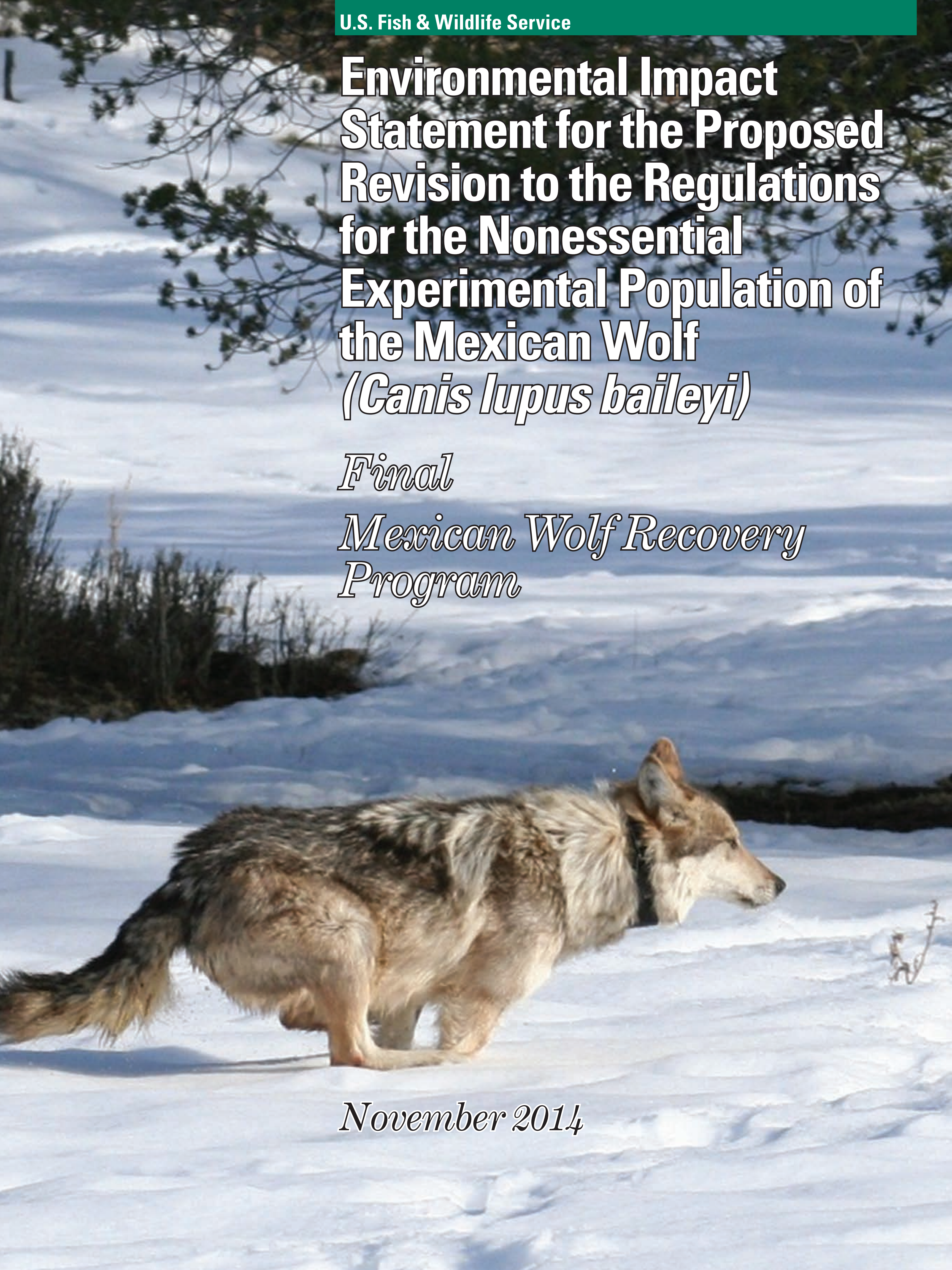
U.S. Fish & Wildlife Service

Environmental Impact Statement for the Proposed Revision to the Regulations for the Nonessential Experimental Population of the Mexican Wolf *(Canis lupus baileyi)*

Final

Mexican Wolf Recovery Program



November 2014

Cover Sheet

Final Environmental Impact Statement

Title of Proposed Action: Proposed Revision to the Regulations for the Nonessential Experimental Population of the Mexican Wolf (*Canis lupus baileyi*)

Lead Agency: United States Fish and Wildlife Service, Southwest Region

Cooperating Agencies:

