49 (42)	20	47.6
2006	59	27	45.8
2007	52	26	50.0
2008	52	19	36.5
2009	42	16	38.1
2010	50	7	14.0
2011	67	20	29.9
2012	80	18	22.5
2013	88	28	31.8
2014	112	30	26.8
2015	98	49	50.0
2016	114	49	43.0
2017	117	34	29.1
2018	131	104	79.4
2019	163	172	105.5
Sum/Avg	1476	650	44.0
Average	67.1	29.5	44.0

Figure 4-1 shows the trend in depredations per wolf since reintroduction began in 1998 through 2019. Annual depredations per wolf have ranged between 0.05 cattle per year in 2003 to 1.05 cattle per year in 2019. The figure shows the sharp increase in depredations per wolf in 2018 and 2019 compared to the previous years where depredations were roughly less than one-half recent activity. The causes of the recent increase are not yet well understood but are noted, nonetheless.

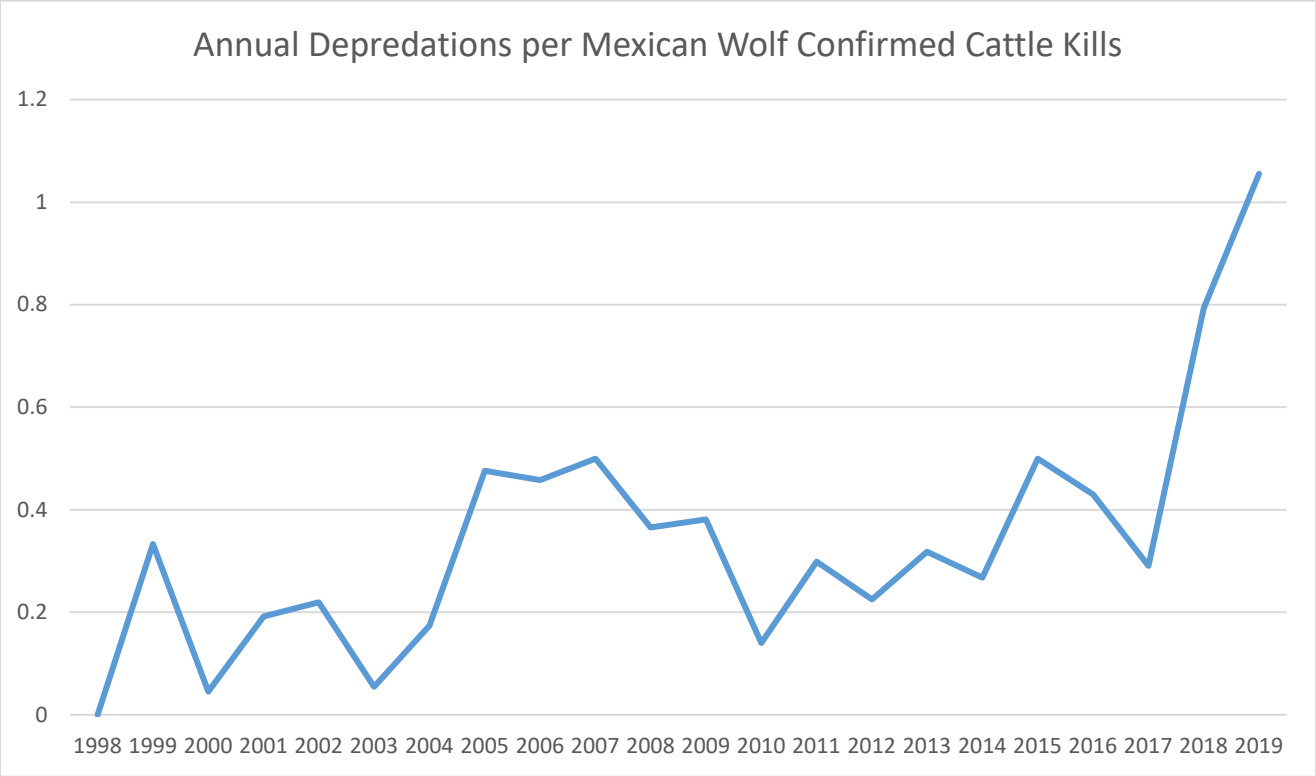

Figure 4-1. Annual Depredations per Mexican Wolf Confirmed Cattle Kills. (Source: Mexican Wolf Recovery Program data, U.S. Fish and Wildlife Service.)

Table 4-2 shows the total estimated number of cattle killed, including unconfirmed kills, by Mexican wolves during the period 1998 through 2019. The 2014 FEIS estimated that there were most likely 4.1 unidentified cattle killed for every confirmed kill.[27] Based on this same projection, it is estimated that there were approximately 2,665 unconfirmed cattle killed by wolves that were unknown or not confirmed during this period. Over this period, approximately 150 cattle were killed on an annual basis.

[27] 2014 FIES, Chapter 4, p. 32.

Table 4-2. Estimated Total Mexican Wolf Cattle Depredations 1998 – 2019.

Year	Minimum Wolf Population Count (observed)	Confirmed Wolf Killed Cattle	Number of Cattle Killed per 100 Wolves	Estimated Unconfirmed Kills	Estimated Unconfirmed Kills per 100 Wolves	Total Estimated Kills	Total Estimated Kills per 100 Wolves
1998	4	0	0	0	0	0	0
1999	15	5	33.3	20.5	136.7	25.5	170.0
2000	22	1	4.5	4.1	18.6	5.1	23.2
2001	26	5	19.2	20.5	78.8	25.5	98.1
2002	41	9	22.0	36.9	90.0	45.9	112.0
2003	55	3	5.5	12.3	22.4	15.3	27.8
2004	44-48 (46)	8	17.4	32.8	71.3	40.8	88.7
2005	35-49 (42)	20	47.6	82	195.2	102	242.9
2006	59	27	45.8	110.7	187.6	137.7	233.4
2007	52	26	50.0	106.6	205.0	132.6	255.0
2008	52	19	36.5	77.9	149.8	96.9	186.3
2009	42	16	38.1	65.6	156.2	81.6	194.3
2010	50	7	14.0	28.7	57.4	35.7	71.4
2011	67	20	29.9	82	122.4	102	152.2
2012	80	18	22.5	73.8	92.3	91.8	114.8
2013	88	28	31.8	114.8	130.5	142.8	162.3
2014	112	30	26.8	123	109.8	153	136.6
2015	98	49	50.0	200.9	205.0	249.9	255.0
2016	114	49	43.0	200.9	176.2	249.9	219.2
2017	117	34	29.1	139.4	119.1	173.4	148.2
2018	131	104	79.4	426.4	325.5	530.4	404.9

Year	Minimum Wolf Population Count (observed)	Confirmed Wolf Killed Cattle	Number of Cattle Killed per 100 Wolves	Estimated Unconfirmed Kills	Estimated Unconfirmed Kills per 100 Wolves	Total Estimated Kills	Total Estimated Kills per 100 Wolves
2019	163	172	105.5	705.2	432.6	877.2	538.2
Average	67.1	29.5	34.2	121.1	140.1	150.7	174.3
Total		650.0		2,665.0		3,315.0	

(Source: Mexican Wolf Recovery Program data and Branch of Economics, U.S. Fish and Wildlife Service.)

Figures 4-2 and 4-3 show the trend in market prices for calves and cattle over 500 lbs. for the previous ten years. Prices have remained relatively stable except for the years 2014 and 2015 when prices peaked. On average, during the past ten years, calf prices were $195.42 per hundred weight (CWT) and the average cattle price was $134.45.

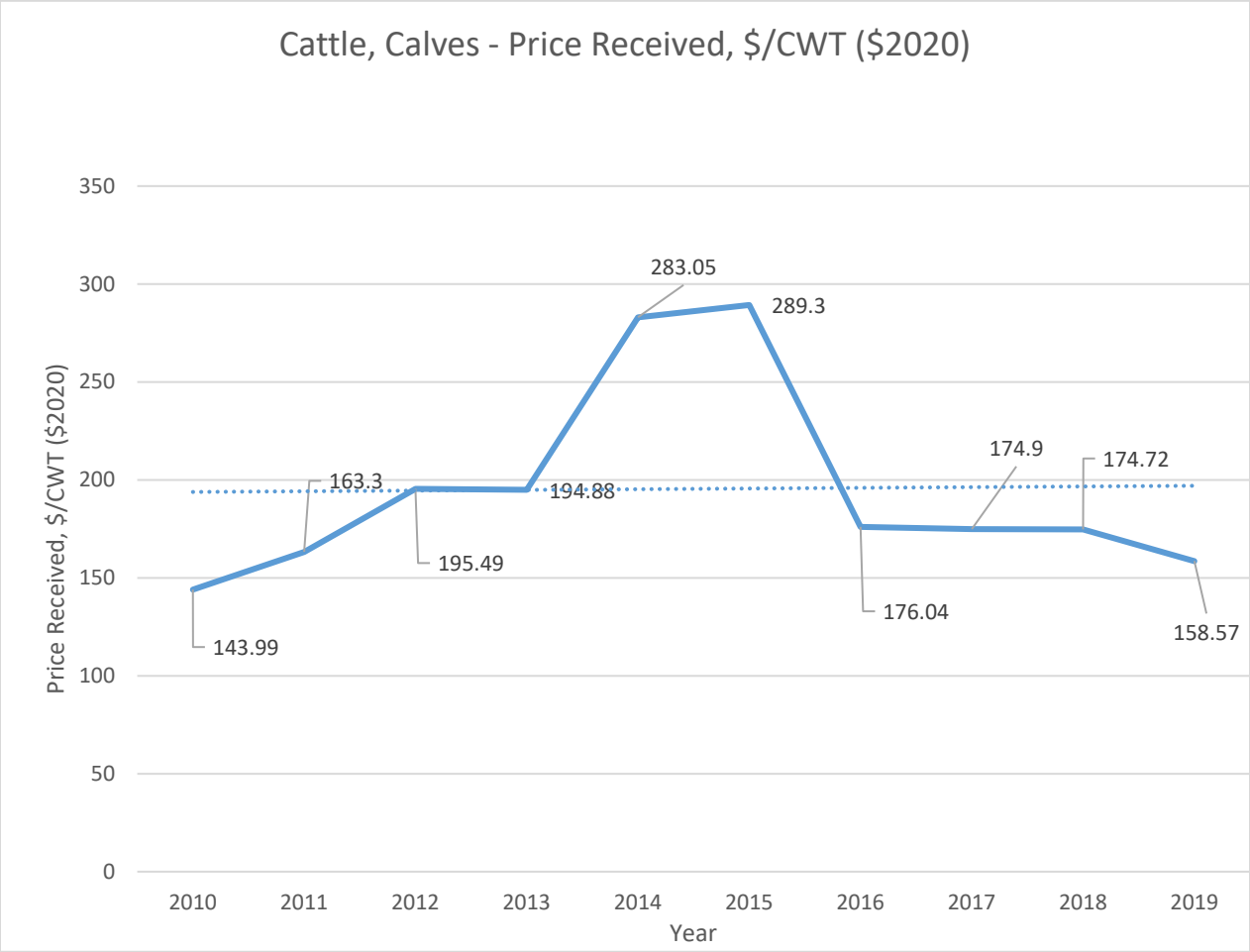

Figure 4-2. Cattle, Calves – Price Received, Measured in $2020/CWT. (Source: National Agricultural Statistics Service, U.S. Department of Agriculture. Http://www.nass.usda.gov/statistics_by_subject/index.php. Accessed January 2021.)

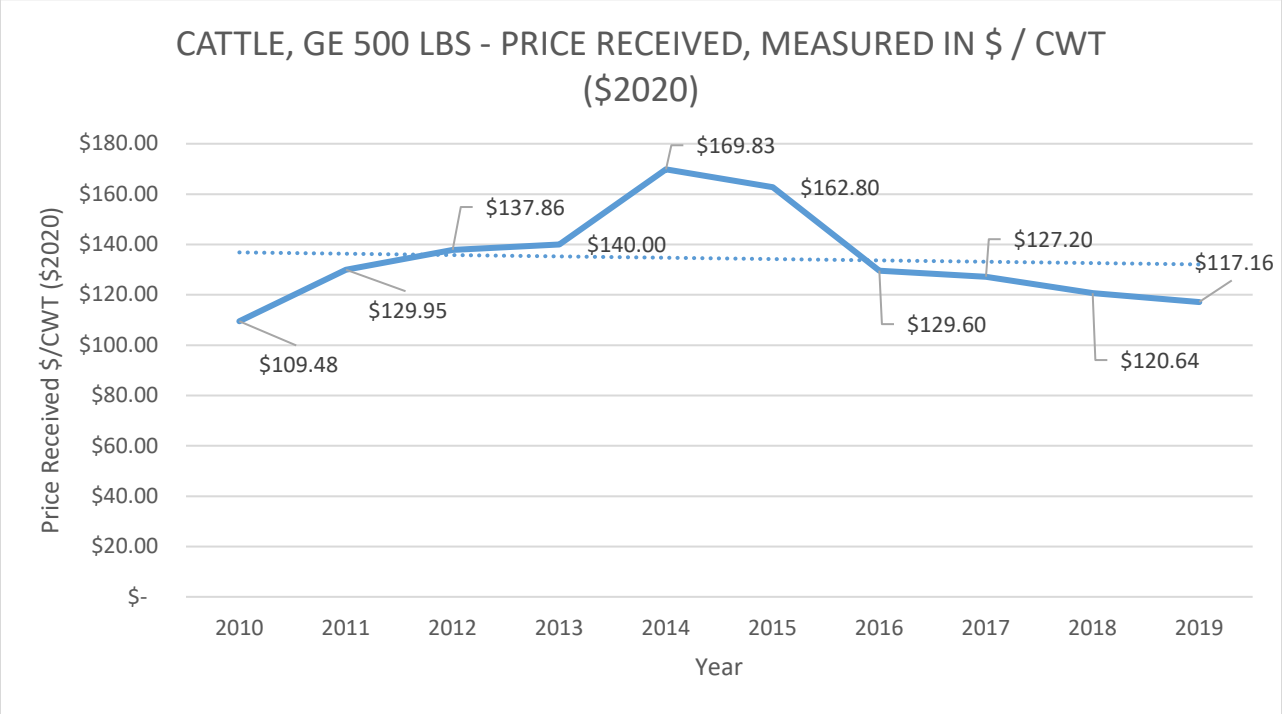

Figure 4-3. Cattle, Greater than or Equal to 500 Pounds – Price Measured in Hundred Weight. (Source: National Agricultural Statistics Service, U.S. Department of Agriculture. https://quickstats.nass.usda.gov/results/AC3B6BE2-2673-383C-81EE-3EA1F658A13C?pivot=short_desc. Accessed March 1, 2021.)

Table 4-3 provides an estimate of the overall direct financial loss of wolf depredations between 1998 and 2019. These estimates are based on the assumptions used in the 2014 FEIS that 68 percent of depredations were for calves with the remainder being cows. Using the average ten-year market value for calves ($195.42/cwt) and cows ($134.45) along with an assumed market weight for 500 lbs. for calves and 1,000 lbs. for cows, the combined weighted value for a depredation is estimated to be $1,094.67 ($2020).

The overall loss of livestock attributable to wolf depredations is estimated to have been over $3.6 million ($2020) during the period 1998 through 2019. Annual average depredations based on this period are 151 depredations each year at a current market loss of $165 thousand. Table 4-3 also provides an estimate of the cost of depredations calculated on a 100-wolf basis. Using this standard, for every 100 wolves, it is estimated that on average there will be 174 depredations each year with a corresponding market loss of $191 thousand. Compared to the combined 2018 Arizona and New Mexico cattle sales of nearly $1.77 billion, the cost of wolf depredations on the overall cattle market in the States has minimal macro-economic effects.

Table 4-3. Estimated Market Value for the Total Estimated Number of Depredated Cattle (Confirmed and Unconfirmed) 1998 – 2019), $2020.

Year	Total Estimated Kills (confirmed and unconfirmed)	Mkt Value ($1,094.67/cwt)	Total Estimated Kills per 100 Wolves	Mkt Value ($1,094.67/cwt)
1998	-	$1,095	0	$0
1999	26	$27,914	170	$186,094
2000	5	$5,583	23	$25,376
2001	26	$27,914	98	$107,362
2002	46	$50,245	112	$122,549
2003	15	$16,748	28	$30,452
2004	41	$44,662	89	$97,092
2005	102	$111,656	243	$265,848
2006	138	$150,736	233	$255,484
2007	133	$145,153	255	$279,140
2008	97	$106,073	186	$203,987
2009	82	$89,325	194	$212,678
2010	36	$39,080	71	$78,159
2011	102	$111,656	152	$166,651
2012	92	$100,491	115	$125,613
2013	143	$156,319	162	$177,635
2014	153	$167,484	137	$149,539
2015	250	$273,558	255	$279,140
2016	250	$273,558	219	$239,963
2017	173	$189,815	148	$162,235
2018	530	$580,612	405	$443,215
2019	877	$960,243	538	$589,106
Average	151	$164,996	174	$190,787
Total	3,315	$3,629,919	3,834	$4,197,321

(Source: Mexican Wolf Recovery Program data, U.S. Fish and Wildlife Service; NASS 2021. Notes: Computations developed by Branch of Economics, U.S. Fish and Wildlife Service using the average weighted price received ($2020) and depredation ratios for cattle and calves for the period 2010-2019.)

While the overall market impact of wolf depredations is minimal compared to the total annual value of Arizona and New Mexico cattle operations, the impacts felt by ranches that incur actual depredations on their herds can be more substantial. This section considers how a model small, medium, and large cattle ranching operation could be impacted from depredations. The analysis uses the latest model ranch pro-forma financial cost and return estimates developed by the New

Mexico State University's College of Agriculture, Consumer, and Environmental Science.[28] This is the same approach adopted in the 2014 FEIS but updated using the latest 2019 financial estimates and expected returns.

As the 2014 FEIS noted, primary factors affecting ranch profitability are auction prices, which affect revenues, and supplemental feed prices, which affect costs. Figure 4-4, below, shows the ten-year trend in alfalfa prices, which has shown a moderate decline over this period. The average price per ton between the period 2011 and 2020 was $247.32, which is the price used for modeling purposes in this analysis.

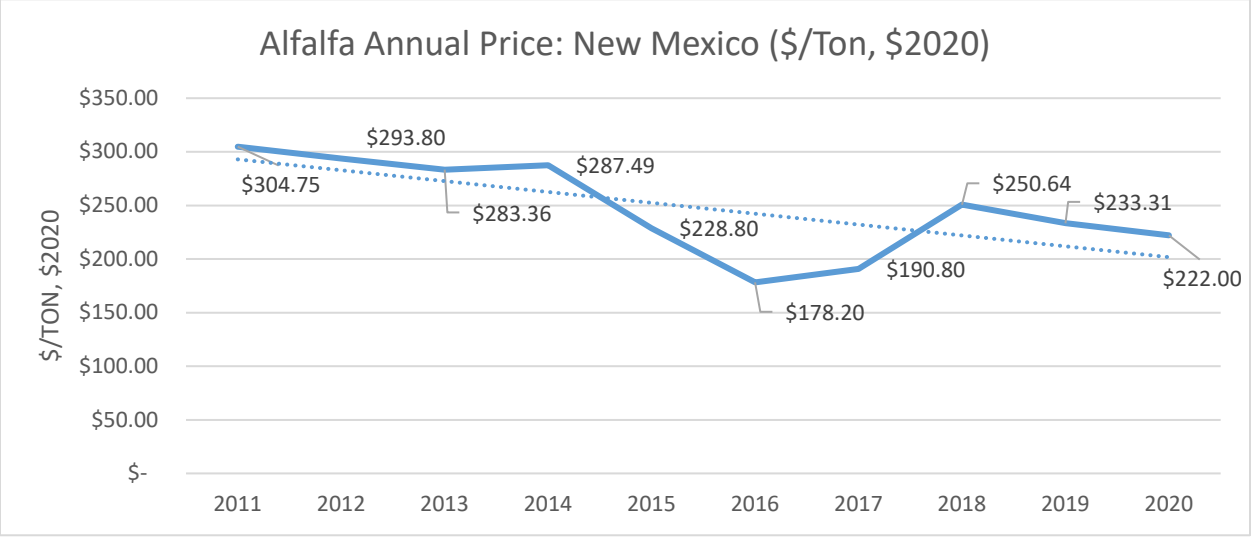

Figure 4-4. Ten-Year Annual Price Received, Alfalfa, ($/Ton, $2020), New Mexico. (Source: U.S. Department of Agriculture, National Agriculture Statistics Service, https://quickstats.nass.usda.gov/results/445E32F9-ABD1-3483-86A6-6BCCEFBAD2EE. Accessed March 2, 2021.)

Table 4-4 shows the basic operating assumptions associated with a small, medium, and large model ranching operation. Like the 2014 FEIS, this analysis uses the Cost and Return Estimates for Southwest livestock operations.[29] The budgets used in this analysis, however, have been updated to reflect the latest budgets published by New Mexico State University for the year 2019. Producer prices, however, reflect the average price received for cattle and calves and average cost for alfalfa over the previous ten years, as previously described.

[28] https://aces.nmsu.edu/cropcosts/
[29] https://aces.nmsu.edu/cropcosts/2019-projected-livestock.html

Table 4-4. Model Ranch Baseline Operating Assumptions

	Small	Medium	Large
Breed Herd Size	76	180	315
Replacement Heifers Kept	11	27	47
Cow to Bull ratio	15	15	15
Calf Crop Percent	0.85	0.85	0.84
Cull Rate	0.15	0.15	0.15
Steer Calf Weight	500	500	500
Heifer Calf Weight	475	475	475
Cow Weight	950	900	1000
Steer Weight	1400	1200	1300
Calf Price ($/cwt)	195.42	195.42	195.42
Cow Price ($/cwt)	134.45	134.45	134.45
Feed Expense Assumptions Federal Leases Permit cost is $1.35 per Animal Unit Month Cattle are grazed on Federal Lands eight months of the year Hay/Alfalfa Cattle on average require one-half ton of hay per month when not grazing on Federal lands Price of Hay is $247.52 per ton based on USDA Market News Weekly New Mexico Hay Summary Salt and Mineral Cattle require on average 0.1 lbs per day 50 lbs of salt cost five dollars			
Source: NMSU Southwest Region Ranch Budgets 2019, https://aces.nmsu.edu/cropcosts/2019-projected-livestock.html and US Fish and Wildlife Service Branch of Economics Analysis.			

Table 4-5 shows the results of the simplistic pro-forma analysis under simple, baseline assumptions (i.e., no wolf effects). The analysis shows that based on expected market prices, feed costs, and weight of cattle sold, a small ranch must sell 51 of its 76 cattle to break even, a medium ranch, 107 cattle out of its total herd size of 180, and a large ranch 193 of its total herd size of 315 cattle. Based on the assumptions of the number of heifers kept by each model ranch, a small ranch can sell up to 15 additional cattle for profit, a medium ranch 47, and a large ranch 75 cattle.[30]

[30] *Note: Sum of breakeven cattle sales and number of cattle representing a profit do not add exactly to total breed herd size for model ranch due to modelling assumptions regarding the average weight of a sold cow/calf/bull along with models emphasis on total weight of sold cattle in pounds to calculate profit.*

Table 4-5. Model Ranch Analysis Results

		Small	Medium	Large
Revenues	Steer Calves	$31,560.33	$74,748.15	$129,270.33
	Heifer Calves	$19,771.62	$45,948.13	$79,179.30
	Cull Cows	$14,050.03	$32,671.35	$63,191.50
	Cull Bulls	$1,882.30	$1,613.40	$5,243.55
Feed Expenses	Federal Lease	$820.80	$1,944.00	$3,402.00
	Hay/Alfalfa	$37,592.64	$89,035.20	$155,811.60
	Salt and Minerals	$277.40	$657.00	$1,149.75
Other Variable Costs	Vet and Medicine	$801.00	$2,310.00	$4,043.00
	Livestock Hauling	$278.00	$708.00	$1,293.00
	Hired Labor	$700.00	$3,500.00	$10,000.00
	Operating Costs - Eqip & Mach	$1,791.00	$1,791.00	$4,959.00
	Operating Costs - Vehicles	$2,066.00	$3,031.00	$4,959.00
	Ranch Maintenance	$1,860.00	$3,031.00	$3,789.00
	Beef Checkoff	$36.00	$105.00	$181.00
	Purchased Livestock	$2,000.00	$2,000.00	$10,000.00
Expected Returns	Total Revenue	$67,264.27	$154,981.03	$276,884.68
	Total Cost (Variable)	$51,572.84	$108,112.20	$199,587.35
	Profit	$15,691.43	$46,868.83	$77,297.33
	Breakeven Cash Price	$135.30	$123.89	$126.67
	Breakeven Cattle Sales	51	107	193
	Number of Cattle Representing Profit	15	47	75

Source: NMSU Southwest Region Ranch Budgets 2019, https://aces.nmsu.edu/cropcosts/2019-projected-livestock.html and US Fish and Wildlife Service Branch of Economics Analysis.
Note: Sum of breakeven cattle sales and number of cattle representing a profit do not add exactly to total breed herd size for model ranch due to modelling assumptions regarding the average weight of a sold cow/calf/bull along with models emphasis on total weight of sold cattle in pounds to calculate profit.

Table 4-6 presents an estimate of the time and value of labor required by ranchers to file a compensation claim for cattle depredations by Mexican wolves. The time and the associated value of that labor spent filing claims is another component of the economic costs associated with wolf depredations. The hourly labor rate reflects the 2020 published wage rate for farmers, ranchers, and other agricultural managers as published by the U.S. Department of Labor Statistics. Like the 2014 FEIS, this analysis assumes that it takes approximately ten hours of labor hours preparing claims with a corresponding economic cost of $370. Since 1998, ranchers have incurred approximately 6,500 labor hours pursuing compensation for a total of 650 depredations at a total cost of $240,000.

Table 4-6. Cost of Compensation Claim Preparation for Confirmed Cattle Depredations by Mexican Wolves

Year	Confirmed Wolf Killed Cattle	Preparation Hours	Labor Rate ($2020)	Labor Cost
1998	0	-	$36.93	$0
1999	5	50	$36.93	$1,847
2000	1	10	$36.93	$369
2001	5	50	$36.93	$1,847
2002	9	90	$36.93	$3,324
2003	3	30	$36.93	$1,108
2004	8	80	$36.93	$2,954
2005	20	200	$36.93	$7,386
2006	27	270	$36.93	$9,971
2007	26	260	$36.93	$9,602
2008	19	190	$36.93	$7,017
2009	16	160	$36.93	$5,909
2010	7	70	$36.93	$2,585
2011	20	200	$36.93	$7,386
2012	18	180	$36.93	$6,647
2013	28	280	$36.93	$10,340
2014	30	300	$36.93	$11,079
2015	49	490	$36.93	$18,096
2016	49	490	$36.93	$18,096
2017	34	340	$36.93	$12,556
2018	104	1,040	$36.93	$38,407
2019	172	1,720	$36.93	$63,520
Total	650	6,500	$36.93	$240,045

(Source: U.S. FWS Mexican Wolf Annual Progress Reports, IEc 2005, and U.S. BLS. https://www.bls.gov/oes/current/oes119013.htm)

The 2014 FEIS also considered the economic cost on typical ranches where the presence of wolves stressed the cattle (physiological impacts). The 2014 FEIS determined from a consideration of available studies that when wolves are present around cattle, cattle tend to become nervous and change their grazing behavior resulting in an average six percent loss of expected weight over the season. Table 4-7 shows how a six percent loss in weight would affect the financial expectations for a small, medium, and large cattle ranch operation based on similar characteristics and assumptions as presented earlier in this analysis. The analysis shows that a six percent loss of weight across the herd for small, medium, and large ranches results in approximately a 20 percent decrease in profits under baseline assumptions with the profit loss varying from $3,100 for small ranches to $16,600 for a large ranch.

Table 4-7. Financial Effect of Six Percent Weight Loss on Model Ranch

	Small	Medium	Large
Baseline Conditions			
Total Revenue	$67,264.27	$154,981.03	$276,884.68
Total Cost (Variable)	$51,572.84	$108,112.20	$199,587.35
Profit	$15,691.43	$46,868.83	$77,297.33
Alternate Conditions (six percent weight loss)			
Total Revenue	$64,184.36	$145,682.17	$260,271.60
Total Cost (Variable)	$51,572.84	$108,112.20	$199,587.35
Profit	$12,611.52	$37,569.97	$60,684.25
Expected Financial Loss Attributable to a Six Percent Decrease in Total Herd Size Weight			
Total Revenue	-$3,079.92	-$9,298.86	-$16,613.08
Total Cost (Variable)	$0.00	$0.00	$0.00
Profit	-$3,079.92	-$9,298.86	-$16,613.08
Percent of Profit	-19.6%	-19.8%	-21.5%

Source: U.S. FWS Branch of Economics, 2021.

Table 4-8 provides an updated estimate of the total economic impact incurred by cattle ranchers due to the presence of Mexican wolves since 1998. Since 1998, the overall impact is estimated to have been $3.9 million or approximately $176,000 each year. On average, the economic impact per wolf in the wild on the ranching community is approximately $2,000 per year.

Table 4-8. Total Economic Impact of Mexican Wolves on Cattle Ranching Operations ($2020)

Year	Mkt Value of Confirmed and Unconfirmed Depredations	Economic Cost of Compensation Claim Preparations	Total Impact	Number of Wolves	Economic Impact per Wolf
1998	$0	$0	$0	4	$0
1999	$27,914	$1,847	$29,761	15	$1,984
2000	$5,583	$369	$5,952	22	$271
2001	$27,914	$1,847	$29,761	26	$1,145
2002	$50,245	$3,324	$53,569	41	$1,307
2003	$16,748	$1,108	$17,856	55	$325
2004	$44,662	$2,954	$47,617	44-48 (46)	$1,035
2005	$111,656	$7,386	$119,042	35-49 (42)	$2,834
2006	$150,736	$9,971	$160,707	59	$2,724
2007	$145,153	$9,602	$154,755	52	$2,976
2008	$106,073	$7,017	$113,090	52	$2,175
2009	$89,325	$5,909	$95,234	42	$2,267
2010	$39,080	$2,585	$41,665	50	$833
2011	$111,656	$7,386	$119,042	67	$1,777
2012	$100,491	$6,647	$107,138	80	$1,339
2013	$156,319	$10,340	$166,659	88	$1,894
2014	$167,484	$11,079	$178,563	112	$1,594
2015	$273,558	$18,096	$291,653	98	$2,976
2016	$273,558	$18,096	$291,653	114	$2,558
2017	$189,815	$12,556	$202,372	117	$1,730
2018	$580,612	$38,407	$619,019	131	$4,725
2019	$960,243	$63,520	$1,023,762	163	$6,281
Average	$164,947	$10,911	$175,858	69	$2,034
Total	$3,628,824	$240,045	$3,868,869	1,388	n/a

Source: Branch of Economics, USFWS.

While the economic impact of Mexican wolf depredations on the value of the entire Arizona and New Mexico livestock industry ($1.8 billion annually, Figure 3-9) is very minor (0.1 percent of the overall combined value of sales) the impact on ranches affected by depredations and/or stress can be much larger in terms of the profitability of their operations. As a result, a compensation fund has been established to help offset this impact. Since 1998, the fund has paid out over $1.0

million in compensation to affected ranchers. However, because the total estimated financial cost on ranch operations attributable to wolf operations is $3.9 million, the fund has only compensated for approximately one-quarter of total losses. Table 4-9 summarizes the effect the compensation fund has had each year since 1998 on the overall estimated economic impact attributable to the presence of Mexican wolves in the wild.

Table 4-9. Estimated Uncompensated Cattle Livestock Operation Losses 1998- 2019 ($2020)

Year	Total Cost ($2020)	Depredation Compensation ($2020)	Uncompensated Losses ($2020)
1998	$0	$858.60	-$858.60
1999	$29,761	$3,782.00	$25,978.53
2000	$5,952	$2,310.00	$3,642.11
2001	$29,761	$15,038.10	$14,722.43
2002	$53,569	$7,632.00	$45,936.96
2003	$17,856	$11,985.00	$5,871.32
2004	$47,617	$6,973.30	$40,643.55
2005	$119,042	$25,080.00	$93,962.14
2006	$160,707	$48,794.25	$111,912.63
2007	$154,755	$38,585.08	$116,169.70
2008	$113,090	$7,288.72	$105,801.31
2009	$95,234	$23,235.63	$71,998.08
2010	$41,665	$4,245.92	$37,418.83
2011	$119,042	$20,044.50	$98,997.64
2012	$107,138	$16,159.00	$90,978.92
2013	$166,659	$30,906.31	$135,752.68
2014	$178,563	$70,733.09	$107,830.12
2015	$291,653	$121,224.29	$170,428.94
2016	$291,653	$79,732.27	$211,920.96
2017	$202,372	$60,009.80	$142,361.83
2018	$619,019	$116,959.32	$502,059.79
2019	$1,023,762	$289,883.89	$733,878.48
Average	$175,858	$45,521	$130,337
Total	$3,868,869	$1,001,461	$2,867,408

Note: Total economic costs calculated as the market value of confirmed and unconfirmed depredated livestock plus the economic cost associated with applying for compensation. Compensation totals obtained from 2014 FEIS and Mexican Wolf Recovery Program data, USFWS.

Alternative One

Impact of Proposed Population Objective

Under Alternative One, more wolves would be present in the future in the MWEPA than under the 2015 10(j) population objective, and we would expect wolves to continue to expand into

unoccupied suitable habitat in Zones 1 and 2 over time, as we have observed under the 2015 10(j) rule. Wolves will continue to occupy suitable habitat in the focal counties (Apache, Gila, Greenlee, Graham, and Navajo in Arizona, and Catron, Chaves, Sierra, and Socorro in New Mexico), and wolf occupancy will likely expand into some counties with suitable habitat that have not had sustained wolf occupancy since the reintroduction began in 1998. Wolf occupancy over time could be expected in Santa Cruz, Coconino, Maricopa, Mohave, Pinal, Pima, Cochise, and Yavapai counties in Arizona, and Bernalillo, Cibola, Dona Ana, Hidalgo, Lincoln, Luna, McKinley, Otero, Torrance, and Valencia counties, New Mexico, with an unlikely chance that wolf occupancy will occur in counties with small, disjunct patches of habitat in Zone 3 such as Chaves, Eddy, and Lea counties in New Mexico. Given our estimate that the economic impact per wolf in the wild on the ranching community is approximately $2,000 per year, per wolf (Table 4.8), a larger population of Mexican wolves would be expected to result in a commensurate increase in economic impacts on the ranching community. That is, our proposed population objective would lead to an increase in the economic impacts to the ranching community.

As highlighted above and could be expected, the significance of Mexican wolves' economic impact on the ranching community differs greatly depending on the scale at which impacts are considered. When viewed at the macro-level across Arizona and New Mexico, the economic impact of depredations from Mexican wolves is minimal, even when considered within the context of the larger population that would be expected under the proposed population objective (see our estimate above of 174 depredations per year per 100 wolves, with a corresponding market value of approximately $191,000/year (Table 4-3), compared to combined cattle sales in 2018 in Arizona and New Mexico of $1.77 billion). If, as previously discussed in Chapter 2, our proposed population objective resulted in a managed population size that ranged from the mid-300s to low 400s, the resultant increase in economic impact of depredations would be approximately an additional $200,000 annually across the MWEPA compared to managing for the population objective of 300-325 wolves under the 2015 10(j) rule. In 2019, the year with the highest number of confirmed and unconfirmed cattle depredations, the market value impact of $960,243 is minimal at the macro-level.

However, the economic impact of depredations and the broader costs associated with the presence of Mexican wolves in the MWEPA on ranching operations is considerably different at the scale of an individual ranch, particularly for small and medium-sized ranches. Based on our model ranch assumptions, small and medium-sized ranches may have only an additional 15-47 cattle to sell for profit above their break-even point, which makes the loss of one or several animals a potentially significant loss. As described in Chapter 3, most of the cattle sales in the state of Arizona are from large ranches with more than 5,000 head (Figure 3-11), but the majority of the ranches are small ranches (i.e., over 85% of ranches in Arizona have a herd size of fewer than 50 cattle). In New Mexico, sales are more evenly distributed from ranches with herd sizes ranging from 200 cattle to over 5,000, but most of the ranch operations in the state (77%) are small (see Figure 3-10). This means that while medium or large ranch operations are driving the economic activity of ranching in both states, there are many small ranches in the MWEPA for which the economic impacts from Mexican wolves may be difficult to sustain.

Compensation for depredation is available and has generally increased since 2015 relative to prior to 2015. However, the increasing number of confirmed depredations in recent years has resulted in a growing gap in some years between compensated and uncompensated losses for ranch operations. While uncompensated losses between 1998 and 2019 averaged $130,337 annually in

the MWEPA, uncompensated losses during 2019 were as high as $733,878.48 based on the assumptions and data in our estimate (Table 4-9). Averaged annually from 1998 to 2019, compensation has covered around a quarter of the economic losses experienced by ranch operators. These losses were incurred by a subset of the counties in the states of Arizona and New Mexico, and more accurately by a subset of the ranch operations in portions of those counties.