USDA Forest Service
USDA APHIS/Wildlife Services – Western Region
National Park Service – Intermountain Region//
Bureau of Indian Affairs – Southwest Region
Bureau of Land Management – Arizona State Office
Bureau of Land Management – New Mexico State Office
U.S. Army, Fort Huachuca, Arizona
U.S. Army, White Sands Missile Range, New Mexico
U.S. Customs and Border Protection
Arizona Game and Fish Department
New Mexico Department of Game and Fish
New Mexico Department of Agriculture
Eastern Arizona Counties Organization
Gila County, Arizona
Greenlee County, Arizona
Navajo County, Arizona
Graham County, Arizona
Cochise County, Arizona
Chaves County, New Mexico
Eddy County, New Mexico
Grant County, New Mexico
Hidalgo County, New Mexico
Lincoln County, New Mexico
Luna County, New Mexico
McKinley County, New Mexico
San Miguel County, New Mexico
Sierra County, New Mexico
Pueblo of Laguna

Abstract: The Service proposes to revise the regulations established in our 1998 Final Rule for the nonessential experimental population of the Mexican wolf. We also propose to extend the authority of the Mexican Wolf Recovery Program's Section 10(a)(1)(A) research and recovery permit to areas that are outside of the MWEPA. In this EIS we analyze the environmental consequences of a range of alternatives, including the Proposed Action and No Action alternative, for our proposal. The action would be implemented through a final nonessential experimental rule, a revised Section 10(a)(1)(A) research and recovery permit and the provision of federal funding.

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EXECUTIVE SUMMARY

The mission of the U.S. Fish and Wildlife Service is:

"Working with others, to conserve, protect, and enhance fish, wildlife, plants, and their habitats for the continuing benefit of the American people".

Under the provisions of the Endangered Species Act of 1973(16 USC §1531-1544), as amended (ESA, the Act), we have primary responsibility for the conservation of terrestrial and freshwater organisms. Section 4(f)(1) of the ESA directs the Secretary of the Interior to "develop and implement recovery plans for the conservation and survival of endangered species". Section 10(j)(2)(A) of the Act specifies that the Secretary of the Interior may authorize the release…of any population…of an endangered species…if the Secretary determines that such release will further the conservation of such species.

The U.S. Fish and Wildlife Service (USFWS, we, us, the Service) propose to revise the regulations established in our 1998 Final Rule for the nonessential experimental population of the Mexican wolf. We also propose to extend the authority of the Mexican Wolf Recovery Program's Section 10(a)(1)(A) research and recovery permit to areas that are outside of the MWEPA. In this EIS we analyze the environmental consequences of a range of alternatives, including the Proposed Action and No Action alternative, for our proposal. The action would be implemented through a final nonessential experimental rule, a revised Section 10(a)(1)(A) research and recovery permit and the provision of federal funding.

BACKGROUND

The Mexican wolf is the rarest, southern-most occurring, and most genetically distinct subspecies of all the North American gray wolves (Parsons 1996, Wayne and Vilá 2003, Leonard et al. 2005). The distinctiveness of the Mexican wolf and its recognition as a subspecies is supported by both morphometric (physical measurements) and genetic evidence (78 FR 35664, June 13, 2013). The Mexican wolf was listed as an endangered subspecies (Canis lupus baileyi) in 1976. The entire gray wolf species (Canis lupus) in North America south of Canada was listed as endangered in 1978, except in Minnesota where it was listed as threatened. Although this listing of the gray wolf species subsumed the previous Mexican wolf subspecies listing, the rule stated that the USFWS would continue to recognize valid biological subspecies for purposes of research and conservation.

In the United States, Mexican wolves were reintroduced to the wild in 1998 in Arizona and New Mexico as a nonessential experimental population pursuant to section 10(j) of the ESA. Captive-bred Mexican wolves can be released into a portion of the Blue Range Wolf Recovery Area (BRWRA), which is part of a larger Mexican Wolf Experimental Population Area (MWEPA). The BRWRA consists of all of the Apache and Gila National Forests. The MWEPA is a larger area surrounding the BRWRA that extends from Interstate Highway 10 to Interstate Highway 40 across Arizona and New Mexico and includes a small portion of Texas north of U.S. Highway 62/180 (63 FR 1752, January 12, 1998). Under current regulations, Mexican wolves can occupy any portion of the BRWRA, but are not allowed to establish in the MWEPA.