Impact of Proposed Genetic Objective

Under Alternative One, we will increase the number of releases we conduct compared to the recommendations in the 2015 10(j) rule. The direct action of releasing cross-fostered wolf pups will not impact the economic activities of ranching operations as these pups are too young to depredate livestock. We continue to expect that our focus on releasing cross-fostered pups rather than captive adult wolves may decrease conflicts between wolves and livestock, as pups raised in the wild may be less likely to engage in depredation or other problem-wolf behavior. To the extent that released pups survive, or that we release adult wolves that survive and subsequently depredate on livestock, economic impacts may be incurred; these impacts are captured by the discussion of the *Proposed Population Objective*, above.

Impact of Proposed Revised Take Provisions

Under Alternative One, two of the three take provisions we are proposing to revise are pertinent to ranching operations because they address management response to wolf-livestock conflicts on Federal and non-Federal land; the third provision for unacceptable impacts to a wild ungulate herd is not relevant to ranching operations and therefore will not be discussed here.

Our proposed revisions to take on Federal land and non-Federal land may limit the ability of a domestic animal and livestock owners, or their agents, to receive a permit for the take of a Mexican wolf to resolve wolf-livestock conflicts during certain years if we have not achieved the annual benchmarks for the cumulative survival of released wolves toward achieving the proposed genetic objective. As described in Chapter 2.3, we expect take of a single wolf to occur for every 12 permits we issue, and for the number of permits we would issue not withstanding these proposed restrictions to be a function of the number of wolves in the MWEPA (Table 2.1). While these permits may provide a management option to assist in addressing wolf-livestock conflicts, they do not offer a guaranteed resolution that would eliminate the possibility of wolf depredation and related economic impacts. Therefore, proposed restriction on these permits will reduce the ability of domestic animal and livestock owners, or their agents, to assist in conflict resolution until approximately 2030 or when we meet the proposed genetic objective, but the Service and designated agencies will still respond to conflict situations during this time period, including removing wolves if necessary, and utilize proactive management approaches to reduce the likelihood of depredations. Therefore, these two proposed revised take provisions likely have a very negligible effect on the economic activity of ranching operations.

Summary and Mitigation of Effects

The primary economic impact to ranching operations from Alternative One will stem from the proposed population objective feature of this alternative rather than the proposed genetic objective or the proposed revisions to three take provisions. Under the proposed population objective, we will manage for a larger Mexican wolf population than under the 2015 10(j) rule to achieve and sustain the proposed population objective. This will lead to managing for a population of Mexican

wolves numbering in the mid-300s to low 400s. An increase in Mexican wolves in the MWEPA may lead to more depredations and associated economic impacts; based on our estimate of average economic impact of $2034 per wolf, the proposed population would result, on average, to additional economic impacts of approximately $50,000 to $200,000 per year depending on the number of wolves (mid-300's to low 400s) compared to the 2015 10(j) rule of a population of 300-325 wolves (Table 4-8). These impacts will be experienced directly by the individual ranching operations that suffer depredations.

The macro-level impact of wolves on ranching operations in the states of Arizona and New Mexico is minimal, however the impacts that individual ranches may experience could be significant, particularly for small ranches that operate at or near their break-even point and have few cattle available to sell for additional profit. Based on the minimal macro-level impacts of this alternative balanced by the recognition of impacts to individual ranching operations, we expect less than significant direct adverse impacts. Compensation programs are available in both states for individual ranching operations that suffer depredations and apply for compensation. Compensation to an individual ranching operation may or may not fully cover losses related to confirmed depredations and does not cover losses related to unconfirmed depredations. Therefore, mitigation through depredation compensation payments to individual ranch operators may offset some, but likely not all, economic impacts. Mitigation is also available in the form of proactive management techniques and funding to offset the cost of these management actions that can be used to reduce the likelihood of depredations, but this does not guarantee that depredations will not occur. Therefore, even with mitigation we expect less than significant direct adverse impacts from this alternative.

We note that the 2015 10(j) rule provides additional measures available for livestock owners and operators or their designated agents to utilize to avoid or minimize the likelihood of depredation activity, including take provisions for opportunistic harassment (50 CFR 17.84 (k)(7)(ii), intentional harassment ((k)(7)(iii)), take on non-Federal lands when a wolf is in the act of biting, killing, or wounding a domestic animal ((k)(iv)(A)), and take by Service personnel or a designated agency ((k)(vii)). We are not proposing to revise these provisions, therefore they remain in effect and are considered additional minimization and mitigation measures applicable to the impacts associated with this alternative.

Alternative Two

Impact of Proposed Population Objective

This alternative shares the proposed population objective feature of Alternative One, and we would expect the effects of this feature on economic activity/ranching operations to be the same under both alternatives (see Alternative One – *Impact of Proposed Population Objective*, above).

Impact of Proposed Genetic Objective

This alternative shares the proposed genetic objective feature of Alternative One, and we would expect the effects of this feature on economic activity/ranching operations to be the same under both alternatives (see Alternative One – *Impact of Proposed Genetic Objective*, above).

Impact of Maintaining the 2015 10(j) Take Provisions

As described under Alternative One – *Impact of Proposed Take Revisions*, only two of the three take provisions under consideration are relevant to ranching operations, take on Federal land and

take on non-Federal land; the take provision for an unacceptable impact to a wild ungulate herd is not relevant to ranching operations. The take provisions for take on Federal land and non-Federal land may affect the management options that are available to the Service, designated agencies, and domestic animal or livestock owners to respond to conflicts between wolves and livestock but do not likely affect the economic activity of a ranching operation. Under this Alternative, we would not temporarily restrict the use of these two take provisions, which could result in the occasional permitted take of a Mexican wolf (estimated as one wolf for every 12 permits issued). Such take may reduce economic impacts compared to the economic impact that would have been incurred if the wolf had successfully depredated on one or more livestock. However, the relatively low likelihood of permitted take results a commensurately low likelihood of a reduction in economic impact for an individual ranching operation. Therefore, we do not consider maintaining the 2015 10(j) take provisions under this alternative to result in a substantially different outcome related to economic impact than revising the take provisions under Alternative One.

Summary and Mitigation of Effects

As in Alternative One, the primary economic impact to ranching operations from Alternative Two stems from the proposed population objective feature of this alternative. We would expect economic impacts of, on average, approximately $2034 per wolf per year, or an additional ~$50,000-200,000 per year based on the larger number of Mexican wolves necessary to achieve the proposed population objective compared to the 2015 10(j) population objective. We do not expect any economic impacts from the proposed genetic objective of this alternative. And, while maintaining the 2015 10(j) rule take provisions for take on Federal land and take on non-Federal land may provide flexibility in our management options to address conflicts because domestic animal or livestock owners could still receive permits for take, we do not expect that the level of take that would occur would have a notable effect on the economic impact of wolves on ranching operations. Based on these considerations and the discussion provided under Alternative One – *Impact of Proposed Population Objective* and *Summary*, including mitigation as described in Alternative One, we expect a less than significant direct adverse impact on ranching operations from Alternative Two.

Alternative Three

Impact of Maintaining the 2015 10(j) Population Objective

Under Alternative Three, the 2015 10(j) population objective of 300-325 wolves would result in fewer wolves than Alternatives One and Two. The lower number of wolves under this alternative would result in, on average, $50,000 to $200,000 less economic impact per year to ranching operations than the proposed population objective in Alternative One and Two (see Alternative One – Impact of the Proposed Population Objective). This dollar amount is insignificant in the context of the billion-dollar ranching sector across Arizona and New Mexico but is more notable at the scale of individual small ranches operating near their break-even point for which cattle not lost to depredations could otherwise have been sold for profit.

Impact of Maintaining the 2015 10(j) Release Recommendation

As described in Alternative One – *Impact of Proposed Genetic Objective*, the direct action of releasing wolves will not have a direct effect on ranching operations. To the extent that released wolves – either cross-fostered pups or adults – survive and subsequently depredate on livestock, impacts could be incurred by the ranches on which the depredations occur. These impacts are a

function of the overall population size and are therefore covered under the discussion of maintaining the 2015 10(j) population objective, above.

Impact of Maintaining the 2015 10(j) Take Provisions

This alternative shares this feature with Alternative Two, and we would expect the economic effects of this feature on ranching operations to generally be the same as Alternative Two. We note that fewer wolves in the MWEPA under this alternative would likely lead to fewer depredations, fewer take permits on Federal and non-Federal land, and less potential for take of Mexican wolves than under Alternative Two. However, as we describe in this section under Alternative One – *Impact of Proposed Revised Take Provisions*, the take provisions provide a management option to assist in addressing wolf-livestock conflicts but have a very negligible effect on the economic activity of ranching operations. Therefore, fewer permits and the resultant lower number of wolves taken via the permits would not result in a substantially different impact than Alternative Two.

Summary and Mitigation of Effects

Alternative Three would have the least economic impact on ranching operations of the three alternatives due to the smaller population size of Mexican wolves that would result from maintaining the 2015 10(j) population objective. At a population size of 300-325 Mexican wolves and an average economic impact per wolf of $2034, we would expect a maximum average impact of $661,050 annually. As similarly discussed under the *Summary* for Alternative One, this dollar amount is insignificant at the macro-level for the ranching economic sector in Arizona and New Mexico. However, individual ranches that suffer depredations bear these costs, some of which remain uncompensated, particularly to the extent that unconfirmed losses occur and do not receive financial compensation. Smaller ranches will be disproportionately impacted because they have fewer cattle to sell for profit above their break-even point. The other two features of Alternative Three, maintaining the 2015 10(j) release recommendations and take provisions, are not expected to have an economic impact on ranching operations, as discussed under the other two alternatives in this section. Based on these considerations and the discussion provided under Alternative One – *Impact of Proposed Population Objective* and *Summary*, including mitigation, which generally applies to this alternative, we expect that Alternative Three will have a less than significant direct adverse impact on ranching operations.

4.3.2 Potential Environmental Impacts and Proposed Mitigation Measures – Big Game Hunting

Alternative One

Impact of Proposed Population Objective

Under Alternative One, we expect wolf density in suitable habitat to range from six to eight wolves per 1000 km^2 due to the proposed population objective; this will result in wolf to 1,000 elk ratios as high as 5.95, but more likely around 4.94 to 5.64 based on managing for a population in the mid-300s to low 400s after the population objective is reached (Table 2.1). We expect that impacts to wild ungulates could occur at this level of predation pressure (see Chapter 4.2 Potential Environmental Impacts and Proposed Mitigation Measures – Wild Ungulates), however, it is difficult to predict at what wolf population size (and corresponding wolf to 1,000 elk ratio) this may occur, or how it may affect the big game hunting economic sector. Hunting activity has increased in both states since the data we collected for the 2014 FEIS (see Chapter 3), during which time the number of Mexican wolves has also steadily increased. As noted in Chapter 3.5.3, both

Arizona and New Mexico state agencies manage hunts for elk and deer to meet specific management objectives, independent of revenue. Therefore, adjustments to big game hunting opportunity and corresponding revenue could be made by the state agencies for various reasons, which could include accommodation for impacts occurring from Mexican wolves. The effect of the proposed population objective to the big game hunting economy is linked in part to the proposed revision of the provision for take in response to an unacceptable impact, therefore additional analysis is provided below, under *Impact of Proposed Take Provisions*.

Impact of Proposed Genetic Objective

The action of releasing wolves will not have a direct effect on economic activity associated with big game hunting. To the extent that released wolves – either cross-fostered pups or adults – survive and subsequently prey on wild ungulates and this predation impacts the success of hunters or hunting opportunities, economic impacts could be incurred. These impacts are a function of the overall population and are addressed for this alternative under *Impact of Proposed Population Objective*.

Impact of Proposed Revised Take Provisions

Of the three take provisions we are proposing to revise under Alternative One, only take in response to an unacceptable impact to a wild ungulate herd is relevant to the economic impact of Mexican wolves on big game hunting (elk and deer). Under this alternative, we would restrict this take provision until we meet the proposed genetic objective of 22 released wolves surviving to breeding age. We have established annual benchmarks toward the proposed genetic objective under our proposed revision to the provisions for take on Federal land and non-Federal land in this alternative to ensure we achieve consistent progress toward recovery; based on those benchmarks and our progress releasing wolves that have survived to breeding age, we expect to achieve the proposed genetic objective by 2030. Negative impacts to the big game hunting economic sector would be most likely to occur during the period that this take provision is restricted because state agencies would not be able to request the removal of wolves if they are causing ungulate herds to fall below management goals (i.e., an unacceptable impact); reducing hunting opportunity could be considered as a response to this situation, potentially leading to a reduction in revenue from a specific GMU for a specific period of time. As described in Chapter 2, we do not have a high degree of certainty as to when impacts to ungulates may occur beyond relying on observations from other geographic areas; we speculate that less than significant impacts to ungulates may occur under this Alternative during a relatively short time period (~6 years) between when the wolf population has increased such that the wolf to 1,000 elk ratio reaches a level that results in unacceptable impacts (potentially above 4 wolves to 1,000 elk) to when we reach our proposed genetic objective and this take provision is no longer restricted (around 2030) (see Chapter 4.2). After the proposed genetic objective is reached and the restriction on this take provision would be lifted, the states could request the removal of wolves causing unacceptable impacts, which would result in mitigation of any reduction in hunting revenue occurring in that area.

Summary and Mitigation of Effects

Under this alternative, we expect the proposed population objective and proposed restriction on the take provision for take in response to an unacceptable impact to a wild ungulate herd to result in wolf densities and corresponding wolf to 1,000 elk ratios that may result in impacts to wild ungulates. If such impacts occur and result in the state agencies reducing hunting licenses in a

GMU for a period, hunting revenue from big game could be reduced during that period. We expect this to most likely occur during approximately a six-year period when wolf to 1,000 elk ratios are greater than 4:1000 but we have not yet achieved the proposed genetic objective around 2030. However, after the genetic objective is reached, any ongoing or future impacts could be mitigated through the removal of wolves causing unacceptable impacts. In addition, we note that the phased approach to Mexican wolf management in western Arizona (50 CFR 17.84 (k)(9)(iv) would continue to be in effect and would reduce the likelihood of impacts to wild ungulates in western Arizona. Based on these considerations, we expect implementation of Alternative One to lead to less than significant adverse indirect impacts.

Alternative Two

Impact of Proposed Population Objective

This alternative shares the proposed population objective feature of Alternative One, and we would expect the effects of this feature on economic activity/big game hunting to be the same under both alternatives (see Alternative One – *Impact of Proposed Population Objective*, above).

Impact of Proposed Genetic Objective

This alternative shares the proposed genetic objective feature of Alternative One, and we would expect the effects of this feature on economic activity/big game hunting to be the same under both alternatives (see Alternative One – *Impact of Proposed Genetic Objective*, above).

Impact of Maintaining 2015 10(j) Take Provisions

Of the three take provisions we are proposing to revise under Alternative One, only take in response to an unacceptable impact to a wild ungulate herd is relevant to the economic impact of Mexican wolves on big game hunting (elk and deer). Under Alternative Two, we would not restrict the use of this take provision and the states could request the removal of wolves that were causing an unacceptable impact to a wild ungulate herd. Removal of wolves in these situations would reduce or eliminate negative impacts of wolves on big game hunting opportunity or revenue. Unacceptable impacts have not occurred in the MWEPA, and we remain uncertain as to when unacceptable impacts may begin to occur, although we estimate that they would be more likely to occur at wolf to elk ratios above 4 wolves to 1,000 elk around 2023-2024, or at some point thereafter (Table 2.1).

Summary and Mitigation of Impacts

Under Alternative Two, the potential for wolves to impact the big game hunting economy stems from the proposed population objective, which would lead to a larger wolf population and higher wolf densities and wolf to elk ratios than under the 2015 10(j) rule. However, this alternative maintains the 2015 10(j) provision for take in response to an unacceptable impact to a wild ungulate herd, which could result in reducing or eliminating adverse impacts to ungulates and the big game hunting economy. Based on these considerations, we expect that implementation of Alternative Two would result in no significant adverse direct or indirect impacts with mitigation.

Alternative Three

Impact of Maintaining 2015 10(j) Population Objective

Under Alternative Three, we would manage for a population of 300-325 Mexican wolves, which

would result in a smaller wolf population than under Alternative One or Two. We expect wolf density in suitable habitat to range from approximately 4.73 to 6 wolves per 1000 km^2 depending on phasing in western Arizona; this will result in wolf to 1,000 elk ratios ranging from 3.5 to 4.33 (Table 2.1). We expect that impacts to wild ungulates could occur at this level of predation pressure but are generally less likely to occur than the other two alternatives that would result in higher wolf to 1,000 elk ratios (see Chapter 4.2 Potential Environmental Impacts and Proposed Mitigation Measures – Wild Ungulates).

Impact of Maintaining 2015 10(j) Release Recommendation

Under this alternative, we could achieve the 2015 10(j) release recommendation with fewer releases than the number of releases we would need to conduct under the other two alternatives. However, as with Alternative One and Two, the action of releasing wolves will not have a direct effect on economic activity associated with big game hunting. To the extent that released wolves – either cross-fostered pups or adults – survive and subsequently prey on wild ungulates and this predation impacts the success of hunters or hunting opportunities, economic impacts could be incurred. These impacts are a function of the overall population and are therefore covered for this alternative under *Impact of Proposed Population Objective*.

Impact of Maintaining 2015 10(j) Take Provisions

Under Alternative Three, we would not restrict the use of the provision for take in response to an unacceptable impact to a wild ungulate herd. As described in this section under Alternative Two, we would not expect to use this take provision any sooner than 2023-2024 when the wolf per 1,000 elk ratio increases above 4:1000. If wolves began to negatively impact wild ungulates such that big game hunting opportunities decreased, this provision would provide mitigation for economic impacts to the big game hunting sector because it allows for the removal of wolves that are causing an unacceptable impact to a wild ungulate herd. See Alternative Two – *Impact of Maintaining 2015 10(j) Take Provisions* for additional discussion.

Summary and Mitigation of Impacts

Under Alternative Three, a population of 300-325 Mexican wolves in the MWEPA would have a relatively low likelihood of impacting wild ungulate populations based on our projections of the wolf to elk ratios that would occur over time. In addition, impacts to ungulates that resulted in decreased hunting opportunities or revenue could be reduced or eliminated through use of the provision for take in response to an unacceptable impact to a wild ungulate herd. Based on these considerations, we expect that implementation of Alternative Three would result in no significant adverse direct or indirect impacts with mitigation.

4.4 Human Health/Public Safety

4.4.1 Potential Environmental Impacts and Proposed Mitigation Measures

We incorporate by reference (40 C.F.R. 1502.21) Chapter 4.5 Human Health/Public Safety from the 2014 FEIS to provide relevant background information that: describes the range of public perceptions about wolves related to public safety; acknowledges that wolves, including Mexican wolves, can pose a credible threat to human safety; provides data on wolf-human encounters, which we have updated in Chapter 3; and describes how habituation, the presence of dogs, rabies, wolves' self-defense behavior or interpretation of humans as predatory attacks can impact wolf behavior and the likelihood of negative wolf-human interactions. This information summarized

that the risk to human safety posed by healthy, wild, non-habituated wolves is extremely small in general but also specific to Mexican wolves in the MWEPA, acknowledging that agonistic or predatory aggression toward humans could be more likely with habituated or food-conditioned wolves or in the presence of dogs (USFWS 2014). We discussed that captive released wolves may be more prone to fearless behavior toward humans, despite appropriate captive management and selection criteria for release candidates, based on our data at the time that nearly 40% of human-wolf interactions documented in the Blue Range Wolf Recovery Area involved wolves recently released from captivity (USFWS 2014, Chapter 4.5.2, *Potential for habituation of Mexican wolves to humans*). We also described local community concerns that the presence of Mexican wolves was resulting in psychological effects to children due to fear of wolves (USFWS 2014, Chapter 4.5.2, *Psychological effects to children from fear of wolves*) and we summarized disease information suggesting that Mexican wolves in the MWEPA are less likely to carry diseases than other wild canids due to our vaccination protocols, active management, and surveillance (USFWS 2014, Chapter 4.5.2, *Potential for Mexican wolves to carry/transmit disease*).

Alternative One

Impact of Proposed Population Objective

Under this Alternative, more Mexican wolves would be present in the MWEPA in the future than under the current population objective, and we would expect wolf density in suitable habitat to be higher than our previous projections (Table 2.1). Wolf to wolf disease transmission may increase in areas of higher wolf density (Brandell et al. 2021) but given that Mexican wolves are less likely to carry diseases than other wild canids due to our vaccination protocols and that we are not aware of instances of Mexican wolves transmitting diseases to humans in the MWEPA, we do not expect that the wolf density that may be reached in the future under the proposed population objective to result in a change in the likelihood of transmission of diseases to humans.

Wolf-human interactions may increase in number commensurate with the growth of the Mexican wolf population over time. Based on our data since 2014, which includes almost seven years under the expanded geography of the 2015 10(j) rule, the majority of wolf-human interactions (almost 70%) have been classified as investigative and only a small percentage (less than 10%) have been classified as aggressive. This suggests that most interactions occurring between humans and wild, healthy Mexican wolves in the MWEPA will continue to pose little or no threat to humans. Our 10(j) regulations will continue to authorize several mechanisms for the Service, designated agencies, or individuals to manage problem wolves or defend themselves including conducting opportunistic harassment, authorized intentional harassment, take by Service personnel or a designated agency, and take in defense of human life, which allows any person to harass, harm, or kill a Mexican wolf in self-defense or in defense of the lives of others. We continue to expect Mexican wolves to primarily inhabit suitable habitat in Zones 1 and 2 in the MWEPA, which are areas of low human density where there is less opportunity for wolf-human interaction than in areas of higher human density.

Impact of Proposed Genetic Objective

Under this alternative, we would conduct more releases than under the current release recommendation in the 2015 10(j) rule. We intend to maintain our current vaccine and husbandry protocols to ensure that Mexican wolves selected for release into the MWEPA are healthy, disease-free animals. Therefore, we do not expect the additional releases to result in any change to the

level of risk to humans of disease transmission from Mexican wolves.

Based on our current focus on cross-fostering, we expect to conduct most of our releases as pups rather than adult wolves or family groups. Although measures are taken by all captivity facilities to avoid habituation of wolves to humans and we implement a rigorous screening process to ensure adult wolf behavior is appropriate prior to release, we recognize there is public concern regarding the potential for adult captive wolves to be more dangerous release candidates due to possible habituation. We have also recognized over the length of the Mexican wolf reintroduction effort that wolves born in the wild have a lower propensity to engage in nuisance behavior, and we expect that although cross-fostered pups are not born in the wild, they are raised in the wild from a very young age (2 week or less) which will reduce the likelihood of nuisance behavior. If we occasionally conduct adult releases, our 10(j) regulations provide release locations in Zone 1 that we have evaluated as highly suitable sites that minimize the likelihood for wolf-human interactions or nuisance behaviors (USFWS 2014).

Impact of Proposed Revised Take Provisions

Under this alternative, two of the three take provisions we propose to revise would reduce the management flexibility of the Service to issue take permits to domestic animal owners or their agents on non-Federal land and livestock owners or their agents on Federal land to protect livestock from wolves. However, other management actions, including both non-lethal and lethal options as discussed above in *Proposed Population Objective*, would still be available to proactively reduce the likelihood of depredations, address wolf-livestock conflicts when they occur, and ensure the safety and defense of human life. These revisions, although they indirectly or directly involve potential wolf-human interactions, do not affect the risk of disease transmission from wolves to humans or the risk of danger to humans of attack by a wolf. Similarly, our proposed revision to the take provision for unacceptable impacts to a wild ungulate herd do not relate to the risk of disease transmission from wolves to humans or any risks to public safety.

Summary

Under this alternative, more Mexican wolves would be present in the MWEPA in the future, we would conduct more releases from captivity to improve gene diversity, and we would have less management flexibility to take wolves in certain situations involving conflicts or impacts to livestock or wild ungulates. Under this alternative, we would continue to implement many actions in captive facilities and in the wild to reduce the risk of disease to Mexican wolves or between Mexican wolves and humans. Although we recognize that wolf-to-wolf disease transmission could increase at higher wolf densities as the population grows over time, Mexican wolves are less likely to carry or transmit diseases than other canids in the MWEPA based on our protocols. We do not expect any aspect of our alternative to result in an increase to the risk to public health from Mexican wolves. While we also would expect that wolf-human interactions may increase as the MWEPA population increases, we expect that most of these interactions would be non-aggressive and would not pose a threat to human safety. Our 10(j) regulations will continue to provide a suite of management measures that ensure the Service, designated agencies, and the public can address nuisance behavior and problems, and act in self-defense. For these reasons, we expect no significant direct or indirect adverse or beneficial impacts to human health or public safety to result from implementation of this alternative.

Alternative Two

Impact of Proposed Population Objective

Alternative Two shares the proposed population objective feature of Alternative One, and as described in Chapter 2, we expect the same population growth performance and management under the two alternatives. Therefore, the potential impacts to human health and public safety of the proposed population objective under Alternative Two are identical to Alternative One.

Impact of Proposed Genetic Objective

Alternative Two shares the proposed genetic objective feature of Alternative One, and we would expect the same effects to the potential for transmission of diseases between wolves and humans or on the public safety of humans due to the presence of wolves in the MWEPA under the two alternatives. Although we expect the time and effort it may take to achieve the genetic objective under Alternative Two to be slightly greater than Alternative One due to the potential for take of released wolves that could count toward the proposed genetic objective to occur under this alternative from maintaining the 2015 10(j) take provisions rather than revising them, as in Alternative One, the length of time it would take us to achieve the genetic objective would not affect human health or public safety.

Impact of Maintaining the 2015 10(j) Take Provisions

Under this alternative we would not revise three take provisions from the 2015 10(j) rule. As described above for Alternative One, these revisions affect our management flexibility in certain situations, but they do not affect the risk of disease transmission from wolves to humans or the risk of danger to humans of attack by a wolf because they are specific to situations involving wolf-livestock interactions or wolf-ungulate interactions. The 10(j) rule will continue to provide mechanisms to manage wolves and address conflicts, including provisions for opportunistic or intentional harassment, take by Service personnel or a designated agency, and take in defense of human life.

Summary

Under this alternative, more Mexican wolves would be present in the future, and we would release more wolves than under the 2015 10(j) rule, while also maintaining our current management flexibility to issue permits to domestic animal or livestock owners for take on Federal or non-Federal land or authorize a state agency to take Mexican wolves in response to unacceptable impacts to a wild ungulate herd. Similar to Alternative One, we recognize that wolf-to-wolf disease transmission could increase at higher wolf densities as the population grows over time, but we also recognize that Mexican wolves are less likely to carry or transmit diseases than other canids in the MWEPA based on our protocols. While we also would expect that wolf-human interactions may increase as the MWEPA population increases, we expect most of these interactions to be non-aggressive and to not pose a threat to human safety. And, while maintaining the take provisions from the 2015 10(j) rule may offer management flexibility in certain situations, these specific provisions do not affect human health or public safety. For these reasons we expect no significant direct or indirect adverse or beneficial impacts to human health or public safety to result from implementation of this alternative.

Alternative Three

Impact of Maintaining the 2015 10(j) Population Objective

Under Alternative Three the MWEPA population would be maintained at 300-325 Mexican wolves, resulting in a smaller population than under the other two alternatives. Therefore, we would expect more wolf-human interactions at 300-325 Mexican wolves than the number of interactions occurring at the current minimum population size of 186, but we would expect fewer wolf-human interactions over time than the other two alternatives because the lower number and density of wolves would reduce the opportunities for wolf-human interaction, even in areas of suitable habitat with low human density. We would expect those wolf-human interactions that did occur to follow the pattern of current interactions, the majority of which are classified as investigative and do not pose a threat to humans. We would expect wolf to wolf disease transmission to be lower than the other alternatives due to the lower wolf density that would be reached over time in suitable habitat, and for this to further minimize any likelihood of disease transmission to humans.

Impact of Maintaining the 2015 10(j) Release Recommendation

Under Alternative Three we would conduct fewer releases than the other two alternatives. Although we previously envisioned the release of family groups or adult wolves to achieve the 2015 10(j) release recommendation, our current success with cross-fostering has led us to focus on this release technique for the time being. Therefore, the likelihood of problematic wolf behavior associated with the initial release of adult wolves is quite low.

Impact of Maintaining the 2015 10(j) Take Provisions

This alternative shares this feature with Alternative Two, therefore we would expect the effects to human health and public safety of maintaining the 2015 10(j) take provisions for take on Federal land, non-Federal land, and in response to an unacceptable impact to a wild ungulate herd to be equivalent between the two alternatives.

Summary

Alternative Three would result in a smaller population of Mexican wolves and fewer releases to improve gene diversity, while maintaining management flexibility for the Service or a designated agency to issue permits for the take of Mexican wolves by a domestic animal owner or their agent on non-Federal land or a livestock owner or their agent on Federal land or to authorize a state agency to take Mexican wolves in response to an unacceptable impact to a wild ungulate herd. Based on our active vaccination protocols and surveillance, we expect Mexican wolves to carry fewer diseases than other canids and for the risk of transmission to humans to be low. We would expect lower levels of disease transmission between wolves in this alternative than at the higher wolf densities projected for the other two alternatives. We would expect wolf-human interactions to continue to increase as the wolf population grows, but for the majority of these interactions to continue to be non-threatening to humans. We would expect fewer wolf-human interactions under this alternative due to the larger number of wolves needed to reach the proposed population objective in Alternatives One and Two. For these reasons we expect no significant direct or indirect adverse or beneficial impacts to human health or public safety to result from implementation of this alternative.

4.5 Environmental Justice

Sections 4.1 through 4.4 provide an analysis of the potential impacts to land use, biological resources, economic activity, and human health/public safety that could occur from implementation of the proposed action and alternatives. In this section we address whether the identified potential adverse impacts to these resource areas would be disproportionately borne by the low income, minority and tribal population groups of concern discussed in section 3.7.

4.5.1 Methodology and Analysis

Executive Order 12898 charges agencies to "make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations in the United States".[31] Though adverse impacts can occur to the general population, factors that pertain only to minority groups, such as economic or cultural factors, make these impacts disproportionally high and adverse.as compared to the general population or comparison population.[32] Current EPA guidance clarifies that a disproportionally high and adverse impact on a low-income and/or minority population is not required to be considered "significant" under NEPA definition (see section 4.0).[33] A disproportionately high and adverse impact is declared when the differences are substantial enough to merit agency action such as mitigation.

Potentially disproportionate impacts on minority, low-income, or tribes (indigenous populations) can indicate an actual or potential lack of fair treatment or meaningful involvement of minority, low-income, or indigenous populations in the development, implementation, and enforcement of environmental laws, regulations, and policies. In order to address whether identified impacts could result in disproportionately high and adverse impacts to population groups of concern we use a comparison to a reference population. A reference population provides context for the analysis of impacts to communities with environmental justice concerns and is critical for assessing potential disproportionately high and adverse impacts. Reference populations are selected based on the nature and scope of the project. Larger or different reference populations (e.g., county, state, or nation) may be needed, particularly for specific circumstances (e.g., where the community with environmental justice concerns represents a majority of the population in the affected environment of the proposed action) to reasonably consider the existence of that population for the geographic unit of analysis being analyzed. Reference populations can be a group of people, generally unassociated with the proposed project or impact of the action, who are outside the affected environment or a group of people within the affected environment who are not identified as a community with an environmental justice concern.

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[31] Executive Order No. 12898. 59 C.F.R. 7629, §1-101. February 11, 1994. https://www.archives.gov/files/federal-register/executive-orders/pdf/12898.pdf; for "disproportionately high and adverse" environmental effects definition see: Council on Environmental Quality. Guidance Under the National Environmental Policy Act. 1997. 26-27. https://www.epa.gov/sites/default/files/2015-02/documents/environmental justice_guidance_nepa_ceq1297.pdf

[32] U.S. Environmental Protection Agency. Community Guide to Environmental Justice and NEPA Methods. March 2019. 42. https://www.energy.gov/sites/default/files/2019/05/f63/NEPA%20Community%20Guide%202019.pdf

[33] U.S. Environmental Protection Agency. Federal Interagency Working Group on Environmental Justice. Promising Practices for ENVIRONMENTAL JUSTICE Methodologies in NEPA Reviews: Report of the Federal Interagency Working Group on Environmental Justice & NEPA Committee. March 2016. 38. https://www.epa.gov/sites/production/files/2016-08/documents/nepa_promising_practices_document_2016.pdf

Factors that may make a population group of concern more vulnerable to the risk vary, depending on the project, on the reason why they are classified as population groups of concern, their location, and their culture. Low-income groups which are associated with lower education levels, higher illiteracy levels, and higher levels of non-English speakers are likely to have a more difficult time recovering from a stressor due to the project not only from lack of resources but also due to difficulties accessing available assistance. Similar issues may occur with the indigenous, racial, and ethnic population groups of concern.

Factors that may indicate a potential environmental justice concern for this project include ability to participate in decision making process, proximity and exposure to hazard, and a susceptible population. Other general indicator of a potential environmental justice concern are multiple, summary, and cumulative effects, unique exposure pathways, and inferior physical infrastructure.

Environmental justice issues can arise due to the unequal distribution of benefits or costs of a project. Thebenefits from an increased Mexican wolf population are things such as existence and bequest values. Recreational non-consumptive benefits from the proposed action and alternatives such as eco-tourism or wildlife watching are addressed in Chapter 4.3 in the 2014 FEIS; additional positive effects from the Mexican wolf such as positive ecosystem effects like trophic cascades are addressed in Chapter 4.2 in the 2014 FEIS, both of which we incorporate by reference (40 C.F.R. 1502.21). Beneficial effects from the project are expected to be more homogenously distributed across all population groups compared to adverse impacts which may be more focused on rural populations in areas occupied by wolves.

4.5.1.1 Analysis Methodology

Population groups of concern within the project area are identified in section 3.7. Our analysis looks at how the general effects of resource-specific outcomes may affect these population groups of concern. Actual or predicted relationships based on group specific risk factors are examined. We then summarize whether the alternative is likely to have disproportionate impacts. In the analysis the magnitude of disproportionate effects between alternatives are compared and the net effects for the affected area's population groups of concern are described.

4.5.1.2 Analysis

Counties with low-income populations, high minority populations, and tribes are all population groups of concern. The focal counties of Apache, Gila, Graham, Greenlee, and Navajo in Arizona, and Catron, Grant, Sierra, and Socorro in New Mexico all have land encompassing part of the Mexican Wolf home range. These focal counties are a majority-minority region with 61.8 percent of the population being made up of minorities (34.8 percent American Indian and 20.7 percent Hispanic). Within the greater study area in Arizona, Cochise, Coconino, Mohave, Pima, Pinal, and Santa Cruz all have population groups of concern due to a meaningfully greater minority population and/or a low-income population by comparison to respective state metrics (Table 3-20 and Table 3-21). In New Mexico, Bernalillo, Chaves, Cibola, Doña Ana, Eddy, Hidalgo, Luna, McKinley, Otero, Torrance, and Valencia all have populations of concern. Through cooperative agreement with the White Mountain Apache Tribe Mexican wolves currently occupy the Fort Apache Indian Reservation. American Indian tribes of concern within the focal counties include San Carlos Apache, White Mountain Apache, Navajo Nation (including Ramah Navajo and the Alamo Band), Pueblo of Acoma, and Pueblo of Laguna. Within the greater study area, the Mescalero Apache Tribe, Pueblo of Isleta, and Pueblo of Laguna are tribes of concern.

Comparison Group

A comparison group or reference population is used to establish a basis to allow for a comparison between different groups. The differences between the effects on a population group of concern and the comparison group will determine if any of the adverse effects from the proposed action and alternatives are disproportionately high and adverse for any population group of concern. For this analysis the use of different comparison groups could be justified. Because impacts from the proposed action and alternatives are possible in the ranching and hunting industries, those industries could each be a comparison group and the effects on the population groups of concern within those industries could be compared to assess the effects on the average industry member. However, local labor demographic data is not available to provide an industry comparison.

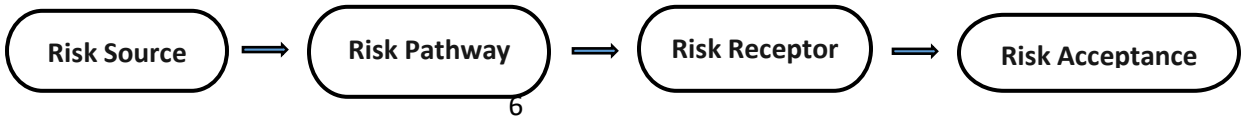
We compared the demographic and economic characteristics of those population groups of concern in the project study area to state and national level data. This necessitated assuming that if a minority, low-income or indigenous population is more heavily represented in an area then it is also proportionately represented in the affected industries. The population group of concern would then be affected by the project to a greater extent than would be the case if the effects were homogenously distributed throughout society.

Pathways of Exposure

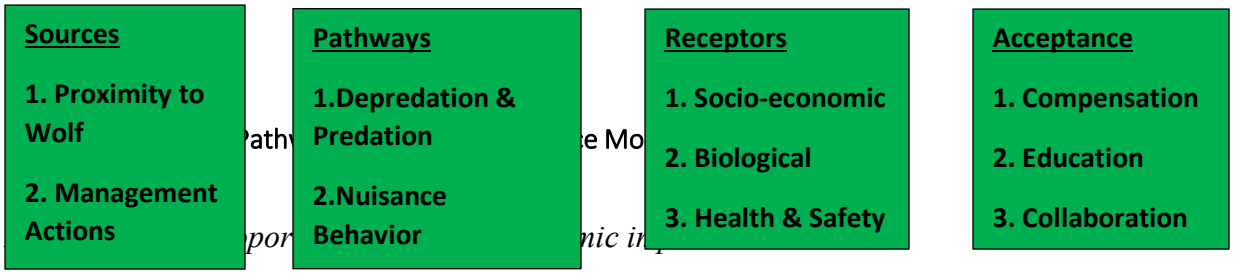
We used a Source-Pathway-Receptor-Acceptance approach, adapted from risk and uncertainty analysis, and a recognized risk model as the basis of our analysis. A risk and uncertainty analysis is an appropriate methodology for this project due to the uncertainty associated with the effects. As depicted in Figure 4-5 the risk source is the increased presence of the wolf (more wolves in a larger area) and changes in management objectives and regulations from the proposed rule changes. The pathways (or, what enables the source to affect the populations) are wolf behavior (i.e., depredation, predation, nuisance behavior), or loss of access to resources. Changes in the economic or social lives of groups may lead to financial or physiological/psychological changes. The last column in the diagram represents actions that may mitigate disproportionate high and adverse impacts to a population group of concern.

General

Step



Project



Economic impacts may affect population groups of concern if industry profit or labor uses change. Social and cultural effects from psychological stress due to the possible negative economic effects of theproposed action or alternatives may occur. Although the main stressor is expected to be economic in nature there is an interrelation between the economic situation of the population groups of concern and the local community. In this analysis the main pathway of exposure to effects of the project to be analyzed is proximity to the stressor. The adverse impacts from the proposed action and alternatives are primarily in the form of loss of income and the resultant risk to the stability of the economic and social prosperity of the groups. Direct impacts to laborers within population groups of concern are not quantified due to lack of data on labor demographics within local industries.

As addressed in the Chapter 4.3 we expect less than significant adverse impacts to overall ranching/livestock production in the project study area from implementation of the proposed action and alternatives. However, annual depredation events from Mexican wolves have not been, and may not be, uniformly distributed across the ranches operating in occupied wolf range. Small businesses involved in ranching and livestock production could also be indirectly affected by factors such as weight loss of livestock due to the presence of Mexican wolves. Table 4-5 in Chapter 4.3 details the model ranch baseline operation assumptions and shows a stronger connection between depredations and possible disproportionate impacts on population groups of concern. These small ranch operations' total profits could be greatly diminished by only one depredation. Table 4-7 also shows the detriment to the small rancher on livestock due to 6 percent weight loss which can also lead to economic harm. Table 3-24 in Chapter 3.7 shows that American Indians and Hispanic groups are a large percentage of the principal operators of beef cattle farms in both Arizona and New Mexico. These minority groups are overrepresented in this industry when compared to the referencenational average. The presence of these population

groups of concern in the industry along with the prevalence of small ranch operations leads to a much higher likelihood of disproportionate impacts of depredation.

Ranching has been a way of life in Arizona and New Mexico since before these territories became a part of the US. While the majority of population of both states now lives in urban areas the culture in the rural areas is still centered on the land and the ranching way of life. While the financial impact of the project alternatives is of a small absolute value the magnitude of these impacts is larger when taking cultural identity and community cohesion into account. This potential communal change alone in itself can be considered a disproportionally high and adverse impact of the proposed action and alternatives as total losses are not just monetary.[34] Therefore, small ranch operations who are marginally most at risk from economic losses and which have a high percentage of focus minority groups identified as principal operators could suffer high and disproportionate adverse impacts from implementation of the proposed action and alternatives.

Analysis for disproportionate adverse biological resource impacts

Population groups of concern may be disproportionality affected by adverse impacts to a biological resource if the quantity, quality, or availability of that resource for human use is reduced or eliminated. Chapter 4.2 analyzes the effects of the proposed action and alternatives on biological resources. Based on our analysis we conclude that less than significant adverse impacts on wild ungulate populations (specifically elk) would occur from implementation of the proposed action and alternatives. Reduction in the abundance or distribution of elk could affect hunting opportunities for this important big game species. Our analysis in Chapter 4.3 concludes that no significant adverse impacts on hunting would occur from the proposed action and alternatives. Despite these findings, disproportionate and adverse impacts could occur as some tribal members do subsist on big game.[35] Populations with smaller land bases and lower big game densities could be further impacted.[36]

Analysis for disproportionate adverse impacts to tribes

Tribal governments may voluntarily enter into management agreements with the Service to manage Mexican wolves on their tribal trust lands. Tribes may also request wolves to be removed from tribal trust lands. Tribes each have unique cultural histories and social structures contributing to a wide variety of views on wolves and therefore there may be positive or negative social impacts associated with wolf presence on or near their reservation.

The White Mountain Apache Tribe has seen minimal costs from depredation and no significant impacts to overall big game populations from the presence of wolves on the Fort Apache Indian Reservation (MWRT Tribal Subgroup 2014). However, tribes may be more vulnerable to economic consequences to ranching and hunting activities due to limited economic opportunities on the reservations. If ranching and hunting are no longer profitable it could lead to increases in long-term unemployment and poverty on the reservation. Additionally, the effects of climate change on indigenous populations are an environmental justice concern of special importance due to these populations often living close to subsistence levels and relying more heavily on

[34] U.S. Environmental Protection Agency. 2016. 39
[35] U.S. Fish and Wildlife Service. Mexican Wolf Tribal Working-Group. Tribal Perspectives on Mexican Wolf Recovery. May 5, 2017. 22
[36] Ibid. 23

natural resources than the general population. The interaction of stresses caused by the increased presence (i.e., more wolves more widely distributed) of Mexican wolves with climate change could increase the uncertainty of the effects of the proposed action and alternatives. It may increase wolf depredation due to lower availability of wild ungulate prey and it may decrease the profitability of ranching/livestock production.

Tribal members could be disproportionately impacted should wolves occupying land adjacent to the reservation depredate cattle on the reservation. Tribes have the authority to allow or not to allow wolves to occupy tribal trust lands and can enter into management agreements with the Service that could serve to reduce potential impacts if wolves are allowed to occupy tribal trust land. The proposed restriction of take provisions under Alternative One would have minimal adverse effects on tribes because tribal governments can request wolf removal at any time. However, tribes as population groups of concern are marginally more at risk from economic losses that may affect their primary source of income. Furthermore, for some tribes and tribal members livestock are used for subsistence. For these reasons, tribal population groups of concern could suffer high and disproportionate adverse impacts from implementation of the proposed action and alternatives.

4.5.2 Mitigation

When determining the presence of a cumulative disproportionally high and adverse impact on an environmental justice population, the benefits of the proposed action and the mitigative measures must be weighed against these impacts. While it is determined that beneficial impacts to the Mexican wolf will occur under the proposed action and alternatives, the negative economic impacts on the substantial minority population in the affected environment from depredations on livestock and ungulates requires mitigative measures for economic damages. These mitigative measures come in the forms of minimizing exposure and providing compensation.[37]

Minority ranchers in the study area could face disproportionally high and adverse impacts from all alternatives proposed. Although impacts on ranching are predicted to have a less than significant direct economic impact on a regional/state scale, there is potential for significant direct adverse impacts on individual ranches with the proposed action and alternatives (4.3). Mitigation measures have been in place attempting to make whole the effects from these adverse impacts. American Indian tribes have the option to have USFWS remove any Mexican Wolf from their reservation and trust lands. For all ranchers some compensative mitigation resources are available for confirmed livestock depredation losses, including financial compensation and educational and avoidance mitigative measures.

As part of the Agriculture Improvement Act of 2018 (2018 Farm Bill), the U.S. Department of Agriculture's Livestock Indemnity Program is an available resource to compensate ranchers for 75 percent of an average annual fair market value livestock (excluding wild free-roaming animals) due to depredation by federally reintroduced and protected animals.[38] Depredation compensation is also available through the Wolf Livestock Demonstration Project Grants. These are Service grant awards made available through a competitive process to eligible states and tribes

[37] For "mitigation" definition see: 40 CFR §1508.20. https://www.law.cornell.edu/cfr/text/40/1508.27

[38] 7 U.S.C § 9081 (b) https://www.law.cornell.edu/uscode/text/7/9081 ; 85 C.F.R.10959 https://www.federalregister.gov/documents/2020/02/26/2020-03841/supplemental-agricultural-disaster-assistance-programs

in accordance with the Omnibus Public Lands Management Act of 2009 (P.L. 111-11) specifically to: (1) assist livestock producers in undertaking proactive, non-lethal activities to reduce the risk of livestock loss due to predation by wolves; and (2) compensation to livestock producers for livestock losses due to wolf predation. These grants require a non-federal match and are typically awarded to the Arizona Game and Fish Department, New Mexico Department of Agricultures, and the White Mountain Apache Tribe. Disbursement of funds is managed by the Arizona Livestock Loss Board in Arizona, New Mexico Department of Agriculture and the Mexican Wolf/Livestock Council in New Mexico, and the White Mountain Apache Tribe on the Fort Apache Indian Reservation. In New Mexico, the Mexican Wolf/Livestock Council provides 100 percent market value for confirmed depredations. The Mexican Wolf/Livestock Council was founded by USFWS and is made up of Arizona and New Mexico ranching, conservation, tribal, and municipal entities. Beyond providing compensation for depredations, the Mexican Wolf/Livestock Council also provides funding for ranchers to implement proactive measures to accommodate wolf presence, financial incentive for avoiding conflict with present Mexican wolves, and continuing education for ranchers for further adaptive measures.[39] The State of Arizona has recently established the Livestock Loss Board for Mexican Wolf depredation compensation for Arizona producers.[40]

Tribal members engaged in the big game industry could also face economic losses without mitigation measures available. There are no existing compensation programs for predation of game species. Breeding animals are vital for tribes that operate hunting programs. According to the Mexican Wolf Tribal Working Group, restitution for the loss of a single high quality breeding animal could be valued at 25,000 to $50,000.[41]

As discussed in section 4.3, the compensative mitigation methods currently available may not be adequate for these minority ranchers. The inability to be fully compensated for all losses and the unwillingness to go through cumbersome administrative process all factor in to reduced efficacy for ranchers of these programs, including tribal ranchers.[42] For Native American tribes, these mitigation measures may be more effectively administered by tribal governments due to distrust of the federal government.[43]

Upon weighing the benefits created by the proposed action and alternatives with mitigative measures on depredations of livestock and wild ungulates, the overall impact on environmental justice concerned populations are disproportionately high and adverse. These small, economically sensitive, minority communities not fully protected by mitigative policies and programs. A single depredation could endanger a minority operator's livelihood. The economic consequences can ripple into the communities. More substantial mitigative measures are necessary to alleviate these disproportionally high and adverse economic impacts.

We note that there are ongoing management actions being implemented under the 2015 10(j) rule

[39] Mexican Wolf/Livestock Coexistence Council. 2014 Strategic Plan. https://www.fws.gov/southwest/es/mexicanwolf/pdf/MWLCC_Final.pdf
[40] Arizona Revised Statutes §17-491- §17-493. https://www.azleg.gov/arsDetail/?title=17
[41] U.S. Fish and Wildlife Service. Mexican Wolf Tribal Working-Group. 22
[42] U.S. Fish and Wildlife Service. Mexican Wolf Tribal Working-Group. Tribal Perspectives on Mexican Wolf Recovery. May 5, 2017. 21-22. https://www.fws.gov/southwest/es/mexicanwolf/pdf/MWRP_Tribal_Perspectives_on_Mexican_Wolf_Recovery.pdf
[43] Ibid. 22

that will remain available to minimize the adverse impacts that may be experienced by minority communities, including:

- Public education and outreach in those areas of the three proposed Management Zones which contain suitable wolf habitat and are thus areas with a potential for wolf occupancy. This will include materials in Spanish, to ensure communication in communities with significant portions of Spanish-speaking residents.
- Investigation by authorized agencies of reported wolf incidents no later than 48 hours after a report is received.
- Working with livestock producers and other landowners to eliminate attractants and to use guard animals, range riders, fladry, and other techniques to reduce conflicts between Mexican wolves and human activities;
- Using monitoring as a means of improving non-lethal control measures to aversively condition wolves through hazing and harassment; using non-lethal control, trapping, translocation, or removal of wolves conducted by authorized personnel of the Service, tribes, and/or designated agents of the Service as authorized under a Service permit;
- Using lethal removal for problem wolves under circumstances where the Service determines that immediate removal of a particular wolf, or wolves, from the wild is necessary, and other options for resolution of the conflict, including live capture, have been exhausted;
- Continuation of the Mexican Wolf Tribal Working Group through annual meetings open to all tribes in Arizona and New Mexico to discuss issues of tribal concern related to Mexican wolf recovery.

We note that the 2015 10(j) rule provides additional measures to avoid or minimize the likelihood of depredation activity, including take provisions for opportunistic harassment (50 CFR 17.84 (k)(7)(ii), intentional harassment ((k)(7)(iii)), take on non-Federal lands when a wolf is in the act of biting, killing, or wounding a domestic animal ((k)(iv)(A)), and take by Service personnel or a designated agency ((k)(vii)). We are not proposing to revise these provisions, therefore they remain in effect and are considered additional minimization and mitigation measures applicable to these economic impacts.

4.6 Cumulative Impacts and Other Considerations

CEQ regulations stipulate that the cumulative effects analysis within an EIS should consider the potential environmental impacts resulting from "the incremental impacts of the action when added to past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such actions" (40 CFR 1508.7). CEQ interprets this regulation as referring only to the cumulative impact of the direct and indirect effects of the proposed action and its alternatives when added to the aggregate effects of past, present, and reasonably foreseeable future actions (CEQ 2005). We incorporate by reference (40 C.F.R. 1502.21) Chapter 4.7 of the 2014 FEIS, which provides additional description of the context for a cumulative impact analysis.

Our analysis of cumulative impacts focuses on the resource areas of land use, biological resources, economic activity, and human health and public safety in Zones 1 and 2 of the MWEPA because, as previously explained at the beginning of Chapter 4, Mexican wolf occupancy will be concentrated in suitable habitat in these areas, and we expect little if any occupancy in Zone 3. Our

analysis is descriptive rather than technical or analytical; this scale and scope is appropriate based on our proposed action being a relatively small modification of our existing regulatory structure for the MWEPA for which no significant adverse impacts are identified in any resource area. No further analysis of impacts to resource areas already excluded from this SEIS is made because the proposed action adds no incremental impact to past, present, and reasonably foreseeable future actions in the action area. These resource areas include aesthetics/visual resources, air quality, cultural/historic resources, climate change, community services, geology/soils, noise, resident population, solid/hazardous waste, transportation/parking, utilities, and water resources.

Duration and Similar Activities

The actions evaluated in Alternatives One and Two in this SEIS will take place primarily over the next eight years (2022-2030) based on our projection of incremental annual population growth to achieve the proposed population objective, incremental annual progress to achieve the proposed genetic objective, and the length of time we would restrict three take provisions. Under Alternative Three, the No Action Alternative, we would expect to achieve the 2015 10(j) population objective within approximately three to four years, and the release recommendation by 2035. We recognize that the recovery effort for the Mexican wolf will extend beyond the timeframe of our proposed actions because additional recovery actions outside of the MWEPA are necessary. After we achieve the proposed population and genetic objectives, we would continue to manage the MWEPA population to ensure threats to the Mexican wolf are alleviated and the population continues to contribute to recovery until delisting is considered. During the period of our proposed action and over the length of the remaining recovery effort for the Mexican wolf we would not expect any additional similar actions in the same geographic area by our agency or other parties; rather, our current proposal modifies the action we took in 2015 to revise the regulations for managing Mexican wolves in this area, and other recovery actions for the Mexican wolf will take place in locations outside of the MWEPA. Similarly, we do not expect our action to lead to any associated projects related to wolf reintroduction or recovery.

Our proposed population objective under Alternatives One and Two would increase the number of Mexican wolves we manage for in the MWEPA compared to the number of wolves we established as our population objective in the 2015 10(j) rule. This is the first time since the Mexican wolf reintroduction began in 1998 that we have aligned our management objective for the MWEPA population with final recovery criteria in an approved recovery plan. We recognize that our initial reintroduction objective in 1998 to establish a population of at least 100 Mexican wolves, followed by our revised population objective in 2015 of 300-325 Mexican wolves, to our current proposed population objective represents an incremental increase over time in our expectations for the MWEPA and its role in the recovery of the Mexican wolf. As such, the public and local communities have experienced this same shifting expectation over several generations. However, our current proposed population objective would lead to managing the MWEPA population over the long-term at a marginally larger population size that will not lead to significant adverse impacts in any resource area and conversely, will allow us to recover the Mexican wolf and consider delisting.

Land Use

In keeping with our approach in the 2014 FEIS, we primarily consider federal agency actions within Zones 1 and 2 of the MWEPA that may affect the resources that may be affected by the

proposed action and alternatives due to the majority of Mexican wolf habitat occurring on federal land (primarily national forests). The Land and Resource Management webpage of the U.S. Forest Service Southwestern Region website (http://www.fs.usda.gov/main/r3/landmanagement) provides information on projects and actions involving multiple forests; in addition, each National Forest website has a Land and Resource Management webpage with current project information. Several of the Forests within the MWEPA have recently revised their Forest Plans (Apache-Sitgreaves, Coconino, Coronado, Prescott National Forests) or are in process (Gila, Cibola, Lincoln), as described in Appendix F. The Planning/NEPA webpage of the Bureau of Land Management provides information about current major planning projects by state (https://www.blm.gov/programs/planning-and-nepa/plans-in-development), as well as a link to a searchable database that contains detailed project descriptions, maps, and additional information (https://eplanning.blm.gov/eplanning-ui/home). Coordination with the Forest Service and Bureau of Land Management assisted in identifying those actions that may affect the same resources as the proposed action and alternatives of this FSEIS; relevant projects were determined to be those projects reviewed, or planned for environmental review, above the level of a Categorical Exclusion. The actions planned by these agencies are neither dependent on the proposed action or alternatives, nor are they part of it, and therefore the environmental reviews will be conducted separately with the results of those reviews incorporated into environmental planning documents prepared by the agencies.

Biological Resources (Wild Ungulates, Mexican Wolves) and Big Game Hunting

To the extent that our proposed action may cause short-term (less than significant) impacts to wild ungulates and big game hunting, actions taken by land management agencies, primarily the Forest Service, that would affect the quality of habitat supporting healthy populations of wild ungulates, or actions taken by state or tribal agencies that manage big game species, could interact synergistically (positively or negatively) with our proposed action. We incorporate by reference (40 C.F.R. 1502.21) our discussion in the 2014 FEIS in Chapter 4.7.1.1 that addresses cumulative impacts on biological resources, including rangeland management by federal agencies, game management by state and tribal agencies, and climate change impacts to elk. Our findings apply equally today: that the intent of ongoing rangeland management is to improve the conditions of rangeland for livestock and wildlife; that state game management agencies utilize an ecologically and sociologically-driven process for determining sustainable big game management objectives; and that shifts in the distribution of ungulate populations could occur from changes in water availability driven by climate change, although we note that both positive and negative effects to elk from climate change have been described in the scientific literature (80 FR 2508). Based on these considerations that suggest actions taken by agencies will be to the benefit of biological resources and that effects of climate change are speculative within the timeframe of our proposed action, we do not expect that the cumulative effects of our proposed action in combination with rangeland or forest management, big game hunt management, or climate change would lead to significant cumulative adverse effects on wild ungulates or big game hunting. We do not expect adverse cumulative effects to Mexican wolves from actions in the project area given that suitable habitat is primarily managed by land management agencies that have legal mandates to conserve threatened and endangered species and have specifically partnered with us through the 2019 MOU for Mexican Wolf Recovery and Management to recover the Mexican wolf.

Ranching/Livestock Production

Although we do not expect a long-term significant adverse economic effect on ranch operations across the MWEPA from our proposed action or alternatives, we do predict that some individual ranch operators will experience direct adverse economic impacts from Mexican wolves, and we recognize that these ranch operators are primarily located in communities with a high percentage of focus minority groups. We have observed that some ranch operations suffer depredations from wolves concentrating in specific areas while other ranches are unaffected, and we predict this pattern will continue. As we discussed in our 2014 FEIS and remains relevant to our current consideration of cumulative effects, many factors can cause mortality in livestock or affect ranch profitability. We incorporate by reference our discussion on ranching and livestock production from Chapter 4.7.1.1 in the 2014 FEIS, including our awareness that a combination of factors such as low cattle prices, higher operating cost, and additional losses due to depredation may make ranching economically infeasible for smaller operations in a given year (Ashcroft et al. 2010).

4.7 Regulatory Compliance and Consistency with Approved State or Local Plans or Laws

We prepared this FSEIS in compliance with and including but necessarily limited to, the same Federal acts and executive orders as the 2014 FEIS. Therefore, we incorporate by reference (40 C.F.R. 1502.21) Chapter 4.8, including subsection 4.8.1 of the 2014 FEIS, which lists and describes these Federal acts and executive orders: Administrative Procedures Act of 1946; Endangered Species Act of 1973; Federal Land Policy and Management Act of 1976; Fish and Wildlife Coordination Act; National Environmental Policy Act of 1969; National Forest Management Act of 1976; National Historic Preservation Act of 1966; Regulatory Flexibility Act of 1980; Unfunded Mandates Reform Act of 1995; Wilderness Act of 1964; Executive Order 12372: Intergovernmental Review of Federal Programs; Executive Order 12898: Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations; Executive Order 13045: Protection of Children from Environmental Health Risks and Safety; and, Executive Order 13175: Consultation and Coordination with Indian Tribal Governments.

In addition, we incorporate by reference (40 C.F.R. 1502.21) Chapter 4.8.2 of the 2014 FEIS which lists the 32 state and local plans or laws we reviewed to evaluate the consistency of our proposed action and alternatives with approved State or local plans or laws (40 CFR 1506.2). These included plans or laws such as county ordinances related to the release or management of predators, comprehensive county plans, Natural Resource Conservation District long-range plans, and Soil and Water Conservation District resolutions related to the reintroduction of endangered predators. In the 2014 FEIS we found that elements of these plans and laws for Federal agencies to "cooperate, consult and coordinate" with the county or conservation district in the development of plans, decisions, activities or actions which may affect the county, the district or its residents were consistent with NEPA's intent and governing regulations, especially related to early and ongoing planning, coordination, and consultation with state and local governments and stakeholders by Federal agencies (40 CFR 1501.8, 1501.9). However, we also found that local government policy statements, county and conservation district land use plans, resolutions and ordinances that place restrictions on, or assert local government authority over, Service actions taken in accordance with the ESA, including the proposed action of the 2014 FEIS, are inconsistent and irreconcilable with Federal law (USFWS 2014, Chapter 4, pg. 98).

During the development of this SEIS, we worked with Cooperating Agencies to determine whether additional local plans or laws should be considered based on the scope of our proposed action and alternatives. Through this process, we identified several additional local plans or laws that were

not included in our review for the 2014 FEIS either because they were subsequently developed or because we were unaware of them at that time. Additional relevant local plans or laws include:

- Lincoln County, New Mexico. Ordinance No. 2014-2. An Ordinance Setting Forth Wolf-Human Protective Measures; Providing for the Severability of Parts Hereof; Providing an Effective Date and Repeal of Ordinance No. 2007-2. Effective date: March 18, 2004.
- Lincoln County, New Mexico. 2017-25 Resolution Lincoln County Land Use Plan Revision – 2017
- Otero County, New Mexico. Ordinance 07-06 County of Otero Genera Ordinance. Adopted October 18, 2007. Codified at 105-1 through 105-4, Article 1: Release of Predatory Animals.
- Otero County, New Mexico. County of Otero Resolution #09-08-2016/105-10. Mexican Gray Wolves.

To the extent that any of these plans or laws establish a local (county) process to request management action by the Service or a designated agency to address wolf-human conflicts and that this process is consistent with, or not in conflict with (e.g., placing restrictions on or asserting local government authority over Federal law) our proposed action, we do not find any inconsistency between the plans or laws and our actions taken in accordance with the ESA. Similarly, to the extent that any of these plans or laws request action from the State of New Mexico or New Mexico Congressional delegation that is not in conflict with our proposed action, we do not find any inconsistency. For example, we note that depredation activities are currently addressed by USDA-Wildlife Services, as requested in County of Otero Resolution 09-08-2016/105-10, not the Service. However, to the extent that any of the documents above establish or include reference to policies or ordinances prohibiting the import or release of certain wildlife, specifically Mexican wolves, we cannot reconcile the proposed action of this EIS with those sections of local government policy statements, plans, or ordinances that clearly contravene the nonessential experimental rule. We recognize the overarching conflict that exists between a county prohibiting the release of a Mexican wolf and the Service's intention to continue releasing Mexican wolves as a necessary component of recovery. However, we also recognize that options to reduce or resolve conflict in specific instances may be available to the Service and our partner signatories to the 2019 MOU for Mexican Wolf Recovery and Management by working with local governments to address safety concerns, select release sites, and provide information to local communities.

We recognize the interest held by local governments and communities, including livestock permittees and private landowners, in the release and management of Mexican wolves in the MWEPA. To that end, we have established a process for the release of Mexican wolves that incorporates collaboration with local entities as well as communication with local communities. Our process includes the following actions: First, we develop an annual initial release and translocation plan, which states our objectives for the year related to the initial release and translocation of Mexican wolves in the MWEPA. The plan is approved by the lead agency signatories to the 2019 Memorandum of Understanding for Mexican Wolf Recovery and Management, which includes state agencies. Prior to release of any Mexican wolf or wolves, we evaluate the wolves for release and determine the method that will be used for release, as well as the timing and location of the release. During this evaluation process we consider the presence of

human inhabitants and livestock within a five-mile radius of the release, potential recreational conflicts, and habitat suitability, including the availability of water or whether supplemental feeding may be beneficial. In coordination with the release, we notify all livestock permittees and private landowners within ten miles of the release site, as well as local county officials and District Rangers of National Forests and may issue a news release.

4.8 Relationship Between Short-Term Uses of Man's Environment and the Maintenance and Enhancement of Long-Term Productivity

NEPA requires an analysis of the relationship between a project's short-term uses of the human environment and the effects that this use may have on the maintenance and enhancement of long-term productivity (40 CFR 1502.6). We incorporate by reference (40 C.F.R. 1502.21) Chapter 4.9 from the 2014 FEIS, which provides our analysis of the effects of our previous proposed action on long-term productivity. We also provide additional discussion to address elements of our current proposed action that differ from the proposed action and alternatives considered in the 2014 FEIS.

Several aspects of our previous analysis of the effects of our proposed action on the maintenance and enhancement of long-term productivity remain pertinent to our current proposed action. Specifically, we are not revising the geographic boundaries of the MWEPA or its zones, and we continue to expect wolves to primarily occupy suitable habitat on Federal and non-Federal land; therefore, the area under consideration has remained constant between our 2014 FEIS and this SEIS. Further, the presence of Mexican wolves on Federal lands remains in conformance with existing Federal agency land use and resource management plans. On non-Federal land, wolf presence can continue to be managed through agreements that provide for occupancy or removal of wolves on tribal land, or through management actions and agreements for private land with state concurrence. In addition, we are not proposing to revise the status of the MWEPA to essential, therefore we will not designate critical habitat nor will Section 7 consultation requirements under the ESA be altered by our proposed action and alternatives. Therefore, we do not expect implementation of the proposed action and alternatives to change the character of the Federal and non-Federal land use within the project study area, its long-term productivity, or its availability for other beneficial uses.

Our implementation of the proposed action and alternatives will result in similar growth and distribution of Mexican wolves within the MWEPA over time as the proposed action and alternatives from the 2014 FEIS (with the exception of the No Action Alternative in the 2014 FEIS). Based on population growth in the MWEPA since 2014, the MWEPA population is growing slightly faster than our previous projections but our proposed population objective to achieve an average population of at least 320 Mexican wolves will result in managing for a population that falls within the range of population sizes analyzed previously: our alternatives in the 2014 FEIS, with the exception of the No Action Alternative, analyzed the effects of population sizes ranging from 315 to 534 Mexican wolves (see USFWS 2014, Appendix D).

In this FSEIS, we are proposing to revise the MWEPA designation to ensure it will contribute to the long-term conservation and recovery of the Mexican wolf. We analyze the impacts of our proposed population objective, genetic objective, and several revisions to three take provisions. Although these alternatives may lead to different impacts across resource areas, the relationship between short-term uses and long-term productivity would not be appreciably different from one alternative to another. The number of wolves present in the MWPEA under each alternative, the

number of releases we conduct, and the potential for temporary restriction on three take provisions will not alter the characteristic uses of the land or resources in the project area. We recognize that short-term economic impacts may be sustained by individual ranchers/livestock producers, but do not expect long-term effects on overall livestock production in the project study area. Similarly, localized, short-term impacts to wild ungulates or the related economy of big game hunting from our proposed action or alternatives will not alter this biological resource or economic sector over the long-term. In conclusion, we do not expect that implementation of the proposed action and action alternatives would permanently narrow the range of beneficial uses of the human environment or adversely affect the long-term productivity of the project area.

4.9 Irreversible and Irretrievable Commitment of Resources

An irreversible and irretrievable commitment of resources refers to the use of those resources that would be involved in the proposal should it be implemented (40 CFR 1502.16). Irreversible impacts are those that cause, through direct or indirect effects, use or consumption of resources in such a way that they cannot be restored or returned to their original condition despite mitigation. An irretrievable impact or commitment of resources occurs when a resource is removed or consumed. The commitment of resources refers primarily to the use of nonrenewable or depletable resources such as fossil fuels, water, labor, and electricity. We incorporate by reference (40 C.F.R. 1502.21) Chapter 4.10 from the 2014 FEIS, as the findings there remain consistent with our findings related to irreversible and irretrievable commitment of resources for this FSEIS.

The Mexican Wolf Recovery Program is currently (2020) budgeted at approximately $2,700,000 annually. Costs associated with the management of the MWEPA and general recovery program for the Mexican wolf include labor, capital expenditures for equipment, materials, supplies and fuel. We may expect an incremental increase in these costs over time from our proposed action or alternatives as the number and geographic distribution of Mexican wolves in the MWEPA increases due to additional consumption of labor and non-renewable use of equipment, materials, supplies and fuel. Any additional incremental costs over the existing consumptive use of our program currently are not expected to be significant.

Our alternatives may modify the number of wolves in the MWEPA, the number of releases we conduct from captivity, and the temporary restricted use of three take provisions. Based on our assessment of impacts to land use, biological resources, economic activity, and human health and public safety we do not expect that implementation of the proposed action and alternatives would result in a significant irreversible or irretrievable commitment of resources. We expect no significant direct or indirect adverse impacts to land use or human health and public safety from the range of features considered under our alternatives, and therefore do not expect any irreversible or irretrievable commitment of resources from our proposal related to these resource areas. We do expect some degree of adverse impact to wild prey (primarily elk) and livestock due to the larger number of wolves we will manage for under the proposed population objective in Alternative One and Two, however the loss of either wild ungulates or livestock is not an irreversible or irretrievable commitment of resources because both are abundant, renewable resources. Labor associated with the implementation of proactive management to decrease the likelihood of livestock depredations may occur, or to address the consequences of depredation (such as building additional fencing, or paperwork associated with depredation claims), however these impacts and commitments can be restored or returned to their prior condition with mitigation such as successful implementation of proactive measures or receipt of depredation compensation.

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5.0 CONSULTATION AND COORDINATION

NEPA requires Federal agencies to make diligent efforts to involve other agencies and the public whenever possible (40 CFR 1506.6). This chapter provides a summary of the opportunities that have been made for public involvement, including government, and non-government agencies or organizations in the development of this SEIS.

5.1 Public Involvement Strategy

The public involvement strategy for this SEIS incorporated the following elements:

- **Public scoping**. We conducted a 60-day public scoping period through the publication of a notice of intent to prepare an environmental impact statement in the Federal Register on April 15, 2020 (73 FR 20967). We summarized and responded to the issues raised during public scoping in the DSEIS and retained this information in the FSEIS (USFWS 2021, Appendix G).

- **Coordination and consultation.** We engaged with multiple federal and state agencies, tribal governments, and local governments through the establishment of cooperating agency status, ongoing partner collaboration, and participation in tribal working groups and tribal coordination meetings.

    - We invited 60 entities to serve as Cooperating Agencies, of which 24 confirmed participation via signature of a Memorandum of Understanding to participate in the development of a SEIS (Appendix E). We held Cooperating Agency meetings via Google Teams video or teleconference on April 30, 2020; July 14, 2020; September 28, 2020; October 13, 2020; November 2, 2020; December 8, 2020; February 18, 2021; May 13, 2021; June 7, 2021; August 19, 2021, February 23, 2022; April 5, 2022; and May 10, 2022

    - We provided updates and opportunities for discussion of the FSEIS at Executive Team and Management Team meetings with signatories to the 2019 Memorandum on Mexican Wolf Recovery and Management on March 13, 2018; September 5, 2018; October 15, 2019; October 30, 2019; June 18, 2020; October 15, 2020; October 28, 2020; March 18, 2021; April 15, 2021; March 9, 2022; and March 30, 2022.

    - We held tribal working group meetings open to all tribes on June 16, 2020, December 15, 2020, August 17, 2021, and October 28, 2021. We also participated in existing tribal coordination meetings between tribes and the Service's Arizona Ecological Field Office on May 13, 2020, April 15, 2021, and April 7, 2022, and with the New Mexico Ecological Services Field Office May 27, 2020, and May 11, 2021. We invited Tribal governments the opportunity to request government-to-government consultation on the proposed rule and FSEIS with the Service via letters sent in September 2021. We held one-on-one coordination calls with several tribes, including the Navajo Nation (May 6, 2020, and October 14, 2020) and White Mountain Apache Tribe (November 18, 2020). We provided updates via email to the tribal working group during the spring of 2022 regarding the FSEIS and final rule.

  - We met with the National Park Service to discuss the Mexican wolf recovery program and the revision of the 2015 10(j) rule on July 21, 2020.
  - We met with the signatories to the Canada United States Mexico Trilateral Committee for Wildlife and Ecosystem Conservation and Management (May 17-20, 2021).
  - We met with Arizona Game and Fish Department and New Mexico Department of Game and Fish on June 12, 2019, to discuss the 2015 10(j) rule revision and SEIS, as well as ongoing telephone and email communication throughout the development of the FSEIS.

- **Multi-media communication**. We employed email, Google Teams video or WebEx meetings, teleconferences, newspaper notices/advertisements, Federal Register notices, News Releases, and website as methods of communication with the stakeholders, Cooperating Agencies, Tribes, organizations, academicians, and the general public. We developed a website for the public with information about our process and links to register for public information sessions and hearings. After each public information session and hearing we posted a video of the event and a full transcript. (This website was dismantled in March 2022, after the public comment period had been closed for over a month.)

- **Public hearings and information sessions.** We held public information sessions during the 90-day public comment period for the DSEIS and proposed 10(j) rule on November 18, 2021, December 8, 2021, and January 11, 2022; we held public hearings on December 8, 2021, and January 11, 2022.

- **Congressional briefings/meetings.** We participated in several Congressional briefings during which we provided information or offered an opportunity to discuss our proposed action and alternatives, including meeting with staff for U.S. Representative Torres-Small (New Mexico) on May 6, 2020; staff for U.S. Senator Heinrich (New Mexico) on May 21, 2020 and March 29, 2022; staff for Representative O'Halleran (Arizona) on February 19, 2021; staff for U.S. Senator Lujan (New Mexico) on March 2, 2021; staff for U.S. Senator Kelly (Arizona) on August 30, 2021; and staff for Representative O'Halleran (Arizona) on August 30, 2021. We held a Congressional briefing in association with the release of the proposed 10(j) rule and DSEIS on October 27, 2021, and in association with the final rule and FSEIS in 2022.

- **Formal or informal meetings and interaction with organizations, academia, and the public.** We held or participated in formal informal meetings with representatives of potentially affected stakeholders/public and organizations to inform them of our proposed action, process, and schedule. We met with:
  - the Director of the Association of Zoos and Aquariums (March 4, 2020; February 9, 2021);
  - several conservation organizations including Defenders of Wildlife, Center for Biological Diversity, Wildlands Network, Grand Canyon Wolf Recovery Project, and WildEarth Guardians (July 29, 2020);
  - Apache County Arizona Farm Bureau (September 1, 2020);

- University of Arizona seminar (September 30, 2020);
- Center for Biological Diversity (January 19, 2021);
- Colorado Parks and Wildlife Department (January 25, 2021);
- Species Survival Program (July 29-30, 2021).

5.3 Public Review and Comment on the DSEIS

On October 29, 2021, we published a Notice of Availability in the Federal Register of the proposed 10(j) rule, *Revision to the Nonessential Experimental Population of the Mexican Wolf* (86 FR 59953), and announced availability of the DSEIS, the scheduled public information sessions and hearings, and the opening of the 90-day public comment period from October 29, 2021, to January 27, 2022. We published a legal notice announcing the public hearings on November 18, 2021, in the newspaper USA Today. The DSEIS and proposed 10(j) rule were made available for review by the public electronically at http://www.regulations.gov in Docket No. FWS-R2-ES-2021-0103, as well as being posted on the Service's Mexican Wolf Recovery Program website. In addition, we emailed information about the public comment period to Cooperating Agencies, Tribes, stakeholders, Congressional members and their staff, and media, and held roll-out briefings for each of these groups.

Over 400 participants joined one or more of the information sessions and public hearings. At the beginning of the information sessions and public hearings, we provided a 20-minute informative PowerPoint presentation; we subsequently posted these slides, our talking points, transcripts, and videos of the events on our website.