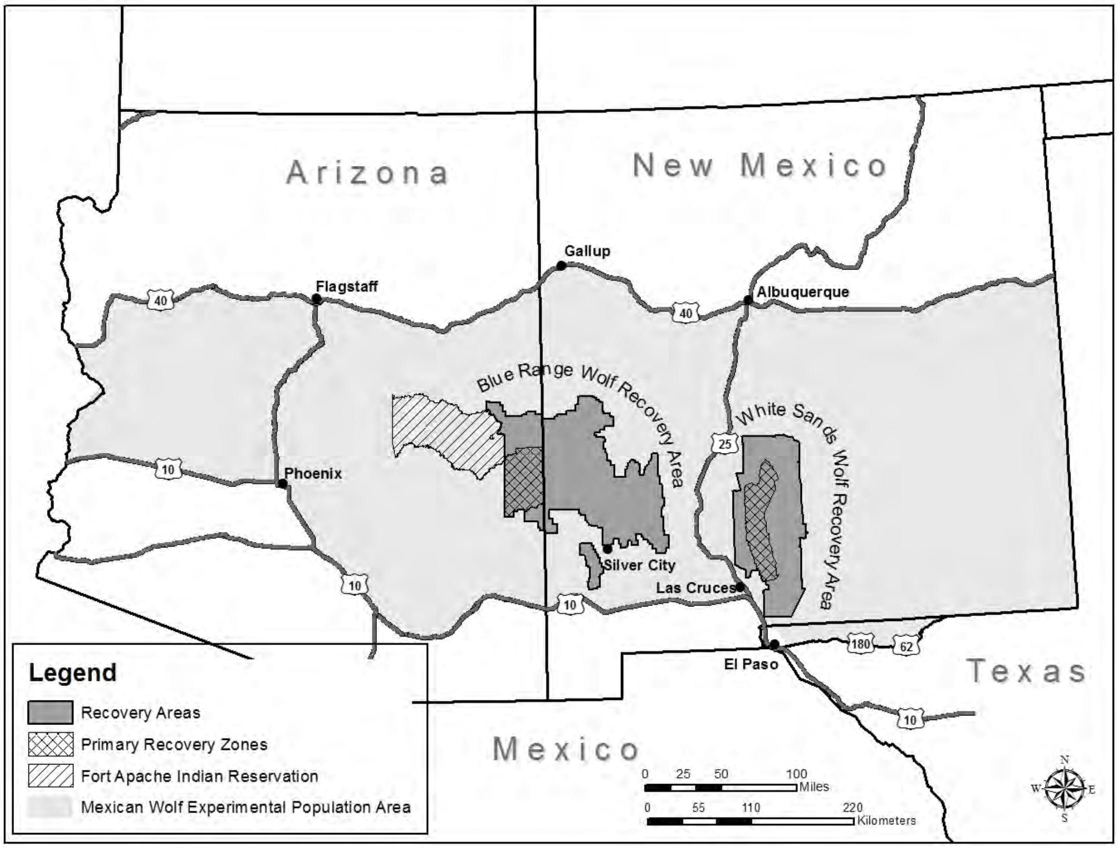

Figure ES-1. Geographic boundaries for the nonessential experimental population of the Mexican wolf as established under the 1998 Final Rule.

On June 13, 2013 we published a proposed 10(j) rule (Proposed Revision to the Nonessential Experimental Population of the Mexican Wolf, 78 FR 35719) for the Mexican wolf nonessential experimental population in Arizona and New Mexico. This action was taken in coordination with our proposed rule, published on the same date in the Federal Register, to list the Mexican wolf as an endangered subspecies and delist the gray wolf [Removing the Gray Wolf (Canis lupus) From the List of Endangered and Threatened Wildlife and Maintaining Protections for the Mexican Wolf (Canis lupus baileyi) by Listing It as Endangered (78 FR 35664)]. We published the proposed 10(j) rule to associate the nonessential experimental population of Mexican wolves with the Mexican wolf subspecies listing, if finalized, rather than with the listing of the gray wolf at the species level and because we are proposing revisions to the current Mexican wolf nonessential experimental population regulations.

On August 5, 2013 we published a Notice of Intent (NOI) to prepare the Mexican wolf EIS in the Federal Register, *Notice of Intent To Prepare an Environmental Impact Statement for the Proposed Revision to the Nonessential Experimental Population of the Mexican Wolf (Canis lupus baileyi)* (78 FR 47268). The NOI solicited comments from the public, government agencies, Tribes, industry, the scientific community, or any other interested parties concerning the scope of the EIS, pertinent issues to address, and alternatives that should be analyzed. On September 5, 2013 we published notices in the Federal Register to extend the public comment period from September 11, 2013 to October 28, 2013 on both of the proposed rules; *Proposed Revision to the Nonessential Experimental Population of the Mexican Wolf* (78 FR 54613) and *Removing the Gray Wolf (Canis lupus) From the List of Endangered and Threatened*

Wildlife and Maintaining Protections for the Mexican Wolf (Canis lupus baileyi) by Listing It as Endangered (78 FR 54614). On July 25, 2014, we published a Notice of Availability (NOA) for the revised proposed rule, *Proposed Revision to the Nonessential Experimental Population of the Mexican Wolf* (79 FR 43358) in the Federal Register, and announced the availability of the draft EIS, the scheduled public information sessions and hearings, and the opening of the 60-day public comment period running from July 25, 2014 through September 23, 2014.