We received over 82,000 public comments (oral and written) during the 90-day comment period for Docket No. FWS-R2-ES-2021-0103 These comments were assigned individual tracking numbers and made available for viewing at http://regulations.gov in the docket. We have included a description of our comment sorting and synthesis process and our response to public comments on the DSEIS in Appendix G.

APPENDIX A: PREPARERS

This Draft Supplemental Environmental Impact Statement (FSEIS) has been prepared by the Department of Interior, U.S. Fish and Wildlife Service (USFWS, we, us, the Service) in compliance with the National Environmental Policy Act (NEPA) of 1969 (42 United States Code [U.S.C] § 4321 et seq.); the Council on Environmental Quality (CEQ) Regulations for Implementing NEPA (Title 40 Code of Federal Regulations [C.F.R.] §§ 1500-1508); DOI Regulations, (43 CFR Part 46 61292), USFWS 550 FW 1 Draft Fish and Wildlife Service NEPA Reference Handbook (USFWS 2013) and other applicable USFWS guidance and instructions. The NEPA process is intended to help public officials make decisions based on the understanding of environmental consequences, and to take actions that protect, restore, and enhance the environment.

The FSEIS was prepared by the staff of the U.S. Fish and Wildlife Service's Mexican Wolf Recovery Program, Ecological Services Southwest Regional Office, and Division of Economics, Headquarters. A list of the persons who were primarily responsible for the preparation of this document and their qualifications is available upon written request from:

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APPENDIX B: GLOSSARY

Blue Range Wolf Recovery Area means the entirety of the Gila National Forest in New Mexico and the Apache National Forest in Arizona in which Mexican wolves may be initially released from captivity, translocated, and managed to reduce conflicts with humans and other land uses to achieve recovery.

Cross-fostering means offspring that are removed from their biological parents and placed with surrogate parents.

Depredation means the confirmed killing or wounding of lawfully present domestic animals by one or more Mexican wolves. The Service, U.S. Department of Agriculture, Animal and Plant Health Inspection Service (Wildlife Services), or other Service-designated agencies will confirm cases of wolf depredation on lawfully present domestic animals. Cattle trespassing on Federal lands are not considered lawfully present domestic animals.

Designated agency means a Federal, State, or tribal agency designated by the Service to assist in implementing this rule, all or in part, consistent with a Service-approved management plan, special management measure, conference opinion pursuant to section 7(a) (4) of the Act, section 6 of the Act as authorized pursuant to § 17.31 for State game and fish agencies with authority to manage Mexican wolves, or a valid permit issued by the Service under § 17.32.

Disturbance-causing land-use activities means for any activity on Federal lands that the Service determines could adversely affect reproductive success, natural behavior, o persistence of Mexican wolves, the Service will work with Federal agencies to use their authorities to temporarily restrict human access and disturbance-causing land-use activities with a 1-mi (1.6-km) radius around release pens when Mexican wolves are in them, around active dens between approximately April 1 and July 31, and around active Mexican wolf rendezvous sites between approximately June 1 and September 30, as necessary.

Domestic animal means livestock (domestic alpacas, bison, burros (donkeys), cattle, goats, horses, llamas, mules, and sheep, or other domestic animals defined as livestock in Service-approved State and tribal Mexican wolf management plans) and non-feral dogs.

Federal land means land owned and under the administration of Federal agencies including, but not limited to, the Service, National Park Service, Bureau of Land Management, U.S. Forest Service, Department of Energy, or Department of Defense.

Initial release means the release of Mexican wolves to the wild within Zone 1, or in accordance with tribal or private land agreements in Zone 2, that have never been in the wild, or releasing pups that have never been in the wild and are less than 5 months 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.

Livestock means domestic alpacas, bison, burros (donkeys), cattle, goats, horses, llamas, mules, and sheep, or other domestic animals defined as livestock in Service-approved State and tribal Mexican wolf management plans. Poultry is not considered livestock under this rule.

Mexican Wolf Experimental Population Area (MWEPA) means an area in Arizona and New Mexico including Zones 1, 2, and 3, that lies south of Interstate Highway 40 to the international

border with Mexico.

Non-Federal land means any private, state-owned, or tribal trust land.

Occupied Mexican wolf range means an area of confirmed presence of Mexican wolves based on the most recent map of occupied range posted on the Service's Mexican Wolf Recovery Program website at *http://www.fws.gov/southwest/es/mexicanwolf/*. Specific to Prohibitions (5)(iii) and (vii)(D) of the proposed rule, Zone 3 and tribal trust lands are not considered occupied range.

Phase 1: Phase 1 will be implemented for the first 5 years following February 17, 2015. During this phase, initial releases and translocation of Mexican wolves can occur throughout Zone 1 with the exception of the area west of State Highway 87 in Arizona. No translocations can be conducted west of State Highway 87 in Arizona in Zone 2. Mexican wolves can disperse naturally from Zones 1 and 2 into, and occupy, the MWEPA (Zones 1, 2, and 3). However, during Phase 1, dispersal and occupancy in Zone 2 west of State Highway 87 will be limited to the area north of State Highway 260 and west to Interstate 17. (Map follows.)

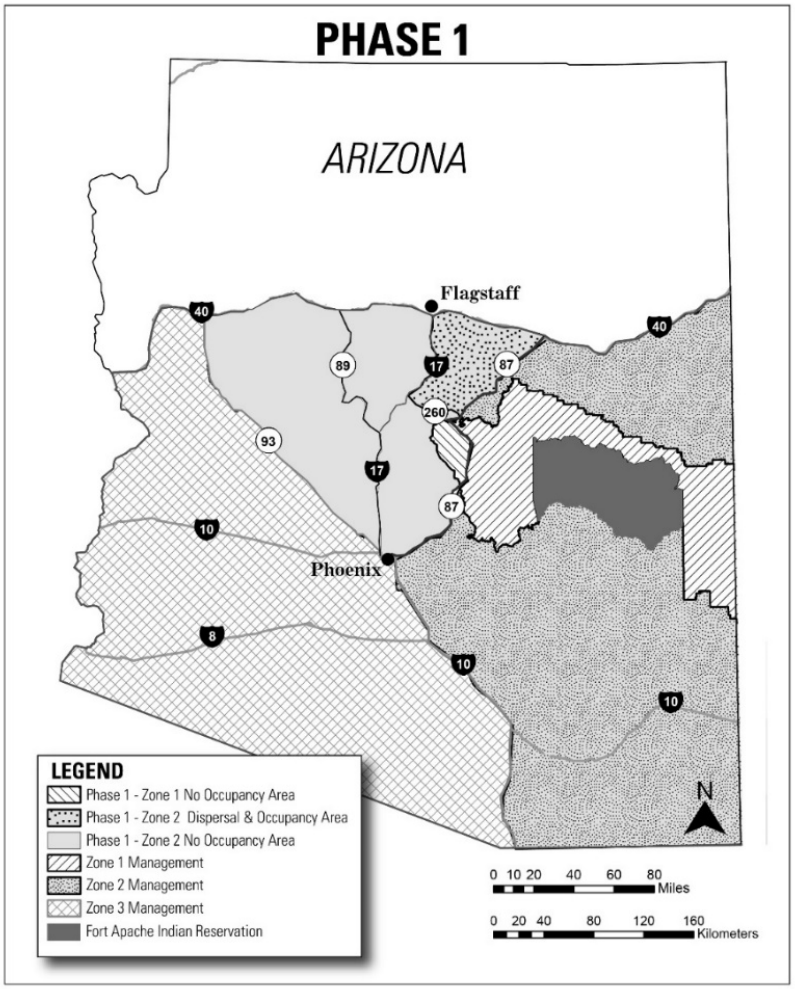

Figure B-1. Phase 1.

Phase 2: In Phase 2, initial releases and translocation of Mexican wolves can occur throughout Zone 1 including the area west of State Highway 87 in Arizona. No translocations can be conducted west of Interstate Highway 17 in Arizona. Mexican wolves can disperse naturally from Zones 1 and 2 into, and occupy, the MWEPA (Zones 1, 2, and 3). However, during Phase 2, dispersal and occupancy west of Interstate Highway 17 will be limited to the area west of Highway 89 in Arizona.

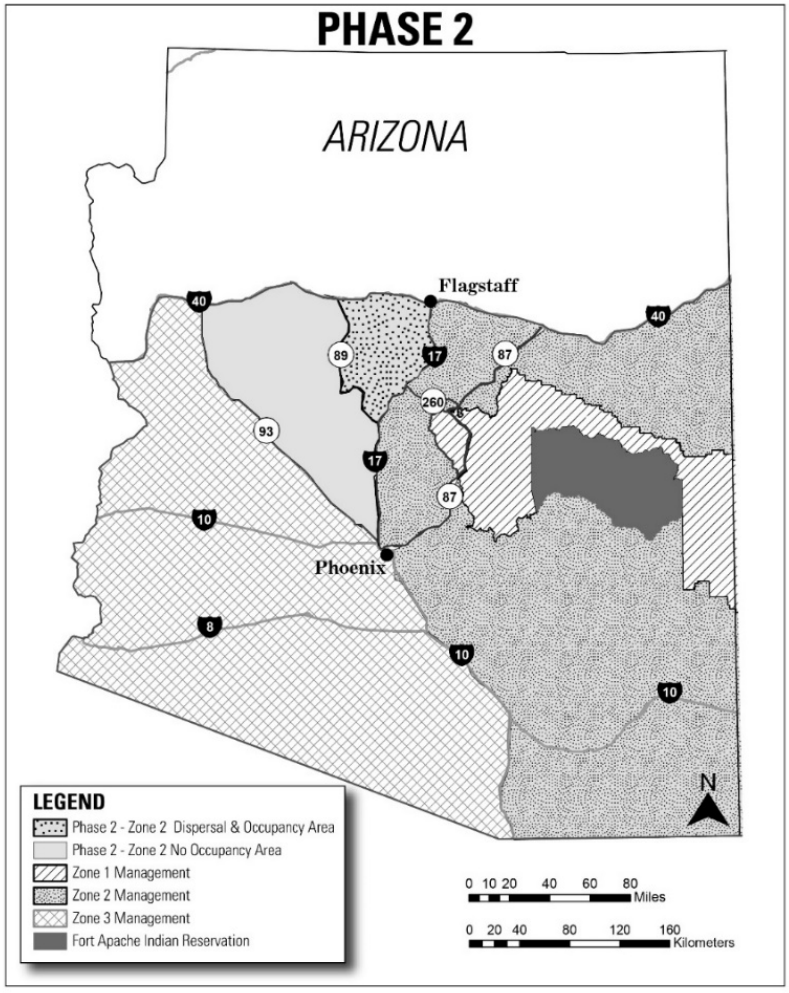

Figure B-2. Phase 2.

Phase 3: In Phase 3, initial release and translocation of Mexican wolves can occur throughout Zone 1. No translocations can be conducted west of State Highway 89 in Arizona. Mexican wolves can disperse naturally from Zones 1 and 2 into, and occupy, the MWEPA (Zones 1, 2, and 3).

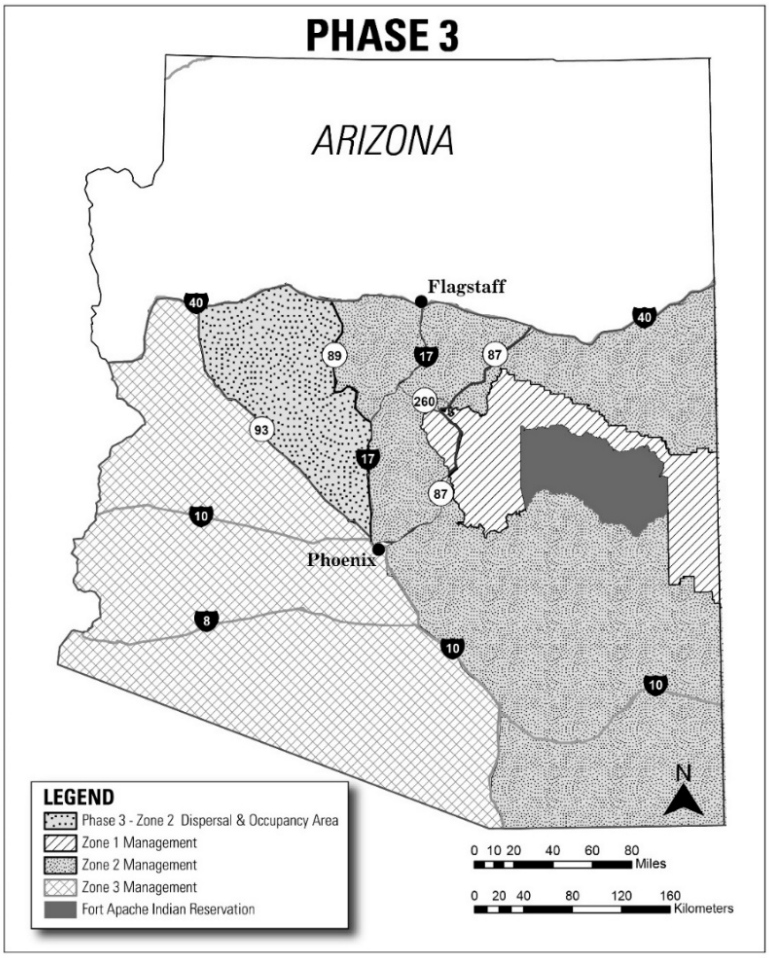

Figure B-3. Phase 3.

Take means to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct (16 U.S.C. 1532(19).

Translocate means to release Mexican wolves into the wild that have previously been in the wild.

Tribal trust land means any lands title to which is either: held in trust by the United States for the benefit of any Indian tribe or individual; or held by any Indian tribe or individual subject to restrictions by the United States against alienation. For purposes of the proposed rule, tribal trust land does not include land purchased in fee title by a tribe. We consider fee simple land purchased by tribes to be private land.

Unacceptable impact to a wild ungulate herd will be determined by a State game and fish agency based upon ungulate management goals, or a 15 percent decline in an ungulate herd as documented by a State game and fish agency, using their preferred methodology, based on the preponderance of evidence from bull to cow ratios, cow to calf ratios, hunter days, and/or elk population estimates.

Wild ungulate herd means an assemblage of wild ungulates (bighorn sheep, bison, deer, elk, or pronghorn) living in a given area.

Zone 1: Zone 1 is where Mexican wolves may be initially released or translocated, and 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.

Zone 2: Zone 2 is where Mexican wolves will be allowed to naturally disperse into and occupy, and where Mexican wolves may be translocated. On Federal land in Zone 2, initial releases of Mexican wolves are limited to pups less than 5 months old, which allows for the cross-fostering of pups from the captive population into the wild, and it enables translocation-eligible adults to be re-released with pups born in captivity. On private and tribal land in Zone 2, Mexican wolves of any age, including adults, can also be initially released under a Service- and State-approved management agreement with private landowners or a Service-approved management agreement with tribal agencies. Translocations in Zone 2 will be focused on suitable Mexican wolf habitat that is contiguous to occupied Mexican wolf range.

Zone 3: Zone 3 is where neither initial releases nor translocations will occur, but Mexican wolves will be allowed to disperse into and occupy. Zone 3 is an area of less suitable Mexican wolf habitat where Mexican wolves will be more actively managed under the authorities of this rule to reduce conflict with the potentially affected public.

APPENDIX C: ACRONYMS

AZGFD	Arizona Game and Fish Department
APA	Administrative Procedures Act of 1946
AUM	Animal Unit Month
AZA	Association of Zoos and Aquariums
BIA	Bureau of Indian Affairs
BLM	Bureau of Land Management
BRWRA	Blue Range Wolf Recovery Area, as designated by the Final Rule (50 CFR 17.84(k))
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
DSEIS	Draft Supplemental Environmental Impact Statement
DOI	Department of Interior
EIS	Environmental Impact Statement
EPA	U.S. Environmental Protection Agency
ESA, Act	Endangered Species Act of 1973, as amended
FEIS	Final Environmental Impact Statement
FR	Federal Register
GMU	Game Management Unit
HM	Head Month
MWEPA	Mexican Wolf Experimental Population Area
NASS	National Agricultural Statistics Service
NEPA	National Environmental Policy Act of 1969
NMDGF	New Mexico Department of Game and Fish
SEIS	Supplemental Environmental Impact Statement
SSP	Species Survival Program
USDA	U.S. Department of Agriculture
USDA Forest Service	U.S. Department of Agriculture, Forest Service

USDA-WS	US Department of Agriculture-Animal Plant Health Inspection Service, Wildlife Services
USFWS or Service	US Fish and Wildlife Service

APPENDIX D: LITERATURE/REFERENCES

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APPENDIX E: LIST OF COOPERATING AGENCIES

Federal Cooperating Agencies

Bureau of Indian Affairs – Southwestern Region

Bureau of Land Management – New Mexico/Oklahoma Office

Bureau of Land Management – Arizona Office

National Park Service – Regional Office

USDA Forest Service – Southwest Region

USDA APHIS Wildlife Services (AZ/NM)

U.S Army Garrison White Sands Missile Range

State Cooperating Agencies

Arizona Department of Game and Fish

New Mexico Department of Game and Fish

New Mexico Department of Agriculture

State of Utah, Public Lands Policy Coordinating Office

County Cooperating Agencies

Eastern Arizona Counties Organization (Graham, Greenlee, Gila, Navajo)

Gila County, AZ

Graham County, AZ

Mohave County, AZ

Catron County, NM

Chaves County, NM

Eddy County, NM

Hidalgo County, NM

Lincoln County, NM

McKinley County, NM

Otero County, NM

Torrance County, NM

Valencia County, NM

APPENDIX F: 2014 SUPPLEMENTAL INFORMATION

This appendix provides updated information and data from the 2014 FEIS of relevance to this FSEIS.

Table F-1, below, provides an update to Table 1-1. Mexican Wolf Experimental Population Releases, Removals and Translocations (Blue Range Wolf Recovery Area and Fort Apache Indian Reservation) from 1998 to 2012 from Chapter 1 of the 2014 FEIS.

Table F-1. Mexican Wolf Experimental Population Releases, Removals and Translocations from 1998 to 2019.

Year	Wolves Released	Number of Permanent Removals	Number of Temporary Removals	Number of Translocations
1998	13	2	4	3
1999	21	0	12	2
2000	16	4	19	18
2001	15	1	9	6
2002	9	3	4	7
2003	8	1	14	15
2004	5	1	6	9
2005	0	5	16	16
2006	4	8	10	6
2007	0	9	14	5
2008	1	0	2	6
2009	0	0	7	6
2010	0	0	0	1
2011	0	1	1	4
2012	0	1	0	0
2013	1	0	6	3
2014	2	0	13	12
2015	1	1	3	1
2016	6	0	2	0
2017	4	1	9	2
2018	8	0	4	5
2019	12	1	12	6
Total	126	39	167	133

Note: Permanent removals include 15 animals removed by lethal control and temporary removals in excess of translocations equal net loss to population of 34 animals.

Table F-2, below, updates Table 1-2. Mexican Wolf Experimental Population Growth from 1998 to 2013 from Chapter 1 in the 2014 FEIS.

Table F-2. Mexican Wolf Experimental Population Growth from 1998 to 2019.

Year	Releases and Translocations	Number of Mortalities	Removals (Permanent and temporary)	Minimum Population Count (Observed)
1998	16	5	6	4
1999	23	3	12	15
2000	34	5	23	22
2001	21	9	10	26
2002	16	3	7	42
2003	23	12	15	55
2004	14	3	7	46
2005	16	4	21	42
2006	10	6	18	59
2007	5	4	23	52
2008	7	13	2	52
2009	6	8	7	42
2010	1	6	0	50
2011	4	8	2	67
2012	0	4	1	80
2013	4	7	6	89
2014	14	11	13	112
2015	2	13	4	98
2016	6	14	2	114
2017	6	12	10	117
2018	13	21	4	131
2019	18	14	13	163
Total	259	185	206	N/A

Note: Mortalities include 105 due to illegal mortality (57%), 21 due to vehicle collision (11%), 32 due to natural causes (17%), 18 due to unknown causes (10%), 0 awaiting necropsy results, and 9 due to other causes 5%). Permanent removals include 15 animals removed by lethal control and temporary removals in excess of translocations equal new loss to population of 34 animals. Updated from Table 1-2. Mexican Wolf Experimental Population Growth from 1998 to 2013 in the 2014 FEIS.

Table F-3. Mexican Wolf Experimental Population Growth Rate from 1998 to 2019.

Period	Releases and Translocations	Number of Mortalities	Removals (Permanent and temporary)	Net Gain in Population	Growth Rate
1998-2002	110	25	58	38	1.003
2003-2007	68	29	84	10	0.069
2008-2013	22	46	18	37	0.107
2014-2019	59	85	46	51	0.115

Note: Mortalities include 105 due to illegal mortality (57%), 21 due to vehicle collision (11%), 32 due to natural causes (17%), 18 due to unknown causes (10%), 0 awaiting necropsy results, and 9 due to other causes 5%). Permanent removals include 15 animals removed by lethal control and temporary removals in excess of translocations equal new loss to population of 34 animals. Updated from Table 1-2. *Mexican Wolf Experimental Population Growth Rate from 1998 to 2013*.

The following information provides minor updates or clarifications to the information contained in the 2014 FEIS, Chapter 3.3.2.1 Federal Land:

U.S. Forest Service

Apache-Sitgreaves National Forest (Arizona)

The Apache-Sitgreaves National Forest is operating under a revised Land Management Plan (plan). The plan was revised in 2015 and provides forest level direction to meet the Forest Service's mission during management of activities on the forests. The plan does not specifically authorize any projects or activities but provides a framework that contributes to sustaining native ecological systems by managing toward desired conditions that support native plant and animal diversity. The plan integrates forest restoration, watershed protection, vegetation resilience to ecological disturbances, wildlife conservation, and contributions to social and economic values, goods, and services. Grazing management occurs on 92 allotments and 2 sheep driveways with approximately 130,000 AUMs of livestock, of which 8,912 are sheep. The forest contains three wilderness areas and one designated primitive area. The wilderness areas are the Mount Baldy (7000 acres), Bear Wallow (11,080 acres), and Escudilla (5,200 acres). The Blue Range Primitive Area (180,000 acres) also occurs on the Apache-Sitgreaves National Forest. The forest included a presidential recommendation for addition to the primitive area of 199,502 acres. The plan also recommends the addition of 6,813 acres to the Escudilla Wilderness and 261 acres to the Bear Wallow Wilderness. From 1997 to 2020 the majority of fires on the Apache-Sitgreaves National Forest were caused by lightning. Over a million acres have burned on the forest during this time-period.

Coconino National Forest (Arizona)

Coconino National Forest revised its Forest Plan in 2018 and is currently managing lands with the framework provided in the revised plan. The revised plan includes components to establish and maintain stand diversity through timber harvest to provide suitable habitat for wildlife while maintaining or enhancing timber production and age class distribution.

Coronado National Forest (Arizona and New Mexico)

Coronado National Forest revised the Land and Resource Management Plan (plan) in 2018 and is currently managing lands with the framework provided in the revised plan.

Prescott National Forest (Arizona)

The Prescott National Forest revised the Land and Resource Management Plan in 2015. Permits are issued to graze livestock covering 62 of the 68 allotments across the forest; four allotments are closed to grazing and 2 allotments are vacant without an active grazing permit. Approximately 135,767 HMs (head months, a description of grazing level that describes the use and occupancy of rangeland by a single animal or equivalent) permitted for cattle and 1,237 HMs for horses.

Cibola, Gila, and Lincoln National Forests (New Mexico)

The Cibola, Gila, and Lincoln National Forests are revising their forest plans and will likely have decisions by the summer of 2021, end of 2021, and in 2022, respectively.

National Park Service

Saguro National Park, White Sands National Monument, Petrified National Forest

Since the completion of the 2014 FEIS, Saguaro National Park acquired 488 acres of land. White Sands National Monument relinquished 3733 acres and acquired a net gain of 2904 acres, and Petrified National Forest acquired 8149 acres (K. Philbrook, NPS, pers. comm. 2020). We note that these Park units do not contain suitable habitat for Mexican wolves.

El Malpais National Monument

In 2018, a lone Mexican wolf male wolf traveled though El Malpais National Monument.

El Malpais does not authorize livestock grazing on NPS lands. There are approximately 300 cattle on private inholdings and surrounding the monument (K. Philbrook, NPS, pers. comm. 2020).

The following NPS units also occur in the project area: Tuzigoot National Monument, Tumacácori National Historical Park, Fort Bowie National Historic Site, and Carlsbad Caverns National Park.

Department of Defense

White Sands Missile Range

The designation of the White Sands Wolf Recovery Area in the 1998 experimental population rule (63 FR 1752-1772, January 12, 1998) as an area for initial release of Mexican wolves was removed in the 2015 10(j) final rule.

The following information provides updates or clarifications to the information contained in the 2014 FEIS, Chapter 3.4.2.2 Wild Ungulate Prey Species.

Mule Deer

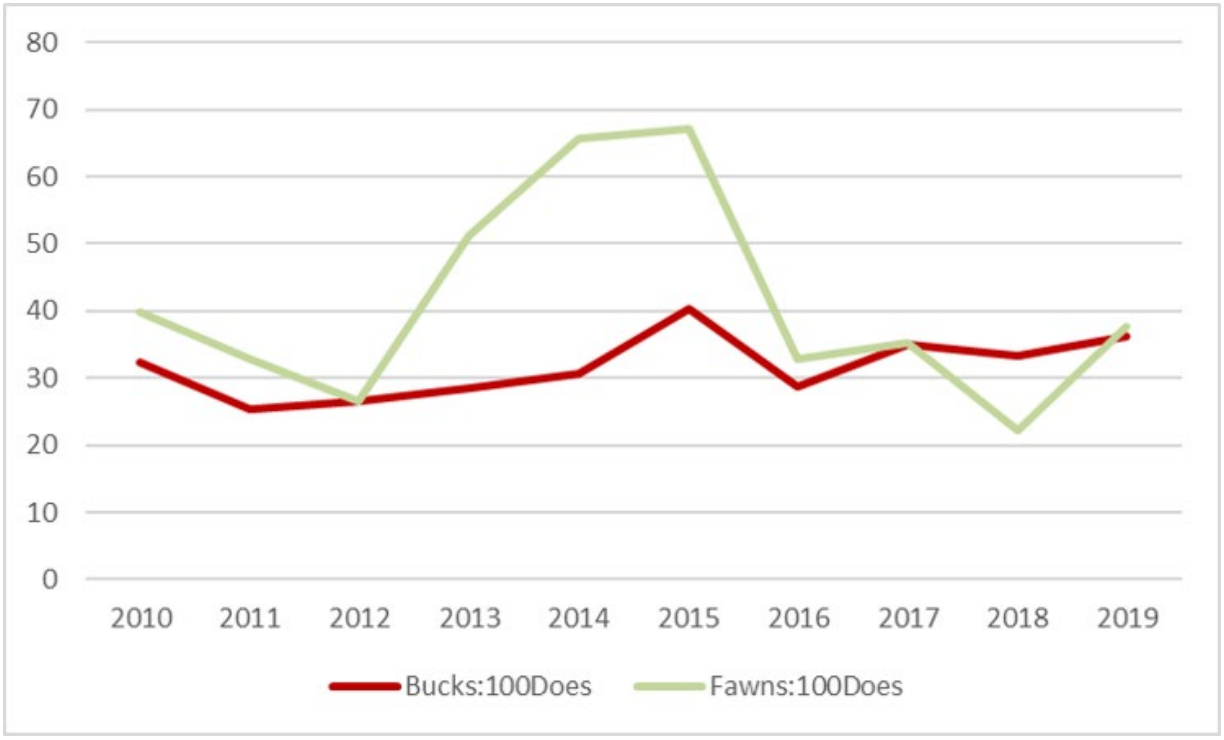

Figure F-1. Demographic ratios of mule deer in NM in the MWEPA between 2001 and 2019.

White-tailed Deer

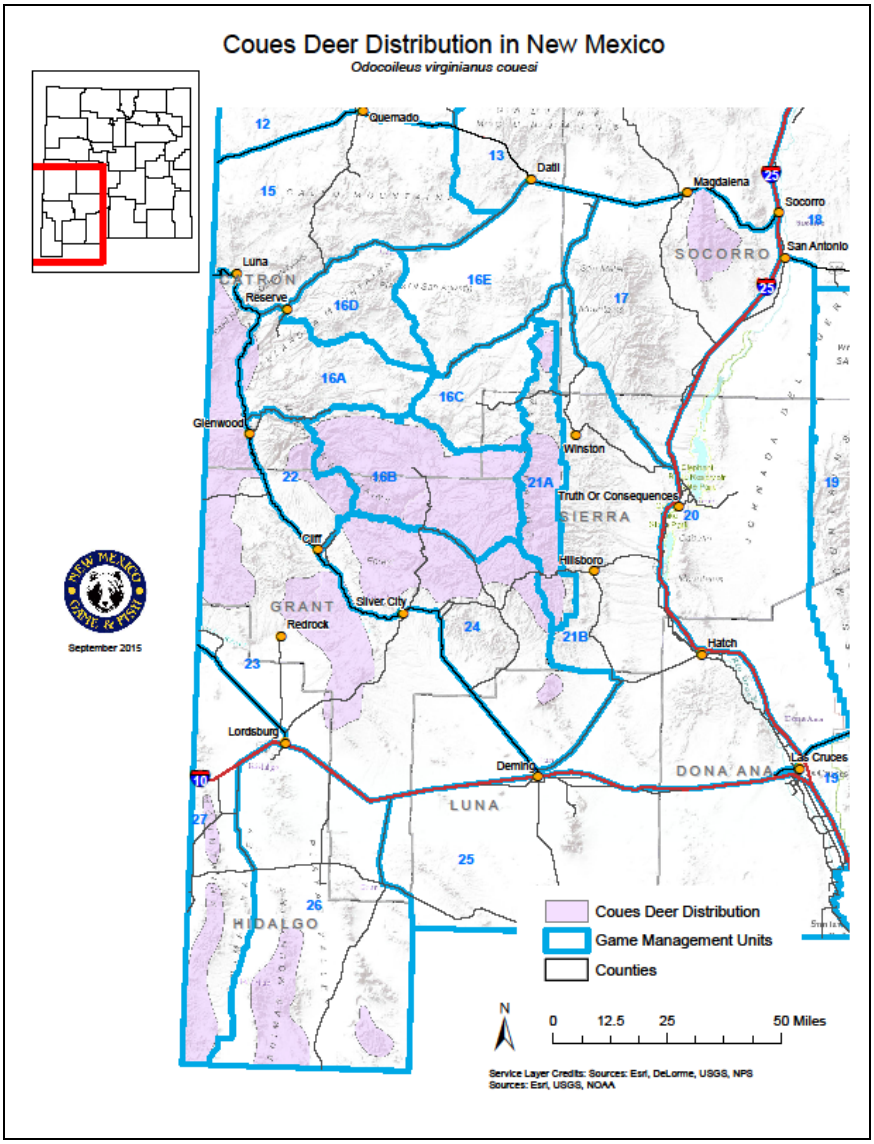

Figure F-2. Coues Deer Distribution in New Mexico (Source: NMDGF data, 2015).

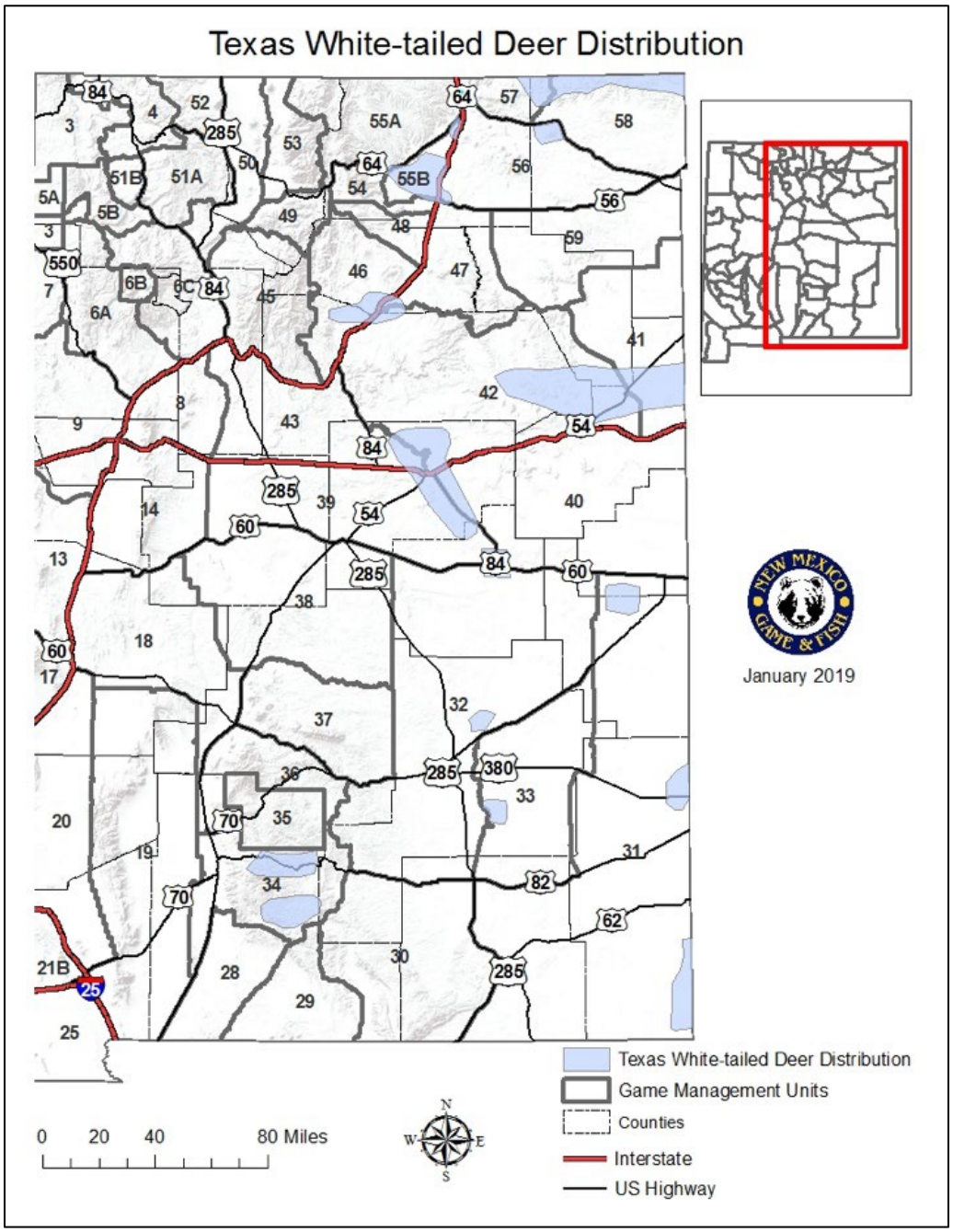

Figure F-3. Texas White-tailed Deer Distribution in New Mexico (Source: NMDGF, 2019 data)

Table F-4. Deer Population Estimates in New Mexico (NMDGF, 2019 data)

Area or deer herd	GMU	Population Estimate
Southwest: Gila Forest	15, 16 A-E, 22	4,800
Southwest: Burro Mountains	23	5,700
Southwest: Silver City	24	4,800
Southwest: Black Range	21 A & B	4,400
Southwest: Zuni Mountains	10, 12	1,900
Southwest: Datil Mountains	13	1,600
Southwest: San Mateo's	17	2,500
Southwest: Southern Desert	19, 20	850
Southwest: Bootheel	25, 26, 27	3,200
Southeast: Sacramento	34, 36	11,000
Southeast: Capitan	37	4,900
Southeast: Manzano/Sandia	14, 18	2,000
Southeast: Corona/Gallina	38	1,500
Southeast: Otero Mesa	28, 29	1,200
Southeast: Guadalupe	30	9,500
Southeast: Permian Basin	31, 32, 33	18,800
Southeast: Eastern Plains	39, 40	2,400

Pronghorn

From an estimated low of 650 animals in 1921, the statewide population of pronghorn in Arizona was estimated at 12,000 – 14,000 post hunt adults in 2019 (AZGFD, unpublished data, 2019). American pronghorn are found primarily in the northern plains with the largest populations in the northwest quadrant of the state. They also inhabit high elevation meadows between Ponderosa pine, mixed-conifer, and spruce-fir forests, semi-desert grasslands, and scattered herds are found in the grasslands of southeastern Arizona (Hoffmeister 1986).

The 2019 statewide population of pronghorn in New Mexico is estimated between 55,000-65,000 animals (NMDGF unpublished data, 2019). Pronghorn can be found on the Plains of San Agustin and the Plains of La Jencia on BLM and State Lands adjacent to the Magdalena Ranger District on the Cibola National Forest. Population estimates for 2018 in the greater Gila survey unit were ~4,000 pronghorn (NMDGF unpublished data, 2019). A population of approximately 170 pronghorn can be found in the grasslands between the Peloncillo, Animas, Alamo Hueco, and Hatchet mountains in southern New Mexico (NMDGF unpublished data, 2019). The Silver City unit is estimated to have 230 pronghorn (NMDGF unpublished data, 2019).

Desert and Rocky Mountain bighorn sheep

In 2019, the population estimate in Arizona of Desert bighorn sheep was 6,000. The population estimate for Rocky Mountain bighorn sheep in Ariznona was over 1,200 in 2019 (AZGFD, 2019 data).

As of 2019, the current statewide population of Rocky Mountain bighorn sheep in New Mexico was estimated between 1565 and 1830 animals. Rocky Mountain bighorn are present in the San

Francisco River corridor and the Gila River near Turkey Creek.

As of 2019, the current statewide population of desert bighorn sheep in New Mexico is estimated between 1020 and 1245. Desert bighorn sheep are present in the Ladrone, Hatchet, Peloncillo, Fra Cristobal, San Andres, Caballo, and Sacramento Mountains in southern New Mexico.

Javelina (Pecari tajacu)

Javelina are concentrated in the southern half of New Mexico with higher densities located in the southwestern portion of the state. Populations in the southeast portion of the state appear to be increasing. Anecdotal evidence suggests javelina are expanding their northward through the Rio Grande corridor.

Oryx

Oryx (*Oryx gazella*), also known as gemsbok, are large (non-native) African gazelles. The New Mexico Department of Game and Fish released 93 captive-bred oryx onto White Sands Missile Range between 1969 and 1977 in order to provide a huntable ungulate population in an area of the state with limited big game opportunities. Oryx can be found at elevations from 3500 to 6500 ft (1067-11981 m). They prefer stony plains with some water access, however oryx can be found in the hills and canyons of the San Andres and Oscura Mt. ranges on WSMR They will utilize water when available, but can subsist in arid habitats with little water. The oryx population is currently estimated between 3,000-5000 animals in New Mexico (WSMR, 2020 unpublished data). Since there are no significant barriers to their movement, they have dispersed approximately 100 miles in all directions off of White Sands Missile Range.

Persian Ibex

In 1970, Persian Ibex (*Capra aegagrus*), which is a non-native species of wild goat, was brought to New Mexico from Iran and kept in a breeding facility. The New Mexico Department of Game and Fish, with an agreement from the BLM, released the progeny of these original ibex into the Florida Mountain Range near Deming, NM over two separate occasions, totaling 42 ibex. These animals formed the basis of New Mexico's current ibex population. As of September 1995, approximately 350 Persian ibex lived in the Florida Mountains and increased to 600-900 animals by 2014. The current population estimate is 500-700 animals and appears to be staying within this mountain range (K. Rodden, NMDGF, pers. comm. 2020). The NMDGF and BLM work together to manage the population.

Feral Horses

White Sands Missile Range no longer has feral horses.

APPENDIX G: PUBLIC SCOPING AND REVIEW

Public Scoping

We received over 87,000 public comments during our public scoping period from April 15, 2020, to June 15, 2020 (85 FR 20967). In our scoping notice, we explained "We will revise the 2015 final rule only to the extent necessary to address the Court's ruling: no additional provisions of the rule are subject to revision…Due to the focus of the remand, we are seeking input from the public only on a narrow range of topics." Those topics included: the essentiality determination, revision of the population objective and release recommendations, and revision of three take provisions (take on federal land, take on non-federal land, and take in response to unacceptable impacts to a wild ungulate herd) (85 FR 20969).

We processed public comments by first sorting out duplicate comments (e.g., mass mailings) and maintaining a single copy. We then conducted a scan of all remaining comments to determine whether the public comment contained substantive information relevant to our requested action such as data, pertinent anecdotal information, or opinions back by relevant experience or information, and literature citations. Non-substantive comments were those that expressed a statement or opinion without providing supporting information or relevance to the scoping request; restated data or information that we already have but without an alternate perspective to consider; restated elements of the March 31, 2018, Court Order; or comments that were beyond the scope of our proposed action, such as recommendations to revise the recovery plan. We identified relevant topics contained in each substantive comment, such as economic impacts and health and human safety, which allowed us to move comments into groups based on topic. We then identified the specific information in each comment pertinent to our scoping request and extracted it into a spreadsheet organized by topic. We were able to synthesize many specific comments within these topics into fewer comments because many commenters had similar concerns. For example, a number of commenters raised the issue of releasing adult wolves into the MWEPA as a method to improve gene diversity. This process left us with synthesized issue summaries to document the range of input we received on a given topic, as well as remaining singular issues.

Below, we provide synthesized and individual comments and responses. Some comments touched on more than one topic; for example, a comment raising concern about whether an essential determination would lead to closing hunting seasons and the resultant economic impact that could occur could be categorized under essential, hunting, or economic impacts. In these situations, we selected the best fit topic based on professional judgement and included the comment in that single topic, although our response may touch on several topics.

Economic Impacts

Comment: Commenters raised concerns about the adequacy of our previous analysis in the 2014 FEIS or 2015 10(j) rule of the economic impacts of Mexican wolf reintroduction on ranching operations. Some commenters specifically requested we conduct additional analyses to better understand the full extent of these potential impacts, including: (1) an analysis of loss of state and local tax revenues in Arizona and New Mexico associated with reduction in livestock head taxes; (2) an analysis of the reduction of state and local government tax revenues from circulating dollars due to the loss of ranching operations forced out of business (including feed sales, cattle hauling to market, sales rings, fuel sales, restaurants, and other local businesses); (3) an analysis of the impacts of lost ranching operations in Gila County specifically (feed sales, hauling, fuel, food, and

other local business); and (4) more analysis of the economic impacts on ranching families and allotment owners. Finally, one commenter provided data on the cost of guard dogs necessary to keep cattle safe from wolves (e.g., 4 dogs at $400-1000+ each, plus food, veterinarian fees, and other care) and expressed concern that many ranches cannot afford guard dogs.

Response: Chapter 4.4 in the 2014 FEIS and Chapter 4.3 in this FSEIS analyze the potential economic impacts of each alternative. This section provides in-depth discussion of both direct and indirect economic impacts on ranching activities and livestock production. The Service calculated the market value of each wolf depredation, while also monetizing the indirect impacts of wolves on the physiological health of livestock, the change in forage use, the need for additional labor, the increased expenditures on supplies, ranch property values, and the potential positive impacts. These analyses accounted for the potentially disproportionate effects of wolf depredations on certain ranches, since wolves and wolf depredation activity are not evenly distributed within the MWEPA. We conclude that implementation of the proposed action or alternatives would produce less than significant direct adverse economic impacts on ranching/livestock production at the macro-scale, while resulting in significant or less than significant direct adverse economic impacts on a subset of individual operators in occupied counties in the MWEPA.

We have no verifiable data that attributes a loss of state or local tax base to Mexican wolf depredation in the formerly designated BRWRA or the MWEPA. In accordance with CEQ (2005) guidance: "It is not practical to analyze how the cumulative effects of an action interact with the universe; the analysis of effects must focus on the aggregate effects of past, present, and reasonably foreseeable future actions that are truly meaningful." Given the minimal adverse impacts at the macro-scale, there is no evidence to suggest that there could be significant cascading effects on ranching-associated businesses in the counties or elsewhere (feed sales, hauling, fuel, food, and other local business) nor on any of their tax revenues.

Estimating allotment use in National Forests is difficult, since access can vary from seasonal use to yearlong grazing access. Without individually reviewing the thousands of allotments in the National Forest, we do not have a reliable method to determine the average number of months that cattle are grazing, which would allow for a more precise method for converting AUMs into actual animal units. Even so, the Service estimated AUMs in Arizona and New Mexico in order to inform its analysis of economic activity and economic impacts. Thus, the Service analyzed the economic impacts of wolf reintroductions on allotments. The Service concluded that implementation of the proposed action would produce less than significant direct adverse economic impacts on ranching/livestock production or no significant impact, which includes ranching operations on allotments.

The economic analysis in Chapter 4.3 of this FSEIS recognizes that ranchers have spent money on goods in order to better manage their operations in the presence of wolves (including guard dogs). No estimates exist, however, describing the frequency and scale of the costs spent on these materials throughout the BRWRA. Therefore, the analysis does not attempt to calculate the economic impact of material acquisitions. The Service acknowledges that a commenter shared an estimate of the cost of procuring and caring for guard dogs on a ranch. However, an anecdotal submission of costs does not adequately illustrate the frequency and scale of the costs spent on guard dogs throughout the MWEPA; the Service does not know if this suggested cost is representative. This data is not available so the Service cannot calculate the overall economic impact of this particular material acquisition.

Comment: We received multiple comments regarding potential economic impacts resulting from effects on hunting. Specifically, comments suggested we needed to further analyze: (1) the effect of a reduction in hunting, guiding, and recreation opportunities (especially on spending on fuel, food, and lodging); (2) the economic impacts of wolf effects on game populations; (3) impacts on game department revenues from changes in numbers of hunting licenses; and (4) the impacts of a reduction in state and local government tax revenues through the reduction of circulating dollars that result from hunting and guiding and recreation opportunities due to impacts on game populations affecting fuel sales, motel revenues, and restaurants.

Response: We updated the analysis of the effects on economic activity from big game hunting in sections 3.5.3 and 4.3.2. Overall, we conclude that, with appropriate mitigation, all three alternatives would lead to no or less than significant adverse impacts on big game hunting, and the recreation economy that depends on this activity.

Under Alternative One, we expect the proposed population objective and proposed restriction on the take provision for take in response to an unacceptable impact to a wild ungulate herd to result in wolf densities and corresponding wolf to 1,000 elk ratios that may result in impacts to wild ungulates for a limited period of time. If such impacts occur and result in the state agencies reducing hunting licenses in a GMU for a period, hunting revenue from big game could be reduced during that period. We expect this to most likely occur during approximately a six-year period if wolf to 1,000 elk ratios exceed 4:1000 but we have not yet achieved the proposed genetic objective around 2030. However, after the genetic objective is reached, any ongoing or future impacts could be mitigated through the removal of wolves causing unacceptable impacts. Based on these considerations, we expect implementation of Alternative One to lead to less than significant adverse indirect impacts.

Under Alternative Two, the potential for wolves to impact the big game hunting economy stems from the proposed population objective, which would lead to a larger wolf population and higher wolf densities and wolf to elk ratios than under the 2015 10(j) rule. However, this alternative maintains the 2015 10(j) provision for take in response to an unacceptable impact to a wild ungulate herd, which could result in reducing or eliminating adverse impacts to ungulates and the big game hunting economy. Based on these considerations, we expect that implementation of Alternative Two would result in no significant adverse direct or indirect impacts with mitigation.

Under Alternative Three, a population of 300-325 Mexican wolves in the MWEPA would have a relatively low likelihood of impacting wild ungulate populations based on our projections of the wolf to elk ratios that would occur over time. In addition, impacts to ungulates that resulted in decreased hunting opportunities or revenue could be reduced or eliminated through use of the provision for take in response to an unacceptable impact to a wild ungulate herd. Based on these considerations, we expect that implementation of Alternative Three would result in no significant adverse direct or indirect impacts with mitigation.

Given these less than significant adverse impacts on hunting, there is no evidence to suggest that there could be significant cascading effects on tax revenues from fuel sales, motel revenues, and restaurants, since there is likely to be no significant effect on hunting, guiding, and recreation opportunities or the regional economy. Even if game departments were to reduce the number of hunting licenses, as is possible under Alternative One, this would likely only occur over a short-time frame (approximately a six-year period when wolf to 1,000 elk ratios are greater than 4:1000

but we have not yet achieved the proposed genetic objective around 2030). After the genetic objective is reached, any ongoing or future impacts could be mitigated through the removal of wolves causing unacceptable impacts.

Comment: Comments suggested that we should conduct additional analyses regarding the economic impacts of a reduction in recreation opportunities from BLM land closures (e.g., reductions in developed and dispersed camping affecting fuel, food, lodging, equipment sales). Comments also requested an analysis of the reduction of state and local government tax revenues from circulating dollars through the reduction of recreation opportunities due to forest BLM land closures of developed and dispersal camping affecting restaurants, motels and food, equipment, and fuel sales.

Response: As we discuss in Chapter 4.1, we do not expect implementation of any of the three alternatives to restrict any activities on Federal, state, private, or tribal trust lands in the MWEPA. Under Alternative One, Federal land use would remain consistent with current uses; no change in land use plans or practices would be necessary, and only temporary small-scale restrictions to public use or access would occur to protect release pens when wolves are in them, active den sites, and rendezvous sites from human disturbance. Management flexibility would decrease in specific instances due to restrictions on the issuance of take permits or authorizations, but these restrictions would not alter land use. Based on these findings, we expect implementation of Alternative One to result in no significant direct or indirect adverse or beneficial impacts to land use on Federal or non-Federal land and no mitigation measures are necessary to ensure the continuation of current land uses.

We also do not expect implementation of Alternative Two to restrict any activities on Federal, state, private, or tribal trust lands in the MWEPA. Under this alternative, temporary small-scale restrictions to public use or access may occur, while current management flexibility related to the issuance of take permits in certain situations would be maintained. These effects do not alter land use on Federal or non-Federal land. Based on these findings, we expect implementation of Alternative Two to result in no significant direct or indirect adverse or beneficial to land use and no mitigation measures are necessary to ensure the continuation of current land uses.

Finally, we do not expect implementation of Alternative Three to restrict any activities on Federal, state, private, or tribal trust lands in the MWEPA. This alternative results in a smaller Mexican wolf population in the MWEPA than Alternatives One or Two with fewer releases to improve gene diversity, resulting in a lower potential for temporary closures to restrict human access near sensitive areas. We would not revise any take measures from the 2015 10(j) rule, and while this would maintain management flexibility in certain situations, it would not affect land use in any way. Based on these findings, we expect implementation of Alternative Three to result in no significant direct or indirect adverse or beneficial impacts to land use and no mitigation measures are necessary to ensure the continuation of current land uses.

Thus, the Service does not anticipate any economic impacts from reduction of recreation opportunities due to BLM land closures under any alternative (either on fuel, food, lodging, equipment sales or associated tax revenues) since large-scale closures on BLM lands are unlikely and public use will continue with little or no expected impact to the public. Under the 2015 10(j) rule as of August 20, 2021, no closures on BLM land have occurred due to the presence of Mexican wolves, including closures to developed and dispersed camping areas.

Comment: Commenters suggested that wolf recovery will increase eco-tourism, economic diversity and prosperity in the Southwest. Another commenter countered claims of Mexican wolf reintroduction improving economic prosperity with the suggestion that the reintroduction program has never hired someone from the local community nor has the program resulted in new businesses forming.

Response: We have no evidence to suggest that reintroduced Mexican wolves have resulted in any notable increase in National Forest visits (see the 2014 FEIS, Chapter 4). Combined with the fact that the topography in many areas of occupied range in the MWEPA makes it very challenging to spot Mexican wolves, our analysis in 2014 concluded that the reintroduction of the Mexican wolf has not had any significant impact on tourism and that the forecasted increase in wolves identified under each of the management alternatives would not likely result in any significant change from the baseline. Our proposed action in this FSEIS would not alter the area in which Mexican wolves occur or change the number of wolves substantially in the MWEPA in such a way as to increase or decrease viewing opportunities related to tourism. Similarly, the proposed revisions to three take provisions in this FSEIS do not have any relation to tourism (outside of hunting, which is addressed under Economic Activity); therefore, we have not analyzed impacts of our proposed action or alternatives on the tourism industry as we do not consider our proposed action relevant to this economic sector. We do not have, nor did we receive through public scoping, any new information or research on the economic benefits of wolves to tourism since our 2014 FEIS to alter the conclusions from the 2014 FEIS. We note that range riders from local communities have been hired with funds contributed by agencies or entities participating in the 2019 MOU for Mexican Wolf Recovery and Management.

Comment: One commenter suggested that we need to conduct additional analysis to determine the impacts of wolf reintroductions on preexisting surface rights on federal lands.

Response: The Service does not anticipate any significant adverse impacts on federal land use (including mineral extraction or oil and gas development) under any of the alternatives. Under the preferred alternative, commercial uses such as forest management, mineral extraction, grazing, and oil and gas development are expected to continue as permitted by the BLM. We also do not expect Alternatives Two or Three to result in significant direct or indirect effects to land use on federal or non-federal land; they would not require the development or implementation of additional mitigation measures to ensure the continuation of current land uses. Without these significant adverse impacts, there are unlikely to be any economic repercussions.

Health and Human Safety

Comment: Commenters expressed concerns that children could suffer psychological trauma and stress living in areas with wolves. Another commenter urged the Service to analyze impacts on ranching families' mental health.

Response: We have no new information or research on the psychological impacts of wolves on ranching families since our 2014 FEIS to alter the conclusions and responses from the 2014 FEIS. In Chapter 4.5.2 of the 2014 FEIS, the Service examined potential psychological impacts on children. This section includes information from the Martin (2007) and Thal (2006) studies and notes, in accordance with 40 C.F.R. § 1502.22, that "No peer reviewed studies have been conducted, and there is no scientifically collected data available to make an evaluation as to whether the reintroduction of wolves into the BRWRA has, or has not, had a positive, neutral, or

negative psychological effect on children living in the rural communities within or proximate to the recovery area." As both Martin (2007) and Thal (2006) acknowledge, neither the data they collected, nor their findings, were scientifically conducted or peer reviewed. Therefore, we consider the information presented in these studies as anecdotal and not evidence of widespread psychological trauma (adverse impact) to children from the presence of the Mexican wolf. We also consider the numerous letters we have received from children expressing their interest in the Mexican wolf and their desire to see wolves in the wild as anecdotal and not evidence of a widespread psychological benefit (beneficial impact) to children. The analysis provided in section 4.5.2 considers the relevant scientific information and opposing views and acknowledges incomplete or unavailable information. In the absence of science-based studies, we do not consider that psychological damage to children is a reasonably foreseeable significant adverse effect from implementation of the proposed action and alternatives. Our current proposed action continues, with modifications, actions that are already underway, e.g., managing the MWEPA population toward a population objective, releasing wolves to improve gene diversity, and modifying take provisions; this FSEIS does not contemplate any substantively new actions that would lead to psychological impacts beyond the scope of the impacts considered in the 2014 FEIS.

Comment: Commenters expressed concerns that wolves would pose a threat to human and pet safety. Specifically, they worried that handling of wild animals could make them lose fear of humans and result in dangerous wolf-human conflicts. One commenter suggested that the Service inadequately analyzed the impact of wolf reintroductions on private lands and human populations in the 2014 FEIS. The commenter noted that Zone 1, where the Service focuses wolf reintroductions and occupation, contains the communities of Show Low-Lakeside-Pinetop in the White Mountains; Linden, Pinedale and Clay Springs; Heber-Overgaard; Forest Lakes, Star Valley, Payson and Pine-Strawberry (from east to west), in addition to numerous smaller developments, campgrounds and recreational areas. They also noted that State Highway 260 and U.S. Highway 60, which are heavily used, and other state highways, numerous improved roads, and Forest Service roads, including a road network that provides access to popular recreational spots, such as lakes and streams stocked with sport fish, cut through Zone 1. The SEIS must adequately analyze the effects of wolf interactions with these rapidly expanding human settlements. One cooperating agency expressed a willingness to help the Service with the analysis of potential impacts to the quality of the human environment.

Response: While Mexican wolves, or any other large, powerful animals, can be dangerous if cornered, threatened, or overly habituated to humans, there is no evidence that wolves have posed an unusual risk to humans within the MWEPA. This FSEIS, Chapter 3, provides updated data on wolf-human encounters in the MWEPA since the 2014 FEIS as well as reiterating the management protocols utilized in captivity to minimize the risk of wolf habituation to humans and the standards used to select wolves appropriate for release to the wild. Wolf injuries to humans are exceptionally rare and incidents evaluated as a predatory attack by a wolf on a human are even more rare. However, "one can never say never when discussing the possibility of wolf attacks on humans" (Mech 1998) and under certain circumstances wolves can present risks to human safety. Review of the case histories of wolf-human encounters and evaluation of the factors, circumstances and conditions that increase the risk of aggressive behavior by wolves continue to lead to the conclusion that: (1) the risk to human safety posed by healthy wild non-habituated wolves is extremely small; (2) agonistic or predatory aggression toward humans is most likely to occur in habituated and food conditioned wolves; (3) the presence of a domestic dog increases the risk of

agonistic aggression by wolves; (4) because known wolf behavioral patterns make incidents of aggressive behavior by wolves towards humans to a large degree predictable they are also preventable through proper management that includes not only wolf behavioral modification and wolf removal but also human behavioral modification and public education (McNay 2007, NPS 2003).

Hunting and Wild Ungulates

Comment: One commenter suggested that if impacts from wolves result in a decrease of grazing on allotments, it could lead to a decrease in the creation and maintenance of livestock water developments. This decrease in water availability could compound the impacts on the wild ungulate population from wolf reintroduction.

Response: This comment assumes that the reintroduction of Mexican wolves will substantially reduce ranching operations on allotments. As the Service explains in Chapter 4 of this FSEIS, the implementation of the proposed action or alternatives would produce less than significant direct adverse economic impacts on ranching/livestock production. Given this information, and the lack of evidence the commenter provided to suggest ranchers would reduce water availability on allotments, we consider the connection between wolf reintroduction and water availability to be speculative.

Comment: One commenter stated that wolves will put pressure on elk and deer populations when there is already more demand for hunting than the prey base can support. Another commenter suggested that the 2014 FEIS inadequately addressed concerns that more wolves on the landscape could reduce hunting opportunities. That same commenter suggested that the Service should reduce the population target for Mexican wolves to reduce potential impacts on prey species.

Response: We updated the information in the 2014 FEIS with wild ungulate and big game hunting data and have analyzed the impact of our proposed action and alternatives in this FSEIS, in Chapters 3.5.3 and 4.3.2. Based on our projections of the wolf to 1,000 elk ratio (see Table 2.1 in this FSEIS), we expect the prey base to be sufficient to support the MWEPA population, and we do not expect widespread reduction in hunting opportunities.

Comment: One commenter suggested that wolf predation on ungulates benefits hunters and trappers by eliminating sick and weak individuals. Hunters benefit from healthy ungulate herds. In contrast, another commenter suggested that coyotes can effectively weed out sick ungulates, providing the same benefit to hunters without adding wolves to the landscape.

Response: We acknowledge the potential for wolves or other mesocarnivores to target vulnerable prey. Data was not provided to substantiate additional analysis of these statements.

Essential / Nonessential Designation

Comment: We received many comments regarding the nonessential experimental designation of the MWEPA. Multiple commenters suggested we consider: (1) the need to base the determination on the status of the endangered Mexican wolf subspecies (from the 2015 listing) rather than on the endangered gray wolf listing (from the 1978 listing); and (2) the need to incorporate the new science that has become available since 1998.

Some commenters suggested that we should designate the experimental population as essential. First, commenters argued that the wild population in the United States is essential to the survival

of the species; specific reasons included: (1) since there is only one wild U.S. population, it is essential to the survival of the species in the wild, and its loss would appreciably reduce the likelihood of the survival of this subspecies in the wild; and (2) since the U.S. population supports about 62% of recovery (according to the recovery criteria of having around 320 wolves in the U.S. and 200 in Mexico), loss of the U.S. population would render recovery unachievable for many decades or likely impossible. Second, commenters argued that the wild population is essential to the species achieving necessary population growth, distribution, recruitment, and genetic variation; specific reasons include: (1) existing established wild family groups (i.e., "packs") are essential to the continued existence of Mexican wolves in the wild because they are the foster parents of the Mexican wolves released from the captive population; and (2) the wild population plays a critical role in the genetic health of the overall population, and is therefore essential to the continued existence of the species; the loss of any wild Mexican gray wolf from the overall gene pool jeopardizes the recovery efforts of the entire population. Third, commenters argued that Mexican wolves are essential because they are important to ecosystem function and because they present a genetically distinct portion of the wolf species that could be particularly important in the future when climatic conditions challenge all wolf subspecies across the northern hemisphere.

Some commenters noted that the nonessential designation relies on the captive population as a source population that would survive should the wild population go extinct. Some commenters stated that the Service cannot rely on a captive population to argue that the wild population is not essential. Other commenters expressed concerns about the health of the captive population and the Service's reliance on it; specifically, these commenters felt that the captive population may not be able to effectively restart a wild population should the current wild population disappear. One of these concerns was that the aging of the captive population and consequent attrition of its genetic diversity compromises the population's ability to replenish the wild population. One commenter cited the changes in inbreeding coefficients between 2008 and 2018 as evidence that any future attempt to re-establish a new wild population would start with a captive population that has deteriorated genetic health. These commenters challenged the notion that the captive population could indefinitely preserve genetic health and effectively build a wild population from scratch. Another commenter suggested that, since there are 163 wolves in the wild [the minimum population documented in 2019] and only 175 wolves of breeding age in captivity, replacing all of the wild wolves would require reintroducing 93% of the potentially breeding wolves in captivity, which could be untenable. Another comment emphasized that, if the current U.S. population was lost, it could not be repopulated from the Mexican population either, due to the small size of this population and potential barriers to connectivity in the future (e.g., border wall). Some commenters also cast doubt on whether the Service would indeed use the captive population to restart a wild population; one commenter referenced an SSP facility that stated early in the reintroduction effort that facilities would not maintain Mexican wolves if the reintroduction failed, suggesting that key stakeholders believed prevention of extinction was not feasible without a wild population. Even if the Service could and did replace the wild population with captive wolves, one commenter noted that these wolves would all be first-generation wild wolves, which the Service has acknowledged are more prone to negative interactions with humans. These commenters requested additional clarity on how we could successfully rebuild the U.S. population of Mexican wolves, should it be lost. Without a compelling argument for this effective repopulation of wolves in the wild, they imply the population must be classified as essential.

On the other hand, some commenters suggested that the nonessential designation for the

experimental population of Mexican wolves was appropriate because: (1) the success of the captive breeding program has created a substantial source population of genetically diverse wolves that would be able to repopulate the subspecies on the landscape; (2) wolves in the wild are genetically redundant to this large captive population; (3) experience from over two decades of reintroductions would ensure future reintroduction efforts are more efficient and more successful than in the past; (4) a majority of the wolves in captivity are young, healthy, and in their reproductive prime and there is not enough space for all of them to reproduce, further indicating that this large population can produce more than enough wolves to reestablish a wild population in the unlikely event it is necessary; (5) there is a second wild population in high quality habitat in northern Mexico with 20-30 wolves that are reproducing, and the Service has a history of successful conservation collaboration with Mexico; (6) there is sufficient genetic health and reproductive potential in the captive and wild populations such that the captive population could easily produce more than enough wolves to reestablish a wild population in the unlikely event it is necessary; and (7) that the Court erred in its interpretation of scientific findings and public comments, which have now been discredited by on-the ground evidence of the success of cross-fostering and successful releases into the wild from captive populations, and this error led to the false reasoning that the essential designation is required to support a successful recovery of the Mexican wolf.

Other commenters described the potential consequences of an essential or nonessential designation. Commenters suggested that, if the Service were to designate the population as essential, it could decrease management flexibility, increase regulatory burden, and reduce collaboration with certain stakeholders. These commenters specifically suggested that an essential designation would: (1) hinder the collaboration with and cooperation from Tribal, State, local, and private landowner partners that are required for successful recovery planning; (2) require interagency consultation on all federal permits, which would complicate ecological restoration efforts and undermine collaboration with livestock producers and other affected stakeholders; (3) put undue burden on private landowners and increase depredations; (4) reduce flexibility for managing problem wolves which could, in turn, reduce public tolerance for wolves and increase illegal take; (5) limit the Service's ability to use the "hands-on" management that has been essential to the population growth of the past decade; (6) require an increase in Service and other federal agency personnel to conduct formal consultations; (7) result in delays of permit application processing; (8) affect pre-existing grazing allotment rights and other activities on federal lands; (9) necessitate a new Section 7 consultation between USDA's Wildlife Services and the Service; and (10) increase costs.

Other commenters claimed that designating the population as essential could enhance wolf conservation since: (1) the consultations that would result would ensure that federal actions (such as permitting livestock grazing on public lands, allowing off-road vehicle recreation, and other federal land activities) would not negatively impact wolf survival; (2) it would allow the Service to designate critical habitat for Mexican wolves; and (3) labeling the population as essential would no longer suggest that the population is expendable, and this label could heavily influence public perception of wolves and how humans behave towards wolves.

Commenters also shared potential benefits of maintaining the nonessential designation, which included: (1) providing a greater level of management flexibility to reduce the economic and cultural impacts from reintroduction, prevent conflicts with livestock, and allow the Forest Service, a major player in recovery, to think creatively about its multiple use mandate; and (2) continuing

to allow federal agencies to confer rather than consult under Section 7 of the ESA.

There were widely disparate thoughts among commenters as to whether maintaining the nonessential designation or changing the designation to essential would increase or reduce collaboration; some commenters felt that an essential designation would prompt more collaborative conservation, while others felt it would disrupt collaboration.

One commenter stated that the Service did not explain the differences between essential and nonessential sufficiently to enable the public to better comment on the topic, especially as it pertains to changes to take provisions or impacts to personal or community economics, wolf depredation management, natural resources, recreation, Mexican wolf abundance, and genetics.

Other commenters provided detailed legal interpretations of the language in Section 10(j) to advise the Service on appropriate application of the provisions of the Act. These included the following:

Multiple commenters suggested that the definition of an "essential experimental population" in 50 C.F.R.§17.80 is arbitrary and capricious, counter to Congress' intent, and "perverts the Endangered Species Act by imposing Section 10(a)(2)(A) requirements over Section 10(a)(1)(A) permits, which Congress neither intended nor passed into law." One commenter noted that the definition in 50 C.F.R.§17.80 and the regulations in § 17.81(c)(2) redefine "essential" from "essential to the continued existence of the species" to "essential to recovery in the wild." They requested that the Service withdraw and revise these regulations.

Some commenters stated their perspective that although the Secretary's regulation requires her to use "the best scientific and commercial data available" that release of an experimental population will further conservation of the species, the ESA itself states the Secretary's determinations regarding whether the population is essential to the continued existence of the species must be based on the "best available information." The plain meaning of that phrase shows that it is a broader category than "best available scientific and commercial data" — and therefore includes such factors as the Service's "track record" of past actions, inaction, and decisions. In other words, the Secretary's findings must always incorporate and be consistent with the best science but are not limited to that.

Commenters noted that Congress did not define or further explain what it meant by "likely to appreciably reduce the likelihood of the survival of the species in the wild" or "in most cases", nor did the Service do so by regulation. Therefore, these commenters stated, courts will give such common words their ordinary meanings and dictionary definitions.

A few commenters suggested the Service maintain nonessential by one of two approaches: (1) amend the definition of "essential" in the Code of Federal Regulations so as to confirm that the Service's rules allow for the consideration of captive populations as well as wild populations when determining if an experimental wild population is "essential"; or (2) interpret the definition of "essential" experimental population as allowing consideration of the broader species (gray wolves) of which an endangered experimental subspecies (Mexican wolves) is a part. In this case, the loss of the wild experimental Mexican wolf population will not jeopardize the broader gray wolf species.

Several commenters suggested that because the Mexican wolf's current range at the time of the 2015 10(j) rule was the Blue Range Wolf Recovery Area ("BRWRA"), the FWS need only make an essentiality determination for wolves released outside the BRWRA.

Response: The Service requested comments on the essential and nonessential experimental designations during the scoping process for the SEIS in order to inform our essentiality determination in the revised 10(j) proposed rule. Thus, we will include responses to the comments we received on essentiality during this scoping process at the same time that we respond to comments on the proposed 10(j) rule, while in the meanwhile noting that many of these comments may be addressed by the essentiality determination provided in the proposed 10(j) rule.

Livestock / Ranching Conflicts of Interests + Wolf Removals

Comment: Many commenters provided input on the current funding and staffing levels for the programs that manage response to livestock depredations (e.g., Farm Bill's Livestock Indemnity Program). First, commenters suggested that the livestock depredation compensation program is currently underfunded, a situation that could only worsen as more wolves appear on the landscape. Many commenters suggested that currently available funds for compensation are depleted too quickly (i.e., current depredation rates are exceeding the funding available for compensation, because they are higher than the depredation rates we used in the analysis in the 2014 FEIS) and the process to receive compensation is burdensome. Many other commenters suggested that the amount of money the compensation program provides per lost animal is inadequate. One commenter explained that livestock owners receive "on the hoof" market value as compensation (the market value for the weight of the discovered carcass, which may already be desiccated or eaten); this value does not reflect the ultimate worth of the animal. Another commenter suggested that the current compensation value for heifers should include an additional amount to account for lost future reproductive potential. Another commenter suggested that compensation for cows should equate to $12,000 per lost cow. These commenters suggested the Service must provide information for how the agency intends to provide adequate compensation for continued or increased livestock depredations. Conversely, one commenter suggested that public funds should not be used for compensation for lost livestock since ranchers already receive subsidies in the form of below-market rate grazing fees and other financial incentives.

Second, multiple commenters suggested that the number of Federal, state, and local government wolf management personnel would have to increase as wolf populations increase and lead to more wolf depredations. They stated that the Service should disclose how many additional personnel will be hired for this management, which would include staff that can conduct investigations of depredations. Additionally, commenters believed the Service should share how they will secure the funding/resources to support this increase in personnel.

Response: We recognize that some commenters feel that current market rates for compensation of livestock lost to wolves are not adequate. However, in order to accurately reflect the costs and benefits of wolf reintroduction in the EIS, the Service discussed current, rather than aspirational, compensation practices in its analysis.

Comment: One commenter stated that stress from wolf presence can lead to abortions in cattle, lower conception rates in livestock, and crippling in livestock; they suggested that the Service did not adequately consider these impacts.

Response: We considered some stress-related impacts to cattle from the presence of wolves, such as weight loss; we do not have, nor did the commenter provide, data or information about abortions, lower conception rates, or crippling sufficient to analyze these potential stress-related conditions as an effect of our proposed action.

Comment: Several commenters suggested improved rules regarding livestock carcass removal to reduce the frequency of depredations, including: (1) increasing requirements for accountability to ensure livestock owners remove dead livestock carcasses and keep track of livestock movements; (2) regulating failure to remove a livestock carcass as a form of illegal baiting, which would result in appropriate penalties; (3) providing federal dollars to help livestock owners remove carcasses (with dynamite, burning, or the application of lime); (4) requiring commitment to carcass removal as a condition for receipt of a grazing permit on federal land; and (5) not allowing removal of a wolf following a depredation event if the relevant landowner did not properly remove a non-wolf killed carcass.

Response: We have forwarded these suggestions to the Forest Service and will continue to work cooperatively to reduce attractants that may increase the likelihood of depredations. Currently, the Forest Service issues carcass removal recommendations for specific areas where removal is feasible.

Comment: Several commenters suggested the implementation of potential management strategies to reduce the frequency of depredations or reduce the impacts of depredations on Mexican wolf populations. These suggestions included: (1) obligating livestock owners to take proactive measures to prevent depredations such as the use of herding dogs or human herders, fladry or fences, alarm/scare devices, and hazing; (2) better encouraging livestock owners to graze cattle away from wolf dens and rendezvous sites; (3) requiring livestock owners to participate in Rancher Predator Awareness training; (4) dedicating additional Service funds to support expanded application of non-lethal wolf management, including range riders, fladry, and payments for accepting the presence of wolf dens on grazing allotments; (5) voluntarily retiring grazing permits where conflicts are high; and (6) releasing genetically valuable wolves into the wild to compensate for wolves lost to management removals. One commenter suggested that the Service should give priority consideration to livestock owners' ideas for solutions.

Response: We recognize and appreciate the range of solutions provided by commenters to help reduce depredations, and we welcome additional ideas from livestock owners or any member of the public. The Service will share these recommendations with our partners as we continue to collaborate on the recovery of the Mexican wolf, but do not consider the suggestions provided to be appropriate for the Service to regulate within the context of our experimental population rule.

Comment: Some commenters felt that the rule as drafted allowed too many opportunities for livestock owners and agency managers to kill or remove wolves on public lands. Many commenters felt that the Service should have a higher bar for conditions that would result in a removal of wolves from the wild. These commenters suggested changes to Service standard operating procedures that could result in less frequent removals, including: (1) not removing wolves that have preyed on livestock if the affected landowner knowingly left cattle unattended in areas with wolf activity; (2) requiring managers and the Service to exhaust all non-lethal options of reducing conflict before removing a wolf; (3) banning wolf removal if affected permittees did not take non-lethal preventative measures to prevent depredations; (4) banning all removals of Mexican wolves south of Interstate 10 to facilitate connectivity to wolves in Mexico; (5) banning removal of Mexican wolves as means of constraining their geographic range or merely because a wolf wanders across a geographic or political boundary; (6) only allowing removal of wolves when they pose a threat to human health or safety; and (7) only allowing removal of wolves if the population is growing at a rate of 10 percent for more than 6 months.

Response: The Service considered these suggestions in Chapter 2 of this FSEIS but did not include them in our proposed action or alternatives because they did not meet the selection criteria for alternatives.

Comment: One commenter cited Santiago-Avila et al. (2018) to suggest that lethal removal of wolves as a response to livestock depredations does not actually decrease the future incidence of depredations. This commenter questioned how we could allow for lethal removal when it is not effective when we could use non-lethal alternatives that better reduce future livestock losses.

Response: The Service and our partners continue to work with willing livestock operators to implement non-lethal alternatives in response to livestock depredations. We have proposed to temporarily restrict take on federal land and non-federal land until we reach our proposed genetic objective, which we expect to achieve by around 2030. We will continue to monitor the scientific literature on this topic and to analyze program data to determine the most effective means of reducing depredations.

Comment: One commenter suggested only allowing scientists and professionals involved in official wolf management access to wolf tracking devices, receivers, or real-time GPS information. If we choose to allow non-scientists access to this data, they asked the Service to explain how sharing this information helps reduce depredations.

Response: Telemetry receivers can provide "real-time" information on wolf locations in the wild, but GPS collar location information typically reflects a time lag because collars record information at set intervals and collar data is downloaded at set intervals (for example, location data may be recorded by the collar once daily and then downloaded to a map every few days). Government employees or scientists have ongoing access to telemetry receivers and GPS data. In certain situations, information and telemetry receivers are shared with livestock owners for periods of time to work collaboratively to prevent depredations, which is a shared goal of the project, livestock producers and some non-governmental organizations. Wolf location information can allow livestock producers to move cattle from an area or apply non-lethal techniques, such as fladry, to discourage wolf presence.

Comment: One commenter requested that the SEIS include updated information on the number of permitted and authorized Animal Unit Months on BLM lands and updated statistics on depredations.

Response: See Chapter 3: Affected Environment, of this FSEIS for information pertaining to permitted and authorized Animal Unit Months and updated data on depredations.

Comment: One commenter expressed that we should include additional analyses that consider how existing predation from bears, lions, and coyotes could indirectly affect livestock (e.g., if wolves take over lion kills, the lions will kill other animals/livestock)

Response: The purpose of this FSEIS is to analyze and describe the potential effects of our proposed action. In Chapter 4.3.2: Alternative One of the 2014 FEIS the Service examined the potential dynamics between reintroduced wolves and other extant carnivores in the MWEPA. Multiple studies suggest that competition between wolves and coyotes, mountain lions, and bears for prey would likely result in wolves killing their competitor, or at least prevailing in the competition for food.

Ecosystem Effects

Comment: Many commenters provided thoughts on Mexican wolves' role in the ecosystem. Commenters noted that wolves are keystone species and apex predators and help ensure a balanced and diverse ecosystem that effectively sequesters carbon dioxide and maintains healthy prey populations. Some commenters suggested that ungulate populations, especially non-native ungulates, have been increasing in Mexican wolf range and that wolf predation on these ungulates can help restore ecosystem health, especially aspen restoration in the Coconino National Forest. Based on this understanding, commenters suggested it would be beneficial to limit take of wolves related to ungulate predation to maintain the ecosystem balance that wolves provide.

Response: The Service recognizes the growing volume of scientific literature pertaining to wolves' role as apex predators/keystone species, continued exploration of "top-down versus bottom-up" ecosystem regulation and trophic cascades, and even potential indirect impacts on climate change. We recognize the importance of predators in maintaining or restoring ecosystem health and that Mexican wolves are an apex predator in the MWEPA. Mexican wolf predation on ungulates may result in very localized shifts in movement patterns of ungulates, which may lead to resultant shifts in vegetation. Although we have proposed to temporarily restrict take of Mexican wolves due to an unacceptable impact to a wild ungulate herd, we have done so in order to improve the success of released wolves surviving to breeding age rather than as a measure to improve ecosystem health.

Comment: One commenter noted that the EIS, the 2015 10(j) rule, and the revised recovery plan do not analyze the effects of wolf reintroductions on other predators, such as bears, cougars, bobcats, and coyotes. They ask whether there are "enough elk, deer and other natural prey to support the current population levels of all predators with an increasing wolf population."

Response: See Chapter 3: Affected Environment of this FSEIS, and of the 2014 FEIS.

Illegal Killing of Mexican Wolves

Comment: One commenter suggested that the Service may be discounting the impacts of illegal killing of Mexican wolves. This commenter referenced a 2017 study in the Journal of Mammalogy that found the Service could be underestimating the rate of Mexican wolf poaching by up to 21 percent.

Response: Illegal killing is the largest source of documented Mexican wolf mortality in the MWEPA. The Service and our partners continue to implement measures to reduce this source of mortality, such as increased law enforcement presence and educational programs and outreach. Although illegal killing is a notable source of mortality, the MWEPA population has almost doubled in size over the last five years. We will continue to monitor the scientific literature for additional information on this topic and to work collaboratively with our partners to address this issue. Our proposed action will reduce demographic threats related to small population size and genetic threats such as inbreeding.

Comment: Given the potential impact of illegal Mexican wolf kills on population management, one commenter suggested that the Service should add a provision to any management rules that would require the release of additional Mexican wolves to compensate for illegal kills.

Response: While neither the 2015 10(j) rule nor the current proposed revised rule mandate the release of additional Mexican wolves to compensate for illegal kills, releases are not restricted and

the Service could choose to release additional wolves for any number of management reasons. Currently, population growth is robust and we focus wolf releases on improving gene diversity rather than replacing wolves lost to various forms of mortality.

Interstate I-40 Boundary of MWEPA

Comment: Some commenters expressed that the rule revision must allow for expansion of the experimental population area north of I-40 to facilitate Mexican wolf recovery. These comments suggested that allowing for this natural expansion of the population would recognize the best available science that has identified suitable wolf habitat in the Grand Canyon ecoregion in northern Arizona and southern Utah and in the Southern Rocky Mountain ecoregion in northern New Mexico and southern Colorado. Allowing for this expansion north of I-40 would also provide additional habitat corridors, connecting Mexican wolves across the Southwest. Without this inclusion of northern areas, commenters suggested that the MWEPA was an inadequate amount of habitat to support full recovery of the subspecies.

Response: For any species, there may be several strategies that provide a valid path to recovery. This is the case for the Mexican wolf – different combinations of the location, number of populations, and number of wolves could alleviate the threats of human-caused mortality, lack of gene diversity, and extinction risk due to small population size. Our recovery strategy, which is based on the current status of the Mexican wolf in the wild and the threats it faces, is to establish and maintain a minimum of two resilient, genetically diverse Mexican wolf populations distributed across ecologically and geographically diverse areas in the subspecies' range in the United States and Mexico (USFWS 2017a). We are focusing recovery implementation in the United States in the area south of Interstate 40, consistent with the range described by Parsons (1996), which the Service previously adopted when we began reintroducing wolves in 1998 (63 FR 1752). In Mexico, federal agencies are currently focusing Mexican wolf recovery efforts in the northern Sierra Madre Occidental. Recent habitat and population viability modeling (Martínez-Meyer et al. 2017; Miller 2017) support our geographic focus because they predict that each of these areas in the United States and Mexico can support a viable Mexican wolf population (USFWS 2017a, USFWS 2017b). At the time of recovery, we expect viable Mexican wolf populations that are stable or increasing in abundance, well-distributed geographically within their range, and genetically diverse (USFWS 2017a).

Comment: Some commenters suggested that allowing for expansion north of I-40 could also provide for connection between Mexican wolves and Rocky Mountain grey wolves. Allowing for this connection would help "maintain adaptive capacity and a regional cline similar to historic conditions." As proposed, the MWEPA and Rocky Mountain grey wolves are 500 miles apart, which would "precludes the likelihood of beneficial genetic mixing."

Response: Genetic exchange between the Rocky Mountain subspecies of grey wolves and Mexican wolves is outside the scope of the 10(j) rule revision and also falls outside the Service's stated recovery strategy in the revised recovery plan. The Service's gene diversity criterion in the revised recovery plan ensures that Mexican wolf populations have genetic representation and that genetic threats have been ameliorated (USFWS 2017a). Ensuring wild populations represent approximately 90% of the gene diversity retained by the captive population provides for representation based on community of practice in the management of captive populations (Siminski and Spevak 2017; USFWS 2017a). This recovery criterion does not necessitate genetic connection between Rocky Mountain gray wolves and Mexican wolves to achieve requisite levels

of genetic diversity (USFWS 2017a).

Comment: Some commenters suggested that the revised rule cannot restrict movement, dispersal, occupation, or future reintroduction of Mexican wolves north of I-40 because it is unrealistic and impractical to believe we can constrain wolves within certain geographical limits. This boundary unnecessarily limits natural dispersal and expansion of the subspecies' range and contradicts the purpose of the ESA to conserve species.

Response: Our recovery strategy, which is based on the current status of the Mexican wolf in the wild and the threats it faces, is to establish and maintain a minimum of two resilient, genetically diverse Mexican wolf populations distributed across ecologically and geographically diverse areas in the subspecies' range in the United States and Mexico (USFWS 2017)a. We are focusing recovery implementation in the United States in the area south of Interstate 40, consistent with the range described by Parsons (1996), which the Service previously adopted when we began reintroducing wolves in 1998 (63 FR 1752). In Mexico, federal agencies are currently focusing Mexican wolf recovery efforts in the northern Sierra Madre Occidental. Recent habitat and population viability modeling (Martínez-Meyer et al. 2017; Miller 2017) support our geographic focus because they predict that each of these areas in the United States and Mexico can support a viable Mexican wolf population (USFWS 2017a, USFWS 2017b). At the time of recovery, we expect viable Mexican wolf populations that are stable or increasing in abundance, well-distributed geographically within their range, and genetically diverse (USFWS 2017a).

Comment: Some commenters believed that allowing expansion of wolves north of I-40 would reduce our reliance on Mexican wolf recovery in Mexico.

Response: The establishment of two resilient populations of Mexican wolves with genetic and ecological representation provides for redundancy (USFWS 2017b). Redundancy provides for security against extinction from catastrophic events that could impact a single population by ensuring that one or more additional resilient, representative populations persist. Our recovery criteria require a minimum of two demographically and environmentally independent populations (e.g., limited dispersal) such that negative events (e.g., disease, severe weather, natural disasters) are unlikely to affect both populations simultaneously (USFWS 2017a). In addition, both populations are independently resilient and could be used as a source for reestablishment if severe catastrophes were to occur in a single population. As modeled by Martínez-Meyer et al. (2017), within the historical range of the Mexican wolf there are areas of high-quality habitat in Mexico and the United States of sufficient size to establish redundant populations that are resilient.

Comment: One commenter expressed that we underestimated the historical distribution of Mexican wolves and that records of wolf presence in Colorado and Utah suggest Mexican wolves originally occupied these areas north of I-40. Thus, our rule should allow for Mexican wolf expansion back into these portions of their historical range.

Response: The Act does not describe recovery in terms of the proportion of historical range or potential habitat that must be occupied by a species, nor does it include restoration throughout the entire historical range as a conservation purpose. Thus, the Act does not require us to restore the Mexican wolves (or any other species) to all of its historical range or any specific percentage of currently suitable habitat to achieve recovery. Our recovery strategy, which is based on the current status of the Mexican wolf in the wild and the threats it faces, is to establish and maintain a minimum of two resilient, genetically diverse Mexican wolf populations distributed across

ecologically and geographically diverse areas in the subspecies' range in the United States and Mexico (USFWS 2017a). Recent habitat and population viability modeling (Martínez-Meyer et al. 2017; Miller 2017) support our geographic focus because they predict that each of these areas in the United States and Mexico can support a viable Mexican wolf population (USFWS 2017a; USFWS 2017b). At the time of recovery, we expect viable Mexican wolf populations that are stable or increasing in abundance, well-distributed geographically within their range, and genetically diverse (USFWS 2017a).

Comment: Commenters suggested that the I-40 northern boundary of the MWEPA has no basis in the best available science and instead was a result of political considerations.

Response: We developed the recovery plan, including our geographic focus, using Mexican wolf monitoring data from the wild and captivity, data from other gray wolf populations when relevant, and other relevant scientific information (USFWS 2017a, USFWS 2017b). We also utilized two recent computer modeling analyses to develop the recovery strategy and criteria in this recovery plan. The first model analyzed population viability (referenced herein as population viability analysis or PVA [Miller 2017]). It used subspecies-specific data (e.g., pairing rates, survival rates, and models for number of detectable pups, and probability of producing a litter), some of which were not available for previous model evaluations to predict how a population will perform over time under different scenarios. The second model analyzed habitat suitability (referred to as habitat suitability analysis [Martínez-Meyer et al. 2017]). It used Geographic Information System data layers to identify variations in habitat quality across the landscape. These data and analyses are provided in our Biological Report for the Mexican Wolf (USFWS 2017b). Our recovery strategy is to establish and maintain a minimum of two resilient, genetically diverse Mexican wolf populations distributed across ecologically and geographically diverse areas in the subspecies' range in the United States and Mexico (USFWS 2017a). We are focusing recovery implementation in the United States in the area south of Interstate 40, consistent with the range described by Parsons (1996), which the Service previously adopted when we began reintroducing wolves in 1998 (63 FR 1752). The recent habitat and population viability modeling discussed above (Martínez-Meyer et al. 2017; Miller 2017) support our geographic focus because they predict that each of these areas in the United States and Mexico can support a viable Mexican wolf population (USFWS 2017a, USFWS 2017b).

Comment: One commenter expressed that trapping or capturing wolves that roam north of I-40 to enforce this northern boundary is an unnecessary risk to wolves since it could lead to injury or mortality.

Response: The Service can capture Mexican wolves to relocate them south of I-40 if the wolf does not independently return to the MWEPA. Moreover, injury or mortality during trapping is rare. Should the Service need to relocate a wolf closer to the core recovery area, we take all necessary precautions to ensure the safety of the wolf. Based on the issuance of the 10(a)(1)(A) permit that allows for these relocations, we know that these infrequent wolf captures will not jeopardize the species but, rather, they will help facilitate achievement of our recovery criteria, which includes establishment of a resilient population south of I-40.

Comment: One commenter suggested an alternative boundary for the experimental population area: the boundaries of the Southwestern Distinct Population Segment.

Response: The Southwestern Distinct Population Segment was a component of a 2003 gray wolf

listing decision, which has since been replaced. These boundaries no longer represent the best available science and do not comport with our revised recovery plan (USFWS 2017a). The updated geographic focus in this recovery plan is based on recent habitat and population viability modeling (Martínez-Meyer et al. 2017; Miller 2017; USFWS 2017a; USFWS 2017b).

Comment: One commenter suggested that we must allow for reintroduction and recovery of wolves north of the MWEPA boundary to combat the impacts of climate change.

Response: While we do not consider climate change to be a threat to the Mexican wolf (see our discussion at 80 FR 2488), we recognize that climatic conditions are changing and may consider establishing populations with genetic representation in ecologically/geographically varied habitat to provide Mexican wolves with the potential to withstand these changes (USFWS 2017a). However, this commenter did not provide any scientific research to support the need for northward expansion due to potential threats from climate change. The Service is also unaware of any research that indicates how this northward expansion would help Mexican wolves adapt to future climatic changes. The gene diversity recovery criterion in the revised recovery plan, which does not necessitate expansion of wolves north of I-40, provides for genetic representation that will allow the species to adapt to future environmental change (USFWS 2017a). Ensuring gene diversity over a longer timeframe will aid the Mexican wolf's ability to respond and adapt to various and changing environmental conditions, including shifts in climate. Moreover, we will achieve ecological representation by the distribution of Mexican wolves across large portions of their historical range (per Parsons 1996) in the United States and Mexico, namely within Arizona and New Mexico south of Interstate 40 and in the northern Sierra Madre Occidental (USFWS 2017a, b). Habitat conditions vary between the United States and Sierra Madre Occidental sites in both terrain and vegetation, as well as the abundance and distribution of prey (USFWS 2017b). These differences will expose the Mexican wolf genome to different environments that may result in different selection pressures. We anticipate more genetically diverse wild populations in the United States and northern Sierra Madre Occidental will be better able to respond to not only the current range of habitat conditions, but also future changing conditions such as shifts in prey availability, drought, or other environmental fluctuations (USFWS 2017a). Variation in environmental conditions (such as drought, fire, and prey fluctuations) and episodic threats, such as disease, are characteristic of wild populations of most species, including Mexican wolves. Mexican wolf populations that are genetically robust will be more likely to recover from episodic threats (USFWS 2010).

International Border – Mexico/United States

Comment: Many commenters expressed doubts about Mexico's ability to maintain and recover self-sustaining Mexican wolf populations, given (1) violence in areas slated for reintroductions; (2) uncertainty regarding their ability to achieve necessary funding; (3) the rapidly declining availability of suitable habitat in Mexico due to human activity and high probabilities of human-wolf conflict; and (4) the insufficient amount of public land and prey to support over 100 wolves.

Response: According to the analyses in our revised recovery plan, we believe there is sufficient suitable habitat in Mexico to support a viable Mexican wolf population (Martínez-Meyer et al. 2017; USFWS 2017b). Due to the intensive logistical, economic, and socio-political nature of the Mexican wolf recovery effort, it is critical to ensure that progress toward recovery is advancing in a timely manner. Therefore, to determine whether the recovery strategy is proving effective, we will evaluate its efficacy and the progress of the Mexican wolf population toward recovery 5 years

and 10 years after implementation of the recovery plan (USFWS 2017a). As we explain in our revised recovery plan, based on these evaluations, we will make a determination whether the recovery strategy is proving effective/feasible or whether it needs to be revised. If we determine the recovery strategy is effective but some elements of recovery implementation need improvement, we will identify what needs to be improved, including actions to address identified needs and the feasibility of conducting such actions such as timelines and costs. If we determine the recovery strategy is not proving effective and the expected recovery level is not achieved, we will identify the reasons for such finding and, if necessary, revisit the recovery strategy and work with States and others to identify other areas with suitable habitat and adequate prey to achieve recovery; change techniques used to address gene diversity; or implement other substantive changes. We will revise the recovery plan or recovery implementation strategy as necessary (USFWS 2017a).

Comment: One commenter asked how the governors of New Mexico, Arizona, Utah, and Colorado could sign a letter suggesting that "majority of Mexican wolf recovery must occur in Mexico" despite peer-reviewed science showing that habitats in Mexico alone cannot support enough wolves to prevent extinction due partly to climate change and increasing aridity projected in the southwestern U.S.

Response: Our recovery strategy for the Mexican wolf is to establish two populations over a large geographical area of the Mexican wolf's range to address the conservation principles of redundancy and representation (both ecological and geographical) (USFWS 2017a). Recent habitat and population viability modeling (Martínez-Meyer et al. 2017, Miller 2017) support our geographic focus because they predict that each of these areas in the United States and Mexico can support a viable Mexican wolf population. In Mexico, there are two large blocks of high-quality habitat in the Sierra Madre Occidental that are connected by areas of lower quality habitat and small interstitial patches of high-quality habitat (Martínez-Meyer et al. 2017); in the revised recovery plan, we refer to these two areas as the northern Sierra Madre Occidental and southern Sierra Madre Occidental (USFWS 2017a). Based on recent habitat modeling, we expect that either of these areas will be able to support a population of Mexican wolves (Martínez-Meyer et al. 2017; USFWS 2017b). Current reintroduction efforts are focused in the northern Sierra Madre Occidental due to logistical considerations (e.g., monitoring wolves in a single area rather than spreading resources between the northern and southern areas), and therefore the recovery strategy in Mexico focuses on this area (USFWS 2017a). However, if Mexican wolves disperse to southern Sierra Madre Occidental or federal agencies in Mexico decide to release Mexican wolves into this area as part of their reintroduction effort, the recovery strategy can be adapted to include wolves in either or both areas (Miller 2017; USFWS 2017a).

Comment: Multiple commenters suggested the SEIS must incorporate analysis and consideration of the expanded border wall with Mexico, which could impede passage of large mammals between the U.S. and Mexico. These commenters suggest that the border wall would necessitate perpetual transborder translocations to ensure there is sufficient migration between the U.S. and Mexico such that wolves in Mexico can increase the viability of U.S. wolf populations. One commenter stated that the border wall means that the "Service cannot rely on wolves in Mexico as part of the metapopulation necessary for full recovery."

Response: The MWEPA does not include the wolves in Mexico; the southern border of the MWEPA coincides with the southern border of the U.S. Additionally, in our revised recovery

plan, even without considering the border wall, we noted that we did not expect the level of dispersal predicted between any of the sites (particularly between the United States and northern Sierra Madre Occidental) to provide for adequate gene flow between populations to alleviate genetic threats or ensure representation of the captive population's gene diversity in both populations (USFWS 2017a). Therefore, we consider genetic management such as releases from captivity (including cross-fostering pups) and translocations to serve as an effective tool during the recovery process to achieve appropriate representation (Miller 2017; USFWS 2017a). Thus, releases and translocations are a form of management that is necessary during portions of the recovery process. Connectivity or successful migrants are not required to achieve recovery (Miller 2017; USFWS 2017a).

Comment: Multiple commenters questioned how we can rely on recovery of wolves in Mexico, given that we have no jurisdiction outside of our borders and thus cannot compel Mexico to carry out and fund conservation activities. Given concerns about Mexico's ability to contribute to recovery, the amount of habitat available in Mexico, and the challenges involved with relying on a sovereign nation to achieve our goals, many commenters suggested we needed to change the provisions in our rule to reduce our reliance on reintroduction in Mexico for achievement of any population objectives.

Response: While we cannot compel foreign governments to carry out activities that achieve our recovery goals, we have decades of collaborative conservation history with Mexico. Section 8 (b) of the ESA encourages foreign countries to provide for the conservation of threatened and endangered species, and the Service to enter into agreements with foreign countries to provide for such conservation. Our relationship with the Mexican government is formalized through a 1996 Memorandum of Understanding establishing the Canada/Mexico/United States Trilateral Committee for Wildlife and Ecosystem Conservation and Management. The Trilateral Committee implements the conservation priorities of Mexico, Canada, and the United States, providing a unique and efficient mechanism to address conservation and management of biodiversity on a continental scale. As such, Mexico regularly contributes to the recovery of listed species that cross the southern border (e.g., thick-billed parrot, ocelot, jaguar). Due to the binational range of the Mexican wolf, successful recovery of the species requires close coordination and cooperation with recovery partners in Mexico. The Service has a strong working relationship with the Mexican governmental agencies CONANP and Secretaría del Medio Ambiente y Recursos Naturales (SEMARNAT), as well as field staff working to reestablish the Mexican wolf in the wild in Mexico. We coordinated closely with Mexican conservation agencies on the development of the revised recovery plan. As noted in our revised recovery plan, the Service and our state partners will continue to seek funding to assist Mexico in implementing actions necessary to achieve Mexican wolf recovery (USFWS 2017a). In addition, the Service and our partners will continue to exchange technology and expertise with Mexico to implement recovery actions (USFWS 2017). Due to the intensive logistical, economic, and socio-political nature of the Mexican wolf recovery effort, it is critical to ensure that progress toward recovery is advancing in a timely manner. Therefore, to determine whether the recovery strategy is proving effective, we will evaluate its efficacy and the progress of the Mexican wolf population toward recovery 5 years and 10 years after implementation of the recovery plan (USFWS 2017a).

Comment: Many commenters suggested that, given concerns regarding Mexico's ability to contribute to recovery, the Service should consider expanding Mexican wolf reintroduction and distribution northward in the U.S. beyond historically occupied areas. Even though most Mexican

wolves historically occurred in Mexico, "the establishment of populations at or beyond the northern limit of the historical range is an appropriate plan to increase recovery success and metapopulation resilience."

Response: The establishment of two resilient populations of Mexican wolves with genetic and ecological representation provides for redundancy (USFWS 2017a, b). Redundancy provides for security against extinction from catastrophic events that could impact a single population by ensuring that one or more additional resilient, representative populations persist. Our recovery criteria require a minimum of two demographically and environmentally independent populations (e.g., limited dispersal) such that negative events (e.g., disease, severe weather, natural disasters) are unlikely to affect both populations simultaneously (USFWS 2017a). In addition, both populations are independently resilient and could be used as a source for reestablishment if severe catastrophes were to occur in a single population. As modeled by Martínez-Meyer et al. (2017), within the historical range of the Mexican wolf (Parsons 1996) there are areas of high-quality habitat in Mexico and the United States of sufficient size to establish redundant populations that are resilient.

Comment: One commenter suggested that recovery efforts must facilitate natural connectivity between the wolf packs in Mexico and the United States.

Response: As explained in our revised recovery plan (USFWS 2017a), we expect the patchy habitat in the border region of Mexico and the United States, as modeled by Martínez-Meyer et al. (2017), has the potential to support a low level of Mexican wolf dispersal between high-quality habitat patches in the United States and the northern Sierra Madre Occidental (about one wolf every 12- 16 years; Miller 2017). Habitat quality between the northern and southern Sierra Madre Occidental sites in Mexico has the potential to support a higher degree of dispersal compared with the potential between the United States and northern Sierra Madre Occidental site, but it is still predicted to be low (about one wolf every 3-4 years: Miller 2017). While we anticipate habitat between any of the populations can support dispersing wolves and provide some connectivity, we do not expect the level of dispersal predicted between any of the sites (particularly between the United States and northern Sierra Madre Occidental) to provide for adequate gene flow between populations to alleviate genetic threats or ensure representation of the captive population's gene diversity in both populations. Therefore, we consider genetic management such as releases from captivity (including cross-fostering pups) and translocations to serve as an effective tool during the recovery process to achieve appropriate representation (Miller 2017). Thus, releases and translocations are a form of management that is necessary during portions of the recovery process. We do not expect regular releases from the captive population to be necessary after Mexican wolves have been recovered because a high proportion of the gene diversity from captivity will have been incorporated into the wild populations and wild populations will be sufficiently abundant such that releases from captivity for population augmentation will not be necessary (Miller 2017). Connectivity or successful migrants are not required to achieve recovery (Miller 2017; USFWS 2017a).

Population Objective

Many commenters suggested that the population targets in our new rule must be significantly more ambitious than those in the 2015 rule in order to achieve long-term genetic health. Specifically, commenters believed that the rule must acknowledge the best available science, which suggests that Mexican wolves need more than one single population to achieve recovery (Hedrick 2016;

Carroll, Frederickson, and Lacy 2013). Rather, they need a metapopulation with three distinct, but genetically connected, populations. One commenter argues that the concept of a metapopulation is also consistent with the "three Rs" framework that the Service has endorsed as a model for viability. The Court and commenters claim that the 10(j) rule as written does not provide for this metapopulation (it only provides for a single population), even though the Service acknowledges this necessity for a metapopulation.

Response: As we explained in our 2015 10(j) rule, we established the population objective at that time based on our interpretation of the best available science within the context of a single MWEPA population, recognizing that we may need to adjust the objective in the future based on revision of the original (1982) recovery plan. We are now proposing a revised population objective that is consistent with the revised recovery plan, which will allow the population to grow larger than the objective of 300-325. Our revised recovery plan addresses the concepts of resiliency, redundancy, and representation (the "three Rs") and establishes a strategy to establish two robust populations over a large portion of the historical range of the Mexican wolf.

Commenters also provided suggestions regarding more ambitious population sizes for each of the Mexican wolf populations required for recovery, stating that these larger population sizes would more adequately provide for genetic health. One commenter suggested that Mexican wolves not only need three interconnected populations but a total of 750 individuals. Another commenter suggested we use the rule of thumb from conservation genetics that suggests individual populations need an effective population size of 500 individuals to maintain genetic health in the long-term (which means having significantly more than 500 individuals in the actual population); another commenter suggested we may only need an effective population size of 100 wolves, which would roughly translate to 500 wolves in the wild. Another commenter suggested that we cannot re-propose a rule with only a single, isolated population with 300-325 individuals, since this is only sufficient for short-term survival, rather than long-term recovery.

Response: We evaluated a number of management scenarios to determine the population size and gene diversity needed to alleviate threats to the Mexican wolf (Miller 2017). Our strategy and recommendations for the recovery of the Mexican wolf are described in the revised recovery plan (USFWS 2017a). We understand that there may be other population configurations that would also alleviate threats to the Mexican wolf.

Comment: One commenter suggested that the use of the current recovery criteria as population objectives and release recommendations in the new rule would be a nonstarter since "the recovery plan's numbers were inadequate," since the recovery plan misapplied scientific research (Carroll et al, 2019), and because the recovery plan's criteria are "discretionary" and "unenforceable."

Response: We acknowledge that a recovery plan is a guidance document that may not be enforceable in the manner described by the commenter. However, we are proposing to establish a population objective for the MWEPA in the regulatory part of the revised 10(j) rule, as well as a genetic objective.

Comment: Some commenters believed that constraining the growth of wolf populations to around 300 individuals (rather than allowing it to reach its "ecologically effective density") contradicts the charge of the ESA to conserve listed species. Other commenters believed it was inappropriate to establish a discrete population objective at all, believing this could compromise flexibility and could be interpreted as a cap that would allow for more wolf removal.

Response: We are proposing to establish a revised population objective for the MWEPA that would not constrain the growth of the population. We explain our rationale for the 2015 10(j) population objective and our revised proposed population objective in Chapter 1 of this FSEIS.

Comment: One commenter suggested we should establish annual population targets to ensure the wolf population is making adequate progress towards recovery.

Response: We have incorporated annual benchmarks toward achieving our proposed genetic objective into Alternative One to ensure the wolf population is making adequate progress towards recovery.

Recovery

Many commenters stated that the analysis in the revised recovery plan is scientifically valid and thus is the only appropriate basis for the SEIS and revised 10(j) rule. These commenters suggested that the Miller (2017) population viability analysis (PVA) in the recovery plan represents the best available science since it included updated parameters (e.g., inbreeding effects, mortality rates, percent of females breeding, and pup recruitment). One commenter shared that, while older PVAs relied on data from other wolf subspecies and limited sample sizes of Mexican wolves to understand impacts of inbreeding (i.e., inbreeding information from 39 litters over 8 years (Fredrickson et al. 2007)), the 2017 model used data from 89 litters over 16 years (Clement and Cline 2016a, b). Another commenter suggested that the extinction probabilities and genetic diversity goals in the recovery plan "are consistent with the scientific literature on long term recovery of endangered species (Doak et al. 2015)." As such, these commenters share that any change to the 10(j) rule's population objectives or release plans should align with this PVA and the revised recovery plan.

Other commenters suggested that the revised recovery plan does not present the best available science and thus should not inform the population objectives and other content in the revised proposed 4(d) rule. One commenter suggested that, because the Court vacated the 2015 section 10(j) rule since it did not use the best available science, this also "renders the revised recovery plan unscientific and insufficient for achieving recovery under the ESA," since it used similar science as its foundation; another commenter suggested it was thus inappropriate to align a new 10(j) rule with the revised recovery plan, since it is based on the same "defective" science in the 2015 rule. As such, they suggested that we would need to revise the revised recovery plan after updating the 2015 10(j) rule.

Other commenters took specific issue with the analysis or recovery criteria in the recovery plan. One commenter suggested that the recovery criteria in the revised recovery plan are insufficient to reduce extinction risk; this commenter suggested that the Service should use other, earlier recovery plans that had more "precautionary" recovery criteria as the basis for the rule revision. Another commenter critiqued that the PVA in the recovery plan overestimates future genetic diversity since the "pedigree of individuals released into the wild will not closely match the pedigrees of individuals projected to be released in the simulations," and thus results in an "inappropriately low standard for retention of genetic diversity" in the recovery plan (i.e., releasing 22 wolves that survive to breeding age). A third commenter suggested the analysis in the recovery plan inappropriately relies on supplemental feeding of wolves in perpetuity, which would not result in "self-sustaining populations," as the ESA directs. Finally, one commenter felt that the desire to create "social tolerance" of wolves motivated the development of the demographic recovery

criteria; they claim that social tolerance is not part of the best available science standard and thus cannot influence development of recovery criteria.

Response: As we describe in this FSEIS and the accompanying proposed 10(j) rule, the population viability model for the revised recovery plan incorporated significant data and analyses that were not available at the time of the 2015 10(j) rule. We developed recovery criteria that would ensure threats to the Mexican wolf are sufficiently alleviated. Our Summary of Public Comments and Responses on the revised recovery plan can be found here: https://www.fws.gov/southwest/es/mexicanwolf/pdf/20171128MWDRPResponsetopubliccommentsFINAL.pdf.

Comment: Some commenters felt that the recovery plan's "reliance on a foreign country is unenforceable and aligning the rule with the recovery plan would create an unenforceable rule for recovery." They emphasized that the Service cannot "rely upon recovery criteria delegated to the sovereign nation of Mexico."

Response: The purpose of our proposed action is to ensure that the MWEPA contributes to the recovery of the Mexican wolf by ensuring that threats have been alleviated in this population. We have included our proposed population objective and genetic objective in the regulatory part of the proposed revised 10(j) rule. The Service pursues the recovery of many species that cross international borders.

Comment: Multiple commenters cautioned that the 10(j) rule must exist separately from the recovery plan, that the rule itself "must include sufficient population objectives and release recommendations to achieve long-term conservation and recovery of the Mexican wolf in geographic areas subject to the jurisdiction of the FWS." They emphasized that the rule cannot rely on discretionary/voluntary recovery actions detailed in the recovery plan to support long-term conservation of the species. Another commenter suggested it would be inappropriate for the 10(j) rule to reflect the recovery plan since 10(j) rules only need to include enforceable provisions that further recovery of the species; they do not need to include "non-binding recovery aspirations contained in the revised recovery plan." On the other hand, one commenter countered that the revised 10(j) rule must "reflect and support recovery criteria established in a recovery plan and that those criteria be based on the best available scientific information and data."

Response: We are proposing to modify the 2015 10(j) population objective, establish a genetic objective, and modify three forms of allowable take in the MWEPA. Although these proposed revisions align with the revised recovery plan, we have proposed to codify them in our experimental population rule.

Comment: Several commenters provided suggestions for new or updated recovery criteria or strategies, which could then inform content of the 10(j) rule revision, including: (1) adding objective and measurable criteria for levels of anthropogenic mortality; (2) including a strategy to release adult pairs, in addition to cross-fostering, to enhance genetic diversity; (3) revising criteria regarding genetic diversity to include direct measures of genetic health, rather than the proxy measure of the total number of releases; and (4) including strategies that "increase the number of releases (via both cross-fostering and release of adult animals) to a level sufficient to adequately ameliorate genetic threats and retain at least 90 percent of the current combined genetic diversity of the captive and wild population."

Response: Our current action is the proposed revision of the 2015 10(j) rule in response to the March 31, 2018, Court Order. We are not revising the recovery plan at this time.

Take / Allowable Forms of Take

Comment: Many commenters provided general reactions that the take provisions in the 2015 rule would not adequately protect Mexican wolves nor facilitate their recovery in the wild.

Response: We agree that nonlethal control of Mexican wolves is the preferred option for managing conflict. However, no single management tool can resolve all issues associated with conflicts. Therefore, State, Tribal, and Federal managers will continue to use a combination of management options, including nonlethal forms of management. The current methods we use to reduce wolf mortality from conflicts by preventing and addressing conflicts in a systematic and prompt manner have accommodated a rapidly increasing Mexican wolf population. Specifically, the take provisions in the 2015 rule, and our proactive processes for preventing and managing conflicts, have allowed the wild Mexican wolf population to grow from 98 wolves in 2015 to 186 wolves in 2020. Even so, the Service is proposing revisions to this rule to further facilitate recovery; specifically, we believe these revisions will allow the Mexican wolf population to achieve the recovery goals in the 2017 revised recovery plan. We believe this revised rule will continue to meet the twin objectives of supporting the recovery of the species while also allowing the Service to effectively respond to the needs of local communities, provide for public safety, and manage conflicts.

Comment: Many commenters provided comments that supported the 2015 rule as written and questioned claims that it inadequately protects genetic health. These commenters suggested that removal of any of the take allowances in the 2015 rule would be untenable for private landowners and ranching. They argued that the take provisions currently in the 2015 rule cannot be negatively impacting genetic health of the wild Mexican wolf population since, thus far, the rule has resulted in no wolf removals. Furthermore, they argue that even when removal of wolves occurred, it never exceeded 3 percent of the population annually, an amount that cannot have a significant impact on population genetics and is not "operat[ing] to the disadvantage of such endangered species" (U.S.C. § 1539(d)). They also suggested that future wolf removals will consider the genetic value of each wolf to further preserve necessary diversity.

One commenter suggested that the Service should not limit private landowners' ability to take in order to improve genetic diversity in the Mexican wolf population, since take of wolves is not the cause of limited genetic diversity. The lack of genetic diversity resulted from a genetic bottleneck given the small size of the founding population. They argue that genetic diversity will always be a concern for this species given the historical context of their reintroductions so the Service should not make decisions about allowed take on non-Federal lands with the goal of enhancing genetic health.

Response: We concur with these commenters that permitted take under the 2015 rule has not negatively impacted the wild Mexican wolf population, since no wolves have been taken under a permit on Federal or non-Federal land or in response to unacceptable impacts to ungulate populations. However, we recognize the limited genetic diversity of the founding population and how this limited diversity could impact Mexican wolf populations in the future; we have thus developed a strategy in the 2017 revised recovery plan to alleviate these genetic threats and recover the Mexican wolf. Based on our analysis of the proposed revisions to the 2015 take regulations,

we believe they will advance this strategy to improve genetic diversity, since they support the release of captive wolves into the MWEPA.

Comment: Some commenters believed that Federal employees should never be allowed to have any take of an endangered species, including the ability to use traps to control native wildlife populations.

Response: While we understand this concern, our ability to manage any species, but particularly a predator, is an important facet of recovery. This management can sometimes involve take. We agree that nonlethal control of Mexican wolves is the preferred option for managing conflict. However, no single management tool can resolve all issues associated with conflicts. Therefore, Federal managers will continue to use a combination of management options, including nonlethal forms of management. The current methods we use to reduce wolf mortality from conflicts by preventing and addressing conflicts in a systematic, fair, and prompt manner have accommodated a rapidly increasing Mexican wolf population. Moreover, based on Federal agencies' obligations under section 7 of the Act, the take Federal agencies incur in their efforts to conserve a listed species cannot and will not jeopardize the species. Additionally, our revisions to the 2015 rule do not contemplate any changes to the take provisions related to trapping.

Comment: Many commenters believed that lethal removal of wolves should be a last resort in all cases, that managers must first be required to use non-lethal wolf control measures. One commenter believed that allowing for any lethal take of Mexican wolves violates the standards in the Act that regulations cannot operate to the disadvantage of listed species; they claimed that allowing for take impacts genetic health, which is a disadvantage to Mexican wolves. Other commenters suggested that wolves should only be killed if they are posing a threat to human safety.

Response: Section 10(j) of the Act allows for lethal take under certain circumstances. Moreover, while the Act requires that Federal agencies further the conservation of listed species, they are allowed exemptions from take prohibitions under certain circumstances, as long as their activities do not jeopardize the continued existence of a listed species. The Service will continue to ensure that lethal control of Mexican wolves does not jeopardize the species. Managing Mexican wolves in a way that prioritizes genetic health is paramount, but we must also ensure that managers have the ability to effectively respond to the needs of local communities, provide for public safety, and manage conflicts. The Service typically employs non-lethal methods (e.g., hazing) before resorting to lethal control. However, the 2015 rule, and the revised rule we are proposing, allow any person to take a wolf in defense of human life. We do not believe these allowances for take, and even the infrequent legal use of lethal control, will negatively impact Mexican wolf population genetics in the long-term.

Comment: Multiple commenters requested that we remove the provision that allowed for accidental take that resulted from trapping or shooting Mexican wolves due to misidentification as a coyote; other commenters believed we should ban the use of traps that have the ability to harm or hold a Mexican wolf within the MWEPA. Many saw this provision as a loophole that has allowed for recreational trappers to depress the wolf population and has resulted in the loss of genetically valuable wolves due to the indiscriminate nature of trapping. One commenter cited that, in the past 18 years, private trappers have caught 55 Mexican wolves, resulting in injury to or death of Mexican wolves. Another commenter believed this provision contradicted basic tenets of responsible hunting and trapping to "know your target." This commenter suggested that those

who accidentally shoot or trap a Mexican wolf "should face felony charges and a lifetime ban from hunting and trapping."

Response: In the 2015 rule, and in our revised proposed rule, we establish a standard that trapping must employ "due care" to minimize the likelihood of trapping a Mexican wolf. In the rule, we discuss that for take to qualify as "unintentional," it must have occurred despite the use of due care, have been coincidental to an otherwise lawful activity, and not have been committed on purpose. Taking a Mexican wolf with a trap, snare, or other type of capture device within occupied Mexican wolf range is prohibited and is not considered unintentional take, unless due care was exercised to avoid injury or death to a wolf. With regard to trapping activities, due care includes: (A) Following the regulations, proclamations, recommendations, guidelines, and/or laws within the State or tribal trust lands where the trapping takes place; (B) modifying or using appropriately sized traps, chains, drags, and stakes that provide a reasonable expectation that the wolf will be prevented from either breaking the chain or escaping with the trap on the wolf, or using sufficiently small traps (less than or equal to a Victor #2 trap) that allow a reasonable expectation that the wolf will either immediately pull free from the trap or span the jaw spread when stepping on the trap; (C) not taking a Mexican wolf using neck snares. (D) reporting the capture of a Mexican wolf (even if the wolf has pulled free) within 24 hours to the Service. If a Mexican wolf is captured, trappers can call the Interagency Field Team (1–888–459–WOLF [9653]) as soon as possible to arrange for radio-collaring and releasing of the wolf. Per State regulations for releasing nontarget animals, trappers may also choose to release the animal alive and subsequently contact the Service or Interagency Field Team. According to these provisions, trappers cannot purposefully depress the Mexican wolf population; any intentional take of wolves, including through trapping, would be illegal. Additionally, trappers must continue to comply with the basic tenets of responsible trapping in order to abide by the "due care" provisions of this exception. If trappers fail to take the necessary precautions outlined as "due care," any take of Mexican wolves, even if unintentional, would be illegal.

Comment: There was disagreement among public commenters as to whether the rule should allow take to prevent impacts to wild ungulate herds. Many commenters felt this take exception was unnecessary, since there is no evidence to suggest that Mexican wolf populations impact the number of wild ungulates available to hunters (e.g., Coconino 2013 EIS and AZGFD (Flagstaff office) trend data show increasing elk populations and steady mule deer populations since 2008). Moreover, they believed this provision does not provide for the conservation of Mexican wolves. These commenters felt we should remove this exception from a new rule and prohibit any removal of wolves due to preying on wild ungulates, at least until Mexican wolves have recovered.

However, other commenters felt granting this flexibility to State agencies to control wolf populations as a means to maintain healthy ungulate herds was appropriate. They felt any future rule should allow take of wolves to prevent harm to ungulate populations, when State wildlife professionals believe it to be necessary, since these ungulate populations have not yet adapted to wolf presence. One commenter claimed that removing this provision could have serious consequences on the ecosystem. Commenters also believed we should remove some of the burdensome processes required for State agencies to receive Service approval to remove a wolf for this purpose, such as providing a peer-reviewed scientific report to the Service.

Response: In preparation of the revisions to the 2015 rule, we worked with the relevant state game and fish agencies in New Mexico and Arizona to propose a revised take provision for "take in

response to unacceptable impacts to a wild ungulate herd;" we discuss our proposal to restrict the use of this take provision for a limited time under Alternative One. This revised provision allows the Service and its partners to address impacts to ungulates over the long-term while also supporting the recovery of the Mexican wolf.

Comment: Some comments suggested tweaks to the definitions in our rule, including: (1) removing "non-feral domestic dogs" from the definition of domestic animals; and (2) adding a definition of "private land," which would include State lands or lands owned by a local municipality, since the rule currently only addresses private land and Tribal land, and seems to overlook State and local properties; if we cannot clarify the definition of private land to include State and local properties, we should add a provision that addresses wolf occupancy on properties owned by a State or local municipality, since these types of land owners should also be allowed to refuse wolf occupancy.

Response: While we appreciate these comments, the Service is not proposing any clarifications or revisions to the rule that are beyond the scope of the court ordered remand.

Comment: One commenter suggested that any Mexican wolf mortality that was not specifically authorized by the Service, regardless of the perpetrator, should automatically result in a Federal law enforcement investigation for potential ESA violations. They suggested this should include Wildlife Services' unintentional or coincidental take of Mexican wolves while conducting their official duties, since this provision, as written, "preemptively exonerates Wildlife Services employees."

Response: Federal law enforcement can investigate any take of Mexican wolves that is in violation of the Act, which would include any take in violation of the provisions of our proposed rule, if finalized. The experimental designation of the MWEPA allows for unintentional take under specific circumstances, including unintentional take that occurs in the course of Federal, State, or tribal agency employees or their contractors performing their official duties. Unintentional take means the take of a Mexican wolf by any person if the take is unintentional and occurs while engaging in an otherwise lawful activity, is take that occurs despite the use of due care, is coincidental to an otherwise lawful activity, and is not done on purpose. Thus, since Wildlife Services is a Federal agency, if Wildlife Services' activities result in unintentional take of Mexican wolves, this take would be lawful. Since this take would not be in violation of the Act, it would not result in Federal law enforcement investigations. This provision for unintentional take acknowledges that, even under the best circumstances when experts take due care in their tasks, on rare occasions, take can occur during the accomplishment of important conservation activities. Fear of prosecution for truly unintentional take would limit the Service's partners' ability to carry out these invaluable conservation programs, which both advance recovery and ensure public safety.

Comment: Many commenters argued that ranchers and livestock owners must be able to retain the ability to lethally control wolves after depredation events. While compensation for lost livestock is helpful, given the volume of depredations that has occurred in the recent past, they argue that "take permits are necessary to manage wolves that are continually threatening livestock and domestic animals" so they do not continue to depredate livestock or pass on bad habits to other wolves in the pack. Another commenter suggested we bring back the "three strikes" rule to govern response to depredations, while guaranteeing that offending wolves would not be relocated to

active livestock grazing allotments.

Response: The revisions to take permits that we are proposing, and that we further detail under the discussion of Alternative One above, will allow private landowners to retain the ability to take Mexican wolves, under certain circumstances. The restrictions we propose to the issuance of these permits create a balance between supporting the recovery of the Mexican wolf while also providing flexible mechanisms to address conflict situations.

Comment: One commenter expressed that our requirement to have an agreement with a willing landowner to release or translocate wolves should also apply to naturally dispersing wolves. They suggest that the Service must clearly state in the rule that naturally dispersing "wolves will not be allowed to use and occupy private land without the landowner's consent, and that wolves will be promptly captured and removed upon request." Furthermore, they argue that the failure to include this provision would discriminate against non-Federal landowners since we clearly state that we will capture and remove wolves from Tribal land, if requested by a tribe.

Response: While we appreciate this commenter's concern, this suggestion is outside the scope of our revisions to the 2015 rule; the Service is not proposing any changes to the rule that are beyond the scope of the court ordered remand. The revisions we propose are intended to provide for the long-term conservation and recovery of the Mexican wolf.

Additionally, Federal agencies have unique relationships with Tribes, which include specific obligations for collaboration and coordination. In accordance with the President's memorandum of April 29, 1994 (Government-to-Government Relations with Native American Tribal Governments; 59 FR 22951), Executive Order 13175 (Consultation and Coordination With Indian Tribal Governments), and the Department of the Interior's manual at 512 DM 2, we readily acknowledge our responsibility to communicate meaningfully with recognized Federal Tribes on a government-to-government basis. In accordance with Secretarial Order 3206 of June 5, 1997 (American Indian Tribal Rights, Federal-Tribal Trust Responsibilities, and the Endangered Species Act), we also readily acknowledge our responsibilities to work directly with tribes in developing programs for healthy ecosystems, to acknowledge that tribal lands are not subject to the same controls as Federal public lands, to remain sensitive to Indian culture, and to make information available to tribes. Our commitment to remove wolves from Tribal lands stems from this unique obligation for proactive collaboration and respecting tribal sovereignty.

Comment: Commenters disagreed on how changes in take regulations could increase or decrease illegal killing of wolves. Commenters agreed that illegal killing of wolves, which occurs due to frustrations with regulation and the inability to manage wolves through legal processes, has a much larger impact on genetic health than the legal removal of wolves, since poachers do not consider the genetic value of the individuals they are removing. One commenter suggested that illegal killing currently has a much larger impact on population dynamics than legal killing since, while only 1.2 wolves per year were legally removed from the population between 2008 and 2020, 7.1 wolves were illegally killed annually between 2012 and 2018. These commenters expressed broad consensus that the Service should thus craft regulations to avoid as much illegal killing as possible, however did not agree on the types of regulations that would minimize poaching. Some commenters argued that loosening restrictions on legal take could ultimately result in more social acceptance of wolves, less illegal wolf removal (since livestock owners would have legal options), and better genetic outcomes. However, another commenter suggested that peer-reviewed studies

(e.g., Chapron and Treves 2016) show the opposite, that the more take we allow, the more wolves will be killed illegally. These studies argue that, if an agency allows for more lethal control of a species, it reduces the public's perceived value of this species, which can then result in more poaching.

Response: We are aware of scientific research investigating the relationship between illegal killing and take regulations. Our proposed revisions would restrict several forms of take, while also allowing the flexibility necessary to manage conflicts and improve public acceptance of wolves. These provisions will allow us to make progress towards recovery and improve the genetic diversity in the MWEPA.

Comment: Multiple commenters requested that, however we change the 2015 rule's take provisions, if at all, we must clearly explain how each take provision improves genetic health "through documenting how each such measure contributes to the achievement of specific genetic metrics" and recovery objectives.

Response: As we discuss in our explanation of Alternative One above, we are proposing to establish annual benchmarks for the number of released wolves that survive to breeding age as a determining factor for whether we will issue permits for take on Federal and non-Federal land. These restrictions will lift once we meet our recovery criteria to have 22 released wolves survive to breeding age (the recovery criteria that ensures achievement of genetic health objectives). These restrictions on permitting will ensure we maintain gene diversity in the population and efficiently achieve our genetic objectives.

Comment: One commenter suggested that we prematurely suggested how we might change the 2015 rule in response to the Court's holding in an NOI by listing the take provisions we would revisit, and the ones we would not. This commenter felt this "predetermined the outcome of rulemaking required by the Court order, to ensure that any and all authorized take is consistent with the long-term conservation and recovery of the Mexican wolf."

Response: The 2018 court order in *Center for Biological Diversity et al.* v. *Sally Jewell et al.*, 2020 clearly stated the take provisions in the 2015 rule that the District Court found to be insufficient to support the long-term conservation and recovery of Mexican wolves: "FWS has repeatedly recognized that one of the chief threats to the species is loss of genetic diversity…yet the expanded take provisions lack protections for loss of genetic diversity. Instead, FWS justifies the expanded take provisions on the ground that they will 'make reintroduction compatible with current and planned human activities, such as livestock grazing and hunting.' This explanation fails to show that FWS considered the requirements of Section 10(d), or that its decision adhered to the ESA's conservation purpose" (No. CV-15-00019-TUC-JGZ (l) (D. Ariz. Mar. 30, 2018)). Based on the court's feedback in this remand, we focused our revisions, and this scoping process, on the specific take provisions the court found to be deficient.

Comment: Some commenters expressed confusion about the relationship between Section 10 permits and 4(d) rules. They believed our rule was acting as a Section 10 permit, rather than a 4(d) rule. They suggested: "The Service should explicitly adopt rules under section 4(d), rather than section 10. The Service should start by drawing clear lines between step one of the analysis, which is deciding what forms of "take" to prohibit under ESA Section 4(d), and step two of the analysis, which is outlining the circumstances in which the Service will grant case-by-case exceptions (permits) under ESA Section 10 allowing for take it chose to prohibit in a Section 4(d)

rule adopted in step one."

Response: Section 4(d) of the Act contains two sentences. The first sentence states that the Secretary of the Interior (Secretary) shall issue such regulations as she deems necessary and advisable to provide for the conservation of species listed as threatened. The U.S. Supreme Court has noted that very similar statutory language like "necessary and advisable" demonstrates a large degree of deference to the agency (see *Webster* v. *Doe*, 486 U.S. 592 (1988)). Conservation is defined in the Act to mean the use of all methods and procedures which are necessary to bring any endangered species or threatened species to the point at which the measures provided pursuant to the Act are no longer necessary. Additionally, the second sentence of section 4(d) of the Act states that the Secretary may by regulation prohibit with respect to any threatened species, or, in this case, species listed as a non-essential experimental population under section 10(j) of the Act, any act prohibited under section 9(a)(1), in the case of fish or wildlife, or 9(a)(2), in the case of plants. Thus, regulations promulgated under section 4(d) of the Act provide the Secretary with wide latitude of discretion to select appropriate provisions tailored to the specific conservation needs of the species. The statute grants particularly broad discretion to the Service when adopting the prohibitions under section 9.

The courts have recognized the extent of the Secretary's discretion under this standard to develop rules that are appropriate for the conservation of a species (see *Alsea Valley Alliance* v. *Lautenbacher*, 2007 U.S. Dist. Lexis 60203 (D. Or. 2007); *Washington Environmental Council* v. *National Marine Fisheries Service*, 2002 U.S. Dist. Lexis 5432 (W.D. Wash. 2002); *State of Louisiana* v. *Verity*, 853 F.2d 322 (5th Cir. 1988)). As noted in the legislative history when the Act was initially enacted, "once an animal is on the threatened list, the Secretary has an almost infinite number of options available to him [or her] with regard to the permitted activities for those species. [S]he may, for example, permit taking, but not importation of such species, or [s]he may choose to forbid both taking and importation but allow the transportation of such species" (H.R. Rep. No. 412, 93rd Cong., 1st Sess. 1973).

In practice, consistent with the two sentences in section 4(d), the Secretary has two mechanisms to provide for the conservation of threatened species in a section 4(d) rule. One mechanism is to promulgate prohibitions similar to those in section 9 of the Act. As discussed above, section 4(d) grants particularly broad discretion to the Service for prohibiting acts discussed in section 9. As noted in *Sweet Home Chapter of Communities for a Great Oregon* v. *Babbitt*, this "second sentence gives [the Service] discretion to apply any or all of the [section 9] prohibitions to threatened species" (*Sweet Home Chapter of Communities for a Great Oregon* v. *Babbitt*, 1 F.3d 1, 8 (D.C. Cir. 1993), *modified on other grounds on reh'g*, 17 F.3d 1463 (D.C. Cir. 1994), *rev'd on other grounds*, 515 U.S. 687 (1995)).

Secondly, section 4(d) provides the Secretary discretion to issue such regulations as she deems necessary and advisable to provide for the conservation of species listed as threatened or, in this case, species listed as a non-essential experimental population under section 10(j) of the Act. Therefore, in addition to prohibiting relevant forms of take, section 4(d) rules can allow other forms of take by excepting this take from the prohibitions. These exceptions can encourage managers to pursue activities that benefit the species but that might result in take, especially if this take would not result in considerable detrimental effects to the species. If the Service excepts take associated with these beneficial activities in a section 4(d) rule, managers can implement these activities without fear of violating section 9 of the Act, even if take occurs.

Thus, while it is permissible for section 4(d) rules to specifically allow certain forms of take, without further permitting requirements, if these exceptions are deemed necessary and advisable for the conservation of the species, section 4(d) rules do not replace or eliminate section 10 permitting processes for activities that are still prohibited in the 4(d) rule.

Genetics

Commenters recommended a variety of genetic management approaches for the MWEPA that:

- Uses observed "effects on the ground" as the metric for assessing the genetic health of the wild population;
- links use of "management flexibility" and permitted take to demonstrated improvement in population numbers, genetic health, geographic presence;
- conducts adult releases (individuals and bonded pairs);
- ensures the support of genetic diversity by widespread, low density distributed of interconnected populations throughout the Southwest;
- releases more breeding pairs so that more pups are born in the wild instead of cross-fostering;
- utilizes a genetic rescue plan with science-based genetic recovery goals with metrics, metapopulation demographics and geography, gene flow, wolf release details and schedules including, if necessary, such details for infusing genes from a different gray wolf subspecies;
- applies the best available science in analyses conducted by independent scientists recognized by their peers as experts in the fields of population genetics and extinction risk;
- include guidelines for management actions related to removals, lethal control, translocation and releases that are based on the actual genetic status of the wild population (e.g., inbreeding depression and genetic variation), rather than an "effort-based" objective, such as that established in the revised recovery plan, which assumes sufficient improvement in the genetic fitness of the wild population based on the number of released wolves that reach breeding age, rather than the wolves actual success at reproduction;
- describes how the Service will monitor the 22 wolves counting toward criteria and demonstrate their benefit to the genetic vigor of the population;
- employs a stewardship approach under the ESA with a longer view of species recovery as opposed to short-term survival;
- considers bringing in breeders from the northern gray wolf population;
- accounts for genetically valuable wolves;
- has no restrictions on the number of wolves released or permitted to exist as wild so that the gene pool can be adequately diverse to ensure long-term survival;
- releases at least four family groups annually;

- includes measuring/monitoring the experimental population's inbreeding coefficient, mean kinship, founder genome equivalents, and gene diversity.

Response: The genetic status of the Mexican wolf population in captivity and the wild is an important factor in our recovery effort, as described in this FSEIS, the proposed 10(j) rule, and the revised recovery plan. We are proposing a genetic objective for the MWEPA to ensure that at least 22 released wolves survive to breeding age in order to alleviate genetic threats to the Mexican wolf consistent with the recovery criteria in the revised recovery plan. We have not restricted the number or type of releases that can be conducted, and we are proposing to limit management flexibility until we have reached the proposed genetic objective. We are currently convening a genetic management group (this is included as an activity in Implementation Schedule Table of the revised recovery plan) to assist us with genetic management and recovery of the Mexican wolf, including addressing the most effective approaches to increase gene diversity in the wild populations.

Comment: The captive population was founded by only seven Mexican wolves, which were captured in the wild and bred in captivity. Already the founder genome equivalent in the captive population has declined to less than three. Even worse, the founder genome equivalent of the wild population is currently less than two, resulting in wild Mexican wolves relatedness being, on average, the same as brothers and sisters. Gene loci have also become monomorphic or "fixed" in the Mexican wolf genome. A congressionally mandated review of the taxonomic status of the Mexican gray wolf demonstrated this condition. These data have since been published. (Robinson et al. 2019, Figure 2).

Response: In small populations, matings among relatives (inbreeding) is inevitable. However, mutation, migration, selection, and chance determine the evolution of both small and large populations (Frankham et al. 2002, pps. 176-196). Increasing the gene diversity of the MWEPA population is at the forefront of our management objectives.

Comment: Independent and academic genetic experts have repeatedly advised the FWS to address genetic deficiencies as expeditiously as possible with releases of more genetically diverse Mexican wolves from the captive population while the wild population was small, and only then growing the population rapidly. In a 2010 paper, Hedrick and Fredrickson warned of the potential need to introduce northern gray wolves into the Mexican wolf population to boost its genetic health and stave off extinction of Mexican wolves.

Response: Released wolves (including both releases from captivity and translocated wolves) contribute their gene diversity to the recipient population when they breed and produce offspring. We will focus on the number of released wolves that survive to breeding age as our method of tracking progress toward achieving the gene diversity criterion, in concordance with Miller (2017). We estimate that an adult female of breeding age has a 78% likelihood of pairing with a male, and once paired, has approximately a 68% likelihood of producing a litter, as a function of age and inbreeding (Miller 2017). Currently, many released wolves die within the first year of release and released Mexican wolves in both wild populations have lower survival rates during that time than Mexican wolves born in the wild that are not associated with a release event (see Miller 2017 for data on release survival). The low survival of released wolves results in the need to release enough wolves that a sufficient number survive to breeding age. Management to improve the survival of released wolves will decrease the number of releases needed to achieve recovery criteria. We are

aware of ideas such as gray wolf integration into the Mexican wolf genome as a potential tool to improve gene diversity. We are not pursuing this option at this time.

Comment: The loss of any wild Mexican wolf from the overall gene pool jeopardizes the recovery effort for the species as a whole. Inbreeding is increasing, and therefore the genetic health of the species is deteriorating. Genetic deterioration results in the species inability to evolve and adapt to changing conditions, including changes in climate.

Response: We are fully cognizant of the critical need to improve the gene diversity of the wild populations of Mexican wolves through the release of wolves from captivity with appropriate genetic background. Release strategies from captivity may include the release of individual or paired adult wolves, a pack of wolves, or cross-fostering of pups. The importance of the releases of Mexican wolves from the captive population into the wild is demonstrated graphically in the PVA report (Miller 2017). We will continue to track inbreeding, mean kinship, and other genetic measures to ensure our efforts to increase gene diversity are reducing the risk of genetic threats to the Mexican wolf. This information will be available in our annual reports for the MWEPA.

Comment: Genetic diversity of wild population is low because USFWS has failed to release enough wolves from the captive population.

Response: We are currently proposing an ambitious set of annual benchmarks to achieve our proposed genetic objective of 22 released wolves surviving to breeding age in the MWEPA.

Comment: Cross-fostering exacerbates the inadequate genetic diversity in the wolf population because it introduces and incorporates the needed genetics too slowly and with too little diversity.

Response: Release strategies from captivity may include the release of individual or paired adult wolves, a pack of wolves, or cross-fostering of pups. Each of these release strategies has benefits and challenges that can be considered, in addition to new strategies that may arise in the future, within the opportunities and limitations of the release event and progress toward recovery. We recognize that it may take longer for a cross-fostered pup to reach breeding age and successfully breed than an adult wolf released to the wild. However, there are additional factors related to wolves' social structure that influence whether an animal will breed, which are unrelated to our release strategy.

Comment: The reintroduced Mexican wolf population in the wild is in significantly worse genetic condition than the captive population. In 2017, the wild population had 77.0%, 15.8%, and 7.2% ancestry from the three lineages (Siminski and Spevak 2017). The founder genome equivalents in the wild population is only 2.04, that is, the present genetic variation is as much as expected if the captive population was founded by only 2 individuals rather than 7. This very low genetic variation in Mexican wolves in the wild population portends severe genetic problems.

Response: See above responses acknowledging that the current gene diversity of the MWEPA is low and is a primary focus of our recovery efforts for the Mexican wolf.

Comment: The present-day members of the captive and wild Mexican wolf populations, which are three generations advanced from those examined by Fredrickson et al. (2007), would be expected to exhibit as much or more inbreeding depression as they found in 2007. A recent analysis of all the wild Mexican wolves that were not fed supplementally showed statistically significant inbreeding depression (C. Carroll, personal communication). These inbreeding depression effects

were not evident in the analysis associated with Miller (2017) because data from unfed wolves were analyzed together, rather than separately, from data from supplementally fed wolves.

Response: In Appendix C in Miller 2017, supplemental feeding was identified as a covariate that may influence reproductive success; we refer the commenter to Table C-1, Figure C-1 in Appendix C (Miller 2017).

Comment: If inbreeding depression were allowed to occur because supplemental feeding is stopped, that is, more inbred individuals had lower fitness than less inbred individuals, then natural selection might be slowly purging this detrimental variation. By not allowing inbreeding depression to occur now because of supplemental feeding, it is expected that there will be a greater accumulation of detrimental variation, which could be expressed in much lower fitness when the more benign environment of supplemental feeding is stopped as part of recovery.

Response: This comment is theoretical and does not provide sufficient data or methodology to explore this genetic management strategy.

Comment: Miller (2017) examined how different numbers of releases from the captive population might impact the genetic variation in the wild population. However, the planned levels of releases he examined were expected to have little impact on the genetic variation in the wild population and were inadequate to meaningfully address the genetic problems in the Mexican wolf population. In addition, Miller (2017) also examined the impact of a doubling of the release schedules, and again, the expected genetic variation was inadequate to address the severe genetic imperilment of the Mexican wolf. As a result, more releases from the captive population than proposed are necessary to significantly increase the genetic variation in the wild population.

Response: The revised recovery plan recommends that 90% of the gene diversity available in captivity should be integrated into the MWEPA population to adequately address genetic threats (USFWS 2017a). Miller (2017) explored a number of scenarios to determine the number of releases that would be necessary to achieve this objective. Based on the results of the model, we have proposed a genetic objective of at least 22 released wolves surviving to breeding age in the MWEPA.

Comment: Since 2014, the Service and its partners have cross-fostered captive Mexican wolf pups into the wild population as an attempt to counter the genetic problems in Mexican wolves. In general, the program has used litters with multiple pups because of logistical constraints. From 2014 to 2019, 10 cross-fostered pups are known to have survived a year and potentially have become part of the population, only about 1.7 pups per year (in 2020, 20 cross-fostered pups were released but the success of this effort is not known). The high relatedness among cross-fostered pups from a few litters would predictably have much less genetic impact than if unrelated pups were introduced. Unlike releases of adults, cross-fostered pups are not specifically selected because of their potential important genetic contribution. All these considerations suggest that cross-fostering, a labor-intensive and very time-dependent option, will not have a significant genetic impact on the wild population. A thorough evaluation of the genetic impact of cross-fostering since 2014 is needed to evaluate the genetic impact of this program.

Response: We intend to conduct a thorough evaluation of the genetic impact of cross-fostering during one or both of our evaluations pursuant to the revised recovery plan at 5 and 10 years after implementation of the plan began in 2017.

Comment: The rules should facilitate a connection to northern gray wolves, which would provide both a way to reduce inbreeding problems and to introduce important adaptive genetic variation. Before extirpation of wolves from the western US, they occurred throughout the western US and formed clines of genetic ancestry and morphology south to north (Wayne and Shaffer, 2016). Restoration of this pattern should be the goal of long-term recovery, not the isolation of Mexican wolves in the southwest and northern gray wolves in the northern Rockies.

Response: We are not currently evaluating the possibility/potential of having northern wolves integrate with the Mexican wolf population, but we recognize it as an option to consider as we continue to utilize various management techniques to reduce genetic threats to the Mexican wolf.

Comment: Releases over the past four decades including cross-fostering has been insufficient.

Response: Initial results from the Mexican Wolf Reintroduction Project has demonstrated that cross-fostering is successful in releasing captive wolves that survive to breeding age. We recognize that additional releases are needed to improve the gene diversity of the MWEPA population and we have proposed a genetic objective to address this need.

Comment: Data from the captive population annual Master Plans from the Mexican Wolf Species Survival Plan committee from 2005 to 2018 shows gradual, inevitable decline in all measures of genetic health in the captive population as expected in a small populations with limited founders of only seven Mexican wolves. The founder genome equivalent in the captive population has already declined to less than three. Even worse, the founder genome equivalent of the wild population has dropped to less than two, resulting in the general relatedness of wild Mexican wolves to each other being on average the same as brothers and sisters. Population geneticists have warned of this looming genetic crisis for well over a decade. USFWS has been aware of this problem for many years and describes the dire genetic status of wild and captive populations in elaborate, purportedly science-supported detail. In addition, independent/academic genetic experts have repeatedly advised the USFWS to address genetic deficiencies as expeditiously as possible with releases of more genetically diverse Mexican wolves from the captive population while the wild population was small, and only then growing the population rapidly. It was assumed that the increase in fitness from lineage crossing would be used expeditiously to enhance the numbers of wild wolves and that a second round of crosses would not be necessary. USFWS abandoned this initial option largely by submitting to pressures to limit releases from the states and other special interests antithetical to successful Mexican wolf recovery.

Response: See our responses above on genetic management.

Comment: As noted by Hedrick and Fredrickson (2010), extraordinary interventions are needed to stave off extinction of the Mexican gray wolf and are not provided by the current 10(j) rule nor the approved 2017 revised recovery plan. The importance of such interventions increases with the continued decline of the overall genetic health of the wild population of Mexican wolves. Furthermore, Carroll et al. (2019) demonstrated that the 2017 population viability analysis - which guided recovery criteria in the 2017 revised recovery plan - was based on scientifically flawed assumptions such as continued feeding of wild packs in order to mask the deleterious effects of genetic issues, and to give the misimpression that the pre-determined population cap of 320 was adequate.

Response: The Service provides food caches for some wild wolves (typically for a pack) to

localize their movements to an area and decrease the likelihood of depredation behavior of nearby livestock. The Service does not provide food caches to mask the deleterious effects of genetic issues. The Service recognizes that population viability models can be structured and parameterized in many ways to explore management scenarios; we used the best available information and data relevant to determining how to alleviate threats to the Mexican wolf when developing the population viability model for the revised recovery plan (Miller 2017).

Comment: Presently, the captive population represents 83% of the founders' genetic variability. Current management and adult wolf exchange, and cross fostering of animals, is ensuring that the captive population maintains the wild population's genetic viability. When the original 2015 10(j) was drafted there were just 258 wolves in captivity and 109 wolves in the wild. Currently, if the wild population of 163 known animals were to be extirpated, all the existing original founder genetic variability of the original founders is available to reestablish a new population. We believe the Service's current management strategy provides for the long-term preservation and availability of the species genetic variability.

Response: The Service continues to prioritize improving the gene diversity of the MWEPA population in our decisions related to releases and removals (take) and has proposed revisions to the experimental population rule to support reducing genetic threats consistent with the recovery of the Mexican wolf.

Comment: Heffelfinger et al. 2017 has argued against re-establishing vitally necessary habitat connectivity and interaction of northern *Canis lupus* with *C.l. balieyi*. This should be re-established and allowed, as *baileyi* has been naturally selected by behaviors and habitat to develop and retain the tratis [present in the remnant population]. Further, Heffelinger et al. falsely claimed that the extremely homozygous, founder-effected population, still undergoing a lethal population bottleneck due to mistaken previous management, has or should be completely defined by the genome present in the descendants of the seven original survivors. Heffelfinger, then, is attempting to force a permanent bottleneck, sending the *baileyi* population to complete homozygosity, with its attendant incapacity to resist extinction by disease, stochastic events, and deleterious genes.

Response: We will continue to conduct ongoing annual monitoring to track Mexican wolf population performance, and we will adjust management techniques and approaches as needed in response to population performance. Our monitoring will continue to focus on annual population growth, recognizing the relationship between recruitment and mortality (i.e., high recruitment may offset high mortality rates). We will continue to use an adaptive management approach.

Comment: The Service needs to demonstrate a greater sense of urgency with all the management strategies available for protecting the genetic health of the wolves.

Response: See our responses above to comments regarding the genetic composition of the wolf population (captive and wild). Our proposed genetic objective and the benchmarks we have proposed in association with temporarily limiting two forms of take will ensure we make expeditious progress to improve gene diversity in the MWEPA population.

Comment: Commenter recommends assessing the impacts of take provisions on the genetic health of the population on a case-by-case basis because the removal of an individual whose genetics are over-represented in the wild population will not have the same impact as the removal of a cross-fostered wolf whose genetics boost the gene pool of the wild population.

Response: We have partially incorporated this concept into our proposed revision to the provisions for take on Federal and non-Federal land by considering whether lethal take of released wolves occurred during the previous year as part of our determination to issue permits for take in the following year. See the description of Alternative One in Chapter 1 of this FSEIS.

Comment: FWS should conduct a scientifically robust assessment of the genetic composition of the experimental population as part of their adaptive management, including a description of methods for assessing and managing population genetic characteristics.

Response: Assessments and studies have been, and are currently being, conducted.

Comment: Commenter provided the article: https://www.paysonroundup.com/news/we-are-family-wolf-recovery-effort-finds-wild-wolves-almost/article_8f6aeb76-0474-5953-8992-8e8e5192bc8d.html and stated that by authorizing the killing of wolves to appease livestock holders the Service is not only not encouraging better livestock management, but is giving a nod to poaching. Research has shown that poaching increases as agencies authorize lethal removal of wolves.

Response: We have considered this article in our development of alternatives in this FSEIS.

Comment: Commenter stated that the Service's genetics recovery criterion is based on effort (i.e., number of releases) rather than results on the ground (i.e., confirmed breeding), and that none of the Service's recovery actions ensure an actual impact. The Service should have a goal of managing, at the end of one hundred years, to conserve in the wild population at least half of the genetic diversity, founder genome equivalent, and mean kinship of the captive population. Commenter provided several release scenarios (e.g., doubling the EIS release level plus the cross-fosters described in the recovery plan) to achieve specific levels of gene diversity, founder genome equivalent, and mean kinship.

Response: The revised recovery plan provides the rationale for the genetic recovery criterion for the MWEPA (see USFWS 2017a). We will continue to track genetic measures such as inbreeding and mean kinship to ensure that releases are adequately improving the MWEPA population's gene diversity.

Comment: Conditions have changed with the expansion of the MWEPA such that releasing adult pairs with pups would be less impactful on local communities than it may have been in the past, ungulate distribution/density information is better understood, and lessons learned in the field would suggest better success is possible. Releasing adult pairs with pups is necessary unless the Service can reliably cross-foster about 24 pups a year.

Response: In the last two years (2020, 2021), we have released 20 and 22 cross-fostered pups, respectively. We will continue to aggressively pursue cross-foster releases in the near term to improve the gene diversity in the MWEPA.

Comment: Monitoring — and accurate reporting to the Court and the public -- of the effectiveness of releases depends on accurate and timely reporting by the Service in monthly updates and annual reports. When events such as death or Fate Unknown occur, it is important that the report indicate whether the wolf was released or translocated — either as a cross-fostered pup or as an adult. This is why conservationists have made requests that the Service include this information in its future reports. Detailed tracing of the life stories of individual released wolves will become increasingly

difficult and time consuming; however, such information is valuable for the Service to make appropriate management decisions and for conservationists to evaluate the scientific support for such decisions.

Response: We have revamped the monthly (now quarterly) reports and are in the process of also revamping the annual reports for the Mexican wolf to ensure we provide accurate, timely information to the public.

Comment: Just as it is important for survival and recovery to release genetically diverse wolves from the captive population into the wild, improvement of the genetic health of the wild population may require temporary or permanent removal of some wolves whose genes are over-represented or where siblings are breeding. This pits the health of the wild population against the interests of individual wolves. Some people find this type of management morally offensive. In taking a position on the removal of any particular wolf, the Service needs to tell the public about not just that animal, but its pack and whether improving the genetic health of the wild population is the exclusive, secondary, or non-existent reason for the removal order.

Response: The Service provides information in the removal order about the depredation behavior that has occurred leading up to the issuance of a removal order for a wolf or wolves. While we recognize that not all members of the public support wolf removal, the Service considers it a necessary option for addressing conflict in certain situations in which other management options have not resolved the problem.

Comment: It is important to note that several parameters in the PVA are conservative to assure the Recovery Plan results in long term recovery and genetic health. For example, the PVA uses 24.9% mortality as a baseline in its scenarios, but the average annual mortality rate based on nearly 47,000 radio-tracking days from wild Mexican wolves in the recovery area (2009-2014) was only 18.9% (Miller 2017). In fact, of all the PVA scenarios modeled, 18.9% represented the lowest end of the range simulated. Mortality rate was the most important factor influencing modeled population performance in the sensitivity analysis conducted by Carroll et al. (2014, table 1). If mortality rates typical of the last 6 years continue, the Miller (2017) PVA exaggerated the number of captive animals that would need to be released to achieve the same retention of genetic diversity.

Response: The Service acknowledges this comment, and no additional response is necessary.

Comment: The most genetically valuable adults need to stay safe in captivity so they can continue to produce the most genetically valuable pups year after year for cross fostering to maximize their contribution to the wild gene pool.

Response: Only genetically well-represented wolves from captivity are selected for release to the wild to ensure that gene diversity in the captive population is maintained according to management objectives established by the Mexican wolf SSP.

Comment: Since 2014, 52 pups have been cross fostered, 10 of which have been documented as recruited into the population as adults, which is a higher success rate than the average wild pup. The program has documented at least 35% of the cross-fostered pups reaching breeding age, and of those, 3 are now breeders in their own pack and have produced a minimum of 17 genetically valuable pups of their own. All these are minimum numbers because cross-fostered pups are not marked externally, and as they disperse naturally with their littermates, they are not confirmed alive until they are recaptured at some future date. The Department has recaptured only a portion

of the successful cross-fostered pups that are in the wild population contributing, or destined to contribute, their valuable genetics. If the same rate of success continues for the 32 pups cross-fostered in 2019 and 2020, there will be 11 additional wolves, specifically produced in captivity for their valuable genetics, achieving breeding age just from the efforts in the last 2 years. At the current rate of cross foster success, the amount of genetic infusion determined to be needed in the updated population viability analysis will be exceeded.

Response: It is possible that the Service will determine that more than 22 released wolves have survived to breeding age at some point in the future for the reasons mentioned above. However, this would not be detrimental to the MWEPA population. We will continue to track the number of released wolves surviving to breeding age each year.

Comment: The PVA reports 3 metrics for gene diversity that are relevant to the Mexican wolf: 1) Mean final gene diversity at the end of 100 years, 2) Retention of gene diversity relative to the starting value, and 3) Retention of gene diversity relative to captive population. Because recovery criteria must be realistic and attainable, the goal is to retain 90% of the genetic diversity of the intensively managed captive population at the same point in time. This provides a reasonable benchmark given what genetic material is actually available to be preserved at this point in time.

Response: The Service will evaluate the extent to which the releases we are conducting will achieve the 90% diversity of the captive population and will continue to track important genetic measures such as inbreeding and mean kinship.

Comment: The Court was not correct in saying "It is undisputed that recovery of the population is in genetic decline…". In fact, the amount of inbreeding is not increasing, as measured by the inbreeding coefficient of all Mexican wolf litters in the wild. Additionally, when one adds the 52 genetically valuable, hand-selected pups cross fostered from captivity in the last 7 years, it becomes apparent that the genetic diversity of the wild population is being managed effectively and aggressively to meet the goals of recovery. The Department requests that the Service calculate and report the annual trend of inbreeding coefficients and mean kinship of all wolves in the wild population, including cross-fostered pups. An accurate assessment of inbreeding trends using the official dataset is critical to inform discussions about the status of the wild population with reliable data to deflect attempts by others to mischaracterize the data from annual reports and other secondary sources.

Response: The Service will report information pertinent to the gene diversity of the MWEPA population in quarterly or annual reports, such as the number of released wolves surviving to breeding age, reproduction of released wolves, and measures of genetic diversity such as gene diversity and mean kindship.

Comment: It is understood from conservation biologists and environmental activists discussions that the desire is to expand Mexican wolves occupied territory northward to meet up with Northern timber wolf populations. The objective as stated is to improve the genetic vigor necessary to halt the downward spiral. What is not discussed in this objective is that the resulting cross breeding will dilute and eventually swamp Mexican wolf genetic distinction. We believe this would be a violation of the Endangered Species Act.

Response: Historically Mexican wolves may have dispersed north of Interstate 40 within zones of intergradation where interbreeding with other gray wolf subspecies may have occurred. The

original zone of admixture between Mexican wolves and Plains wolves (*C. l. nubilus*) was in central Arizona and New Mexico. There was never a zone of admixture between Canadian wolves and Mexican wolves. The potential for positive benefit through genetic augmentation from cross-breeding Mexican wolves *C.l baileyi* with northern Rockies/Canadian gray wolves (*C. l. occidentalis*) versus the negative potential of "genetic swamping" of the Mexican wolf subspecies is a subject which we intend to further explore as part of our recovery actions. As we state in the Biological Report, careful evaluation of the potential effects of introgression of gray wolves is needed to determine whether allowing gray wolves to breed with Mexican wolves could be appropriate during a later stage of recovery or after recovery (Hedrick and Fredrickson 2010). Until such evaluation occurs, and pending its results, we will continue to manage against such breeding events occurring south of Interstate 40 in the United States for now.

Comment: Genetic diversity is not an excuse to permit serious impacts to persons or property. Allowing wolves to remain and continue unacceptable behavior on non-federal lands merely encourages bad behavior and transmitting that behavior to the offending pack. For these reasons there needs to be a return to the three strikes rule with an inclusion that prevents livestock depredating wolves from being relocated into occupied livestock grazing allotments.

Response: We recognize the need to manage the MWEPA population to ensure public safety and will utilize a variety of management methods to address problem wolves, including those wolves that have gene diversity that is beneficial to the MWEPA population. We will evaluate all conflict situations on a case-by-case basis; we have no plans to return to the three strikes Standard Operating Procedure.

Comment: Part of the basis for the Courts' remand decision was concern over the effects of inbreeding on the current population. However, the judge could only rule on the now-outdated information available at the time in the administrative record which represents only a partial inbreeding analysis through 2006 (Fredrickson et al. 2007). As such, the Court was not able to consider the updated information that informed the PVA showing inbreeding was not significantly affecting the number of young observed in the summer as previously thought. Fredrickson et al. (2007) analyzed only 39 litters (1998-2006), but for the revised recovery planning process, Clement and Cline (2016a,b) updated this analysis using all available data (Miller 2017, Appendix C). Their analysis included 50 more litters from an additional 8 years of wild, recovering Mexican wolves (total of 89 litters) and found no significant relationship between female inbreeding levels and the number of pups with her in the summer.

Response: We agree that additional data has been gathered since the completion of the 2015 10(j) rule and we have included it throughout the FSEIS and proposed 10(j) rule where applicable. We also provide citations to sources that contain relevant data or analyses conducted subsequent to the 2015 10(j) rule, such as the revised recovery plan (2017 a, b).

Comment: Regardless of the reason for issuing a removal, every removal order should, and should continue to, consider the genetic value of each wolf to the wild and captive populations and therefore the overall genetic health of the wild population. The Department recognizes the need to potentially limit the take of animals that were specifically placed into the wild out of captivity to further improve the genetic health of the wild population and in those circumstances, the Department recommends other potential management options such as hazing, diversionary feeding, or translocation. Any revisions to the take provisions under consideration should consider

the current and future efforts being undertaken to increase the genetic health of the population, and the amount of predicted take should the take provision be allowed.

Response: The Service has proposed revisions to the experimental rule to establish a genetic objective and temporarily restrict take provisions until the proposed genetic objective has been met in recognition of the importance of increasing the gene diversity of the MWEPA consistent with the recovery needs of the Mexican wolf. The Service will continue to utilize and prioritize non-lethal methods of management to address conflict situations.

Comment: Commenter stated that the 67% increase over the last five years of the captive population has resulted in the population consisting of young, healthy animals in their reproductive prime and that the reproductive rate of the captive population could be increased if the entire population were allowed to breed.

Response: Based on Scott et al. 2020, the Service agrees that the reproductive rate of the captive population could be increased if additional captive pairs were allowed to breed.

Comment: Based on 2019 data from the Mexican Wolf Management Team, genetic enrichment of the wild U.S. population has been successfully implemented through cross fostering with 50 pups being cross fostered since 2015, of which 10 have been documented to reach adulthood, demonstrating a recruitment rate superior to that of the wild pups, and of those, 3 are now breeders in their own pack and have produced a minimum of 17 genetically valuable pups. From the 32 pups cross-fostered in 2019 and 2020, extrapolating the known rate of at least 35% of the cross-fostered pups reaching breeding age, which represents best available science, it is likely that the wild breeding population will be augmented by an additional 11 highly genetically valuable wolves.

Response: As of June 1, 2021, we are aware of a minimum of 7 cross-fostered Mexican wolves that have survived to breeding age. We will continue to intensively monitor packs with cross-foster pups to document survival to breeding age.

Comment: Removing select wolves with very high mean kinship from the MWEPA population provides an opportunity to improve the genetics of the population and potentially increase the growth rate. This could be explored through additional Vortex model runs.

Response: Additional analyses related to this comment may be evaluated in the future as the Service continues to manage the gene diversity of the MWEPA population. The Service recognizes that removing wolves with very high mean kinship from the MWEPA population could improve the gene diversity of the population.

Comment: Commenters stated that Service has not followed its stated intent in the 2015 10(j) rule to release wolf families. The Service's failure to release family groups comes despite its specific delineation of a zone system for wolf management in part to facilitate such releases.

Response: In recent years, the Service has expended significant effort exploring cross-fostering as a method of release, in part due to the acceptance of this method by some local communities who do not favor the release of captive adult wolves. We retain the option to release family groups of Mexican wolves and consider it important to have options for the types of release we conduct so that we can adapt over time to the changing needs of the MWEPA population and the local communities. Cross-fostering was considered at the time of the 2015 10(j) rule, as demonstrated

by the provision in Zone 2 to allow for the release of Mexican wolves that are less than 5 months old on Federal land (see Appendix B: Glossary).

Comment: The Service should refuse to remove any wolf that is genetically valuable where that value cannot be at least equally replaced, absent sufficiently compelling circumstances (i.e., the extremely rare occurrence of actual harm to human life).

Response: In the United States, our recovery strategy will entail adaptively managing our removal rate of Mexican wolves in response to documented mortality during the previous year to ensure that mortality is not hindering population growth over multiple years. Therefore, we will employ management actions to work to reduce wolf-livestock and wolf-human conflict through the implementation of pro-active measures to avoid and minimize depredation; facilitate the provision of compensation for the economic impact of wolves on rural ranching communities; and employ a phased management approach in Arizona to minimize or avoid possible adverse impacts to wild ungulate populations (specifically elk). We will also allow take of Mexican wolves under specific circumstances and continue to work collaboratively with state and local governments, tribes, livestock producers, state game and fish departments, and stakeholder organizations to achieve the social tolerance for wolves in rural communities necessary to achieve Mexican wolf recovery.

Miscellaneous

Comment: One commenter suggested that the Service was giving too little weight to the opinions of the American public in its decision-making process. They cited polls that indicate approximately 70 percent of Americans support Mexican wolf recovery. Since most reintroductions occur on Federal public lands that every American citizen "owns," the opinion most important for consideration is the interest of most of the American public. This commenter felt that we ignored the desires of this most important group of "persons holding any interest in land which may be affected by the establishment of this experimental population" throughout our process: the American public. Another commenter suggested that the Service put too much weight on comments from the States as compared to comments from the public or academic researchers.

Response: The Service is aware of various polls conducted to document national, regional, or local opinions about Mexican wolf recovery. The Service has designated Zone 1 in the MWEPA for the reintroduction of adult Mexican wolves, which is Federal public land. Reintroduction of Mexican wolves can also occur in Zone 2 in the MWEPA according to the provisions of our 10(j) rule, on Federal or non-Federal land. The Service recognizes the importance of managing the MWEPA collaboratively with our Federal, state, tribal, and local partners.

Comment: One commenter expressed that we should include additional information in the SEIS regarding the probabilistic sampling methods to be used in estimating Mexican wolf abundance.

Response: See our annual reports, online at https://www.fws.gov/southwest/es/mexicanwolf/ for the methodology we use in our end-of-year minimum population counts.

Comment: One commenter suggested that the Service promised to conduct a review of the Mexican wolf reintroduction program in 2020 to examine its overall performance. However, this commenter was concerned that the SEIS and rulemaking process was distracting from that promised review. Thus, they requested that the new rulemaking contain the contents of this comprehensive review, in addition to the information necessary for the rulemaking.

Response: We provide an updated list of the various reviews the Mexican Wolf Recovery Program will undertake in coming years in the proposed 10(j) rule.

Legal Issues / NEPA

Comment: Multiple commenters felt that the limited scope of the requested public input during the public scoping process (i.e., that we only requested input on four specific issues) violated NEPA policies and was pre-decisional. One commenter asserted that limiting public comment to these four issues was a "deliberate attempt to take inconvenient issues off the table by asserting the Service is not required by the Court's order to even consider public input in those areas."

Response: The purpose of our FSEIS is to analyze proposed revisions to the experimental population designation for the Mexican wolf in Arizona and New Mexico in response to the March 31, 2018, Court Order. Therefore, we requested information in the public scoping process that was pertinent to the revisions we were considering.

Comment: Multiple commenters suggested that the Service must consider comments on the population caps and the northern boundary of the MWEPA and incorporate these suggestions into new alternatives in the SEIS, even if the Court did not vacate these aspects of the rule and if the Service did not specifically request input on these issues during public scoping. One commenter emphasized that the Court's failure to invalidate the population caps and the northern boundary of the MWEPA does not mean they actively approved of these measures either. Rather, they just concluded that they would not "cause irreparable harm" to the wolves "in the near future."

Response: Our Alternative Selection Criteria for the alternatives we selected for this FSEIS are provided in Chapter 2.

Comment: One commenter provided specific suggestions on details to include in a new preferred alternative, including: (1) annual releases of captive-bred wolves until genetic diversity reaches a point halfway between current levels in the captive and wild population; (2) no population caps; (3) not allowing removal if wolf depredated wild ungulates; (4) only authorizing take in cases where the wolf is threatening human safety; (5) not allowing removal of a wolf if the permittee/agent was aware of presence of wolves but not present on the allotment while depredation occurred; (6) not allowing removal if non-wolf-killed livestock carcasses attracted wolves to the vicinity of the livestock; (7) not allowing removal of a wolf after a depredation event if the wolf previously fed on non-wolf-killed livestock; (8) not allowing any removal of wolves south of Highway 10, except for human safety, to facilitate natural connectivity between the U.S. and Mexico; and (9) not allowing removal of wolves for breaching any geographic boundary.

Response: We have considered these suggestions and either incorporated them or eliminated them because they did not meet our alternative selection criteria, as described in Chapter 2 of this FSEIS.

Comment: Multiple commenters suggested that the 2014 FEIS did not adequately consider a full range of potential alternatives, including that the Service failed to consider: (1) the effects of a "true 'no action' alternative in which all wolves are removed"; (2) alternatives that included conservation activities outside the jurisdiction of the lead agency, including one that relied more heavily on establishment of a population in Mexico or one that converted the Mexican wolf recovery program to a state-managed program, like that of the gray wolf; and (3) an alternative that involved designating the experimental population as "essential."

Response: According to NEPA guidance "Forty Most Asked Questions Concerning CEQ's National Environmental Policy Act Regulations" (46 FR 18026),

> Section 1502.14(d) requires the alternatives analysis in the EIS to "include the alternative of no action." There are two distinct interpretations of "no action" that must be considered, depending on the nature of the proposal being evaluated. The first situation might involve an action such as updating a land management plan where ongoing programs initiated under existing legislation and regulations will continue, even as new plans are developed. In these cases "no action" is "no change" from current management direction or level of management intensity. To construct an alternative that is based on no management at all would be a useless academic exercise. Therefore, the "no action" alternative may be thought of in terms of continuing with the present course of action until that action is changed. Consequently, projected impacts of alternative management schemes would be compared in the EIS to those impacts projected for the existing plan. In this case, alternatives would include management plans of both greater and lesser intensity, especially greater and lesser levels of resource development.

Comment: One commenter provided additional suggestions for strategies to consider in the SEIS, including: (1) providing telemetry equipment to local government law enforcement and investigators to monitor the presence of wolves more accurately and (2) providing telemetry equipment to ranchers, especially for those ranching operations that are experiencing depredations.

Response: While these recommendations are relevant to the management of the Mexican wolf, they are not regulatory actions and as such are not relevant to the proposed regulations in the proposed revised experimental population rule.

Comment: One commenter suggested that 40 CFR 1506.2 (d) requires the Service to "update the reviews of current land use plans, policies and controls for affected States, Tribes and Local Governments," based on new information in the 2015 rule and any revised 10(j) rule. Specifically, the Service must review these plans in light of changes including: (1) eliminating any restriction or limit on the size of the Mexican wolf population, notwithstanding the purpose of the Proposed Rule; (2) increasing the area that Mexican wolf population can occupy from 6,845 acres (the area within the Blue Range Mexican Wolf Recovery Area (the BRWRA)) to more than 90 million acres; (3) increasing the area into which Mexican wolves can be translocated from 6,845 acres (i.e., the BRWRA) to more than 50 million acres; (4) increasing the area in which Mexican wolves can be released from 700,000 acres (i.e., the Primary Recovery Zone) to more than 8 million acres; and (5) allowing Mexican wolves to disperse throughout and occupy the entire Mexican wolf experimental population area (the MWEPA), with the sole exception of tribal trust land.

Response: We assessed the consistency of our proposed action and alternatives with approved State or local plans or laws in the 2014 FEIS (Chapter 4.8.2) and in this FSEIS (Chapter 4.7).

Comment: One commenter suggested that the Service must write an entirely new EIS, rather than an SEIS. They claim that "a supplemental EIS is only appropriate where the underlying NEPA document itself is not legally deficient," and, given the arguments of plaintiffs in the litigation on the 2015 10(j) rule, failing to remedy all of the identified deficiencies in the 2014 FEIS, including the lack of a "reasonable range of alternatives," could present a legal vulnerability. They emphasized that the Service must ensure this new EIS "properly evaluates the direct, indirect, and cumulative effects of the revised management rule on Mexican wolves and the recovery of

Mexican wolves in the wild."

Response: CEQ's National Environmental Policy Act Implementing Regulations (40 CFR 1502.9) states that Agencies:

> (1) Shall prepare supplements to either draft or final environmental impact statements if a major Federal action remains to occur, and: (i) The agency makes substantial changes to the proposed action that are relevant to environmental concerns; or (ii) There are significant new circumstances or information relevant to environmental concerns and bearing on the proposed action or its impacts.

The Service determined that a supplemental environmental impact statement is appropriate under these circumstances because we are proposing modifications to the regulations we established in the 2015 10(j) rule, which we analyzed in the 2014 FEIS.

Comment: One commenter cautioned that the Service must conduct all new Section 7 consultation on any new 10(j) rule and associated permits to be legally defensible. They suggested that, while the Court did not specifically find deficiencies in the consultation the Service conducted on the 2015 rule, the plaintiffs argued it was arbitrary and capricious.

Response: The Service will conduct necessary consultations pursuant to Section 7 of the Endangered Species Act in association with this rule revision.

Comment: One commenter suggested that, given the language in section 10(d) of the Act and the purpose of the Act as detailed in Section 2 (to conserve the ecosystems upon which threatened and endangered species depend), the Service not only must explain how the new rule "does not operate to the disadvantage of the Mexican wolf," but also must show how the rule conserves the ecosystems upon which the Mexican wolf depends.

Response: We have aligned our proposed rule revision with the recovery strategy for the Mexican wolf, which we developed to satisfy the Section 4 requirements of the Endangered Species Act for recovery planning.

Literature and Data

Comment: Commenters provided citations to literature that we had not previously referenced in the 2014 FEIS or 2015 10(j) rule. Commenters provided these citations with and without context.

Response: We have incorporated citations relevant to our analysis in the FSEIS or proposed 10(j) rule to ensure our documents reflect the best available science. Literature that we did not incorporate into these new documents either did not represent the best available science or was not relevant to the analysis.

PUBLIC COMMENTS ON THE DSEIS

We employed the same process to sort and synthesize public comments on the DSEIS that we used to sort and synthesize the public scoping comments (see above). As with the public scoping comments, we received many comments that were non-substantive in nature, expressing either support for, or opposition to, the proposed action or more generally the Mexican wolf recovery effort. Many comments were also duplicative (exact reproductions or reiteration of the same points) to other comments received on the DSEIS or during scoping. Therefore, scoping comments and our responses are provided in the FSEIS to ensure we addressed the full range of comments received during the public comment period. Substantive comments in many cases overlapped

issues that are pertinent to both the proposed 10(j) rule and the DSEIS. We singled out and responded to the comments and issues that we consider to be entirely, or primarily, specific to NEPA, below. Additional synthesis and response to public comments will be provided in the final 10(j) rule. Finally, many comments asked for information or analyses that were already provided in the DSEIS/FSEIS or the proposed or final 10(j) rule; we did not individually respond to those comments since they are addressed in the body of the documents. One example of this was a commenter who asked how wolves will be managed as they expand their range in the MWEPA; that information is contained in the final 10(j) rule.

Economic Impacts

Several commenters stated the economic analysis does not adequately include all direct and indirect economic losses that wild wolves impose, including lowered conception rates in livestock due to stress, fewer weened calves due to wolf kills, undetected depredations, and lower weaning weights in calves that do survive. These impacts would affect small cattle business, in addition to costs required for labor, added wellness checks, moving livestock to different pastures, time tracking wolves, game camera maintenance, and additional feed needed for mitigation measures. Furthermore, a commenter added that property values will decline because buyers in the livestock business will actively avoid properties with wolves present.

Comment: Several commenters expressed concern that the cattle ranches operating within Mexican gray wolf ranges were uniquely different from the ranches used to model the effect of wolf depredations on financial operations.

Response: The DSEIS relied on NMSU College of Agriculture's Cooperative Extension Service (CES) developed Cost and Return Estimates for cattle ranches for over a decade. CES provides estimates for a typical small, medium, and large ranching operation and updates their models on an annual basis. The CES model ranches are distinguished by geographic region. For the purposes of modelling wolf presence and depredation effects on affected ranches, we selected the CES Cost and Return Estimates for ranches operating in the southwest portion of the State, where wolves are most likely to reside.

We recognize that in using a model that typifies ranches by the size of their operations (small, medium, and large) that there will still be operations that do not conform completely to the characteristics of one of the three model ranches. Some ranches may experience greater impacts than those predicted, while others will experience less impact. In summary, however, we believe that by relying on a model developed by a credible, independent third-party that we have used the best available, unbiased model and assumptions for us to understand the effect that the presence of wolves on affected ranches may have on their operations. Our approach was also reviewed by independent academic peer reviewers who concurred with our approach.

Comment: Some commenters pointed out that our model did not account for additional variable costs ranchers would incur to take preventative measures to avoid wolf presence and depredation effects on their herds. Examples of such measures may include labor and material costs associated with efforts such as the installation of flagging, moving and monitoring cattle, and extra feed to make up for lack of foraging opportunities.

Response: While we do discuss preventative efforts that a rancher may take in response to the presence of wolves to avoid depredations and stress-related impacts, we did not include such behavior in our modelling efforts because of limited data. A recently published study by Bickel

et. al. 2020 finds that some ranchers spend a large amount on preventative measures relative to net financial returns and that ranchers who have not been directly affected by predations tend to have more negative perceptions than ranchers who have been directly impacted and act accordingly. The authors raise several issues needed to better understand how ranchers behave in response to actual and perceived risks of wolf presences including research on the effectiveness of preventative measures along with more detailed data on depredations rates and spatial variability along with exploring other causal factors. The authors also suggest future research should consider trying to improve our understanding of what ranchers would be willing to pay to avoid depredations, which would allow us to begin to understand the non-monetary impacts of reintroduction.

Because such data does not yet exist, we relied on developing an economic model using NMSU's Cost and Return Estimates for southwest New Mexican cattle ranches using worst case scenario of how the presence of wolves, including expected depredations based on historical data, would affect the financial returns of operations. In the future we hope to be able to expand our research to study the behavior of ranches actually affected by Mexican gray wolves not only to better understand the financial and social impacts on but to better understand the effectiveness of preventative measures. We note that under generally accepted economic principles, ranchers would be expected to limit any additional efforts to reduce the probability of depredations and related effects from wolf presence to the amount that the operation would be expected to lose if in fact depredations and related effects do in fact occur.

Comment: One commenter believed that we understated the full economic cost associated with a depredation stating that instead of replacing a depredated cow, a rancher may retain a marketable calf from the herd.

Response: Our economic model assumed that the financial impact on a ranch that incurred a depredation event would be the expected market value of a heifer cow that would have been sold at years end. We selected the market value of a heifer cow because of its relatively high value compared to calves, which are more likely to be targeted by wolves due to their comparative vulnerability. As the commenter stated, some ranchers who incurred a depredated cow may instead decide to invest in keeping an otherwise marketable calf from the herd to replace the cow while maintain the genetics of the herd withing the ranch's operations. Under such a scenario, the financial impact would be a function of the net value between the otherwise retained heifer that was depredated and the market value of the retained calf, along with a presumed loss in offspring for a year while the retained calf grows to breeding age. We noted in our previous response that data is lacking in understanding real world response to wolf presence on affected ranches and based our estimate of economic impacts on realistically worst-case financial impact scenarios based on readily available data.

Comment: One commenter asked why we did not use agricultural statistics from the New Mexico Department of Agriculture and instead relied on data published by the U.S. government.

Response: In our general overview and characterization of the ranching industry, we relied on data published by the National Agricultural Statistical Service (NASS) from the U.S. Department of Agriculture. This NASS data set is used by the New Mexico Department of Agriculture for its own publications: https://www.nmda.nmsu.edu/wp-content/uploads/2022/02/2020-NM-Ag-Statistics.pdf.

Comment: One commenter stated the Service removed milk and feeder cows in the estimate of livestock potentially affected by the proposed action in the 2014 EIS but has now returned to including them.

Our Response: In describing the total number of ranch operations and cattle in the affected counties, we selected data from the 2017 Census of Agriculture based on the reported total number of cattle and calves (see Table 3-4 in the DEIS). This estimate does include operations and cattle inventory classified as milk and feeder cows. When we looked at the data, we determined that because the total number of milk and feeder cow operations and their inventory constituted a very small percentage of the total estimate of all cattle and calve operations that we would not be over stating impacts. Specifically, we found that over 99 percent of operations and 97 percent of inventory were independent of milk and feeder operations on average throughout the nine counties in the study area. Moreover, the presentation of these numbers was used to provide an overall sense of the potential number of operators and inventory considered at risk from wolf depredations compared to the total inventory of the States. The estimates presented in Table 3-4 of the DEIS did not have any bearing on how we estimated the impacts on affected ranches from depredations later in chapter 4 of the DEIS.

Comment: One or more commenters stated that the Service needs to employ a better compensation program that provides timely depredation compensation payments, includes payments for both confirmed and unconfirmed depredations, and ensures more agency personnel are available to protect the economic well-being of livestock producers.

Response: We recognize that some depredation compensation payments have been delayed due to grant administration. We are supporting grantees to resolve these issues and have observed timely compensation payments (generally within 30 days) over the last two years. The availability and coverage of funding is defined by the applicable grant or program providing compensation (see https://www.fws.gov/library/collections/wolf-livestock-loss-demonstration-project-grants and https://www.fsa.usda.gov/programs-and-services/disaster-assistance-program/livestock-indemnity/index). Our 10(j) final rule provides several regulatory provisions for allowable forms of take (including harassment and permitted take, as well as take by Service personnel or a designated agency) to ensure that the Service, designated agencies, and livestock producers can collaborate on the prevention and resolution of wolf-livestock conflicts as the wolf population continues to grow.

Environmental Justice and Mitigation

Comment: Several commenters stated that the proposed revisions, in particular the removal of an upper population limit, places a disproportionate burden on ranchers and rural communities in wolf country.

Response: We recognize that Mexican wolf reintroduction and recovery imposes an economic burden on some livestock operators in the MWEPA, as discussed in Chapter 4. We have added additional measures in the FSEIS to mitigate these impacts.

Comment: The Service should incorporate additional mitigation measures for environmental justice impacts, including outreach targeted to non-English speaking populations.

Response: We have added additional mitigation measures in the FSEIS as recommended.

Comment: A commenter mentioned mitigation measures are not provided to address the impact of having to move cattle at the U.S. Forest Service's request due to nearby wolf denning. Commenters requested the FSEIS include mitigation measures to replace lost tax revenues and detail the increase in management personnel necessary to protect producers while managing and monitoring the wolves.

Response: The provision in the MWEPA regulations for "Disturbance-causing land-use activities" (17.84 (k)(8)), provides for the Service to work with any federal agency, in this case the U.S. Forest Service, to temporarily restrict human access and disturbance-causing land-use activities in specific areas, at specific times of the year, according to our definition of "disturbance-causing land-use activity". This provision is not under revision and therefore not subject to additional mitigation measures pursuant to the FSEIS.

Biological Resources

Comment: A commenter questioned the Service's expectation for the wolf population to stabilize at 300-400 wolves due to management actions such as reducing food caches and increasing translocations.

Response: We expect the future growth of the wolf population to be moderated by natural causes (increased wolf density, prey availability) as discussed in Chapter 3 of this FSEIS and in the 2014 EIS, as well as in response to management actions such as reduced food caches (which may result in lower pup survival), translocations, or removals. We have informed our estimates of future wolf population growth on data from the MWEPA, while recognizing that future population growth may differ from our projections.

Comment: Several commenters disagreed with the scale or approach of the Service's biological resources analysis in the DSEIS and stated the Service should conduct a concentrated impact analysis based on the geographic area where wolves are present. For example, one commenter stated that the Service should analyze impacts in the area formerly known as the Blue Range Wolf Recovery Area (including GMUs 1 and 27 in Arizona and GMUs 15, 16A, 16B, 16D, 21A, 21B, and 22 in New Mexico) and then extrapolate those impacts to the wider area that wolves now occupy or may in the future.

Response: As we describe in 3.5 Economic Activity, we updated the FSEIS with the additional counties where Mexican wolves have had home ranges through 2019 in order to describe and assess the economic impacts of our revisions inclusive of the areas that have been newly occupied by wolves since the 2015 10j rule took effect. Throughout the analysis we refer to these as "focal" counties so that we can differentiate them from counties that have not had wolf presence and potentially associated impacts. We take the same approach with GMUs, for the same reason.

Comment: A commenter stated that the Service did not analyze the difference in release methods (adults versus cross fosters) and therefore did not take a hard look at the foreseeable environmental impacts of the proposed genetic objective.

Response: We recognize in the FSEIS that cross-foster wolves will require two years to reach breeding age, as opposed to one year for adult releases. This results in a one-year difference between when cross-fostered wolves, versus adult wolves, could affect the gene diversity of the population through breeding events. Other than the one-year time difference, there is no difference in cross-fostered versus adult released wolves. As we explain in the FSEIS, the social tolerance

for cross-foster pups from local communities is significantly higher than for adult releases. Therefore, we consider cross-fostering to be a preferable release technique, even though we recognize the logistical difficulties this method presents compared to adult releases.

Comment: One commenter provided information from hunting outfitters and guides in New Mexico suggesting decreased elk herds and hunt success due to increased wolf occupancy in the Gila National Forest wilderness. The commenter requested that the Service update the ungulate information in the DEIS with harvest statistics because according to the commenter harvest data suggest that elk in unit 16B/22 are declining drastically. This commenter stated that he expects the wolf to 1,000 elk ratio is already at 4:1000 or higher in wilderness areas. The commenter stated that the SEIS should recognize that individual hunting and guiding outfitters have been put out of business due to wolf impacts on wild ungulates rather than claiming no significant impact. The commenter stated that the Service continues to downplay the economic impacts of the wolf program.

Our Response: GMU 16B is part of the Greater Gila elk population and NMDGF does not partition it out when assessing population metrics. Rather this unit is combined with several others and assessed as part of an elk herd on a larger geographical scale that includes GMUs 15, and 16A-E. In this Greater Gila population, NMDGF has not seen a decline and classifies this population as "stable". However, NMDGF does not quantify sub-populations (such as GMU 16B) within this region, so we recognize this does not mean that elk aren't changing their use patterns through time.

Comment: A commenter questioned the impacts that Mexican wolves have on other predators, such as mountain lions, black bears, and coyotes, including whether more Mexican wolves will lead to competition with these other predators, impacting the future prey populations.

Our Response: The Service addressed the interaction between Mexican wolves and other predators in detail in the 2014 FEIS, which we also reference in the Biological Resources section of the 2022 FSEIS.

Comment: Several commenters identified a discrepancy between the amount of suitable habitat the Service states is available in the MWEPA in the DSEIS compared to the amount of high-quality habitat identified by Martinez-Meyer et. al 2017 or mentioned in the revised recovery plan and questioned the validity of the Service's claim that there is adequate suitable habitat in the MWEPA to support a population of Mexican wolves. Another commenter stated that the current population occupies approximately 60% of suitable habitat in the MWEPA and will need additional area to establish necessary populations for recovery.

Our Response: As we state in the FSEIS, we maintained the methodology used in the 2014 EIS to estimate the amount of suitable habitat for Mexican wolves in the MWEPA, resulting in an estimate of approximately 32,265 mi^2 (83,556 km^2) of suitable habitat in Zones 1, 2, and 3. We maintained this methodology for the FSEIS because it is a valid estimation approach and in particular because we did not want to make comparison or reference between the 2014 EIS and the supplemental information in the DSEIS/FSEIS unnecessarily difficult. That being said, we also recognize the validity of the binational habitat analysis conducted by Martínez-Meyer 2017 as part of the revised recovery plan, and we reference that research in the DSEIS/FSEIS. The methods used by Martínez-Meyer et al. 2017 were very different and included various scenarios (i.e.,

pessimistic, intermediate, and optimistic; and with and without an ungulate biomass index (UBI)) that produced a range of estimates of the amount of high-quality habitat in Arizona and New Mexico south of Interstate 40. The intermediate scenario with UBI estimated 17,239 mi^2 (44,477 km^2) of "high and highest" quality patches (Martínez-Meyer 2017, p. 55, Table 11). The numbers differ between the two estimation techniques because of how the habitat layers were defined and modeled, with the Martínez-Meyer 2017 model having a more restrictive definition of high-quality habitat compared to our definition of suitable habitat. We note that wolves currently occupy 19,495 mi^2 (50,492 km^2) of the MWEPA, which is a larger amount of habitat than the total amount of habitat estimated by Martínez-Meyer; we consider large tracts of suitable habitat to still be available (unoccupied) for wolves in the MWEPA. In addition, we note that while the current population may occupy slightly over half of the estimated suitable habitat in the MWEPA, currently occupied habitat can support a higher density of wolves than it currently does (USFWS 2014, Appendix D).

Comment: Several commenters expressed concern about the impacts an increased wolf population would have on ungulate populations or on hunting and guiding outfitters or local communities. One commenter stated that increased wolf releases coupled with decreased resource availability and changing landscapes will present significant stressors to wild ungulate herds, and that ungulate populations, once diminished past a certain percentage, very rarely can be reversed. Several commenters expressed concern about drought conditions on ungulates. Another commenter expressed concern about the accuracy of statements that impacts to ungulate populations have yet to be documented and are not anticipated before reaching the benchmark of 22 released wolves in 2030.

Our Response: In both Arizona and New Mexico, wild ungulate populations are monitored at a relatively large scale on an annual basis and small-scale variation in localized herds is expected due to a number of factors including management objectives and landscape conditions. Neither state has yet recorded an observable negative impact from wolves on wild ungulates.

General NEPA Issues

Comment: Several commenters stated that the population objective needed to be calculated with a geometric mean, rather than an arithmetic mean, because the arithmetic mean lambda can be biased and not accurately capture a population's trajectory.

Response: We concur that using a geometric mean is appropriate. The geometric mean is an average that multiples the values and finds the root of their product, as opposed to an arithmetic mean that is based on adding the values. The geometric mean is widely used for finding growth rates and percentage change because it is considered more accurate. We have clarified this by revising the population objective to "… and the annual population growth rate averaged over the 8-year period must demonstrate a stable or increasing population, as calculated by a geometric mean."

Comment: Several commenters noted that Alternative Two provides greater management flexibility and therefore should be selected by the Service because the difference in conservation benefit between the Alternative One and Two is minor.

Response: We selected Alternative One as our Preferred Alternative and proposed action in the DSEIS because it provided greater conservation benefit to the Mexican wolf and was responsive to the court-ordered remand.

Comment: A commenter stated that the Service should have selected a No Action Alternative that analyzed the environmental impact of implementing the 2015 10(j) rule without the "illegal elements". Similarly, a commenter stated that Alternative Two is defective because it contains the take provisions that the judge ruled against.

Response: Alternative One remedies the faults the court found; therefore, it is a valid alternative that, regardless of its name, is what the commenter is asking for. Alternative Two is of value because it addresses the primary issue raised by the court – that the rule must provide for the long-term conservation and recovery of the Mexican wolf, by establishing revised population and genetic objectives that are consistent with the long-term conservation and recovery of the Mexican wolf. Alternative Two maintains the take provisions from the 2015 10(j) rule to allow the Service to evaluate these provisions in the context of our proposed revised goals as well as within the current status (growth) of the population. The potential effects of the take provisions, and whether or not they may be supportive of long-term recovery, are highly variable depending on the level and timing of take expected to occur, as well as the context within which they are being implemented. Alternative Two allows the Service to estimate the actual expected level of take that could be expected from these provisions based on over five years of implementation, and to evaluate these take provisions against more rapid population growth than previously documented in the 2015 10(j) rule, a larger population goal without an upper limit, and a larger number of and more rapid release schedule than established in the 2015 10(j) rule. The commenter cites *Friends of Yosemite Valley v. Scarlett*, 439 Supp. 2d 1074, 1105 (E.D. Cal. 2006) as authority supporting their comments. However, as the commenter points out, Friends of Yosemite was different because there the Ninth Circuit held "the entire plan invalid." This invalidation left the National Park Service with a clean slate upon which to draft a new plan. Here, the Service did not have a clean slate and the court did not vacate the 2015 10(j) rule. The Service used the valid parts of the 2015 10(j) rule and excised those parts of the rule invalidated by the court. The Service has complied with the March 31, 2018, Court Order to develop a revised final 10(j) rule and has analyzed the effects on the human environment of the proposed revisions to the 2015 10(j) rule.