PURPOSE AND NEED FOR THE PROPOSED ACTION

We propose revisions to the regulations established for the Mexican wolf reintroduction in the 1998 Final Rule and the Mexican Wolf Recovery Program's section 10(a)(1)(A) research and recovery permit (TE-091551-8 dated 04/04/2013). The **purpose** of our proposed action is to further the conservation of the Mexican wolf by improving the effectiveness of the Reintroduction Project in managing the experimental population. We intend to do this by: (1) modifying the geographic boundaries in which Mexican wolves are managed south of Interstate-40 in Arizona and New Mexico under section 10(j) of the Endangered Species Act; (2) modifying the management regulations that govern the initial release, translocation, removal and take (see the definition of "take" provided in the List of Definitions) of Mexican wolves; and (3) issuing a section 10(a)(1)(A) permit for the MWEPA and areas outside of the MWEPA. Revisions to the 1998 Final Rule and the section 10(a)(1)(A) permit are **needed** because: (1) under the current regulations we will not be able to achieve the necessary population growth, distribution and recruitment that would contribute to the persistence of, and improve the genetic variation within, the experimental population; (2) there is a potential for Mexican wolves to disperse into southern Arizona and New Mexico from reintroduction areas in the states of Sonora and Chihuahua in northern Mexico; and (3) certain provisions lack clarity, are inadequate, and/or limit the efficacy and flexibility of our management of the experimental population of Mexican wolves.

In order to satisfy our purpose and need, our Proposed Action is intended to:

- Increase the total number of wolves in the experimental population and allow for their distribution over a larger area. A larger population of wolves distributed over a larger area has a higher probability of persistence than a small population in a small area.
- Provide additional areas for initial release of Mexican wolves into unoccupied suitable habitat thereby increasing the likelihood that those releases will be successful. More successful releases can provide the number of effective migrants per generation into the experimental population needed to improve the genetic variation within the population and to replace wolves that may be lost from the population due to management removal actions or mortalities.
- Improve the genetic variation within the experimental population. Higher levels of genetic variation decrease the risk of inbreeding depression and increase the probability of persistence (i.e., lowers the extinction risk) of a small population. With better representation of genetic variation, the experimental population is also better able to support the loss of individual wolves with a particular genetic make-up.
- Use the captive Mexican wolf population as the source population that will provide the genetic interchange necessary to improve the genetic variation within the experimental population. Until there are other populations of Mexican wolves established in the wild, the captive population is the only source of effective migrants to the experimental population.
- Accommodate natural dispersal behavior by allowing the experimental population to occupy and establish territories in areas of suitable habitat throughout an expanded MWEPA. Natural dispersal and colonization of new areas will improve the probability of persistence of the experimental population.

- Improve the effectiveness of the Reintroduction Project through the use of voluntary management agreements. Such agreements can further the conservation of the Mexican wolf through the proactive implementation of management actions taken in cooperation with willing private land owners and tribal governments.
- Effectively manage Mexican wolves within an expanded MWEPA in a manner that furthers the conservation of the Mexican wolf while being responsive to the needs of the local community in cases of depredation or nuisance behavior by wolves. We expect that modifying the provisions governing the take of Mexican wolves to provide clarity and consistency will contribute to our efforts to find the appropriate balance that supports wolf population growth while minimizing nuisance and depredation impacts on local stakeholders.
- Establish a coherent management regime under the proposed 10(j) rule in an expanded MWEPA. The area of Arizona and New Mexico south of I-10 may provide stepping stone habitat and dispersal corridors for wolves dispersing north from Mexico and south from the experimental population in the BRWRA. Management of all Mexican wolves in this area under the proposed 10(j) rule will improve the effectiveness of the Reintroduction Project in minimizing and mitigating wolf-human conflict.

PROPOSED ACTION AND ALTERNATIVES

We are proposing revisions to the regulations established for the Mexican wolf reintroduction in the 1998 Final Rule and the Mexican Wolf Recovery Program's section 10(a)(1)(A) research and recovery permit (TE-091551-8 dated 04/04/2013). In summary we propose to:

- Modify the geographic boundaries in which Mexican wolves are managed south of Interstate-40 in Arizona and New Mexico under section 10(j) of the Endangered Species Act.
- Modify the management regulations that govern the initial release, translocation, removal and take (see the definition of "*take*" provided in the List of Definitions) of Mexican wolves.
- Issue a section 10(a)(1)(A) permit for the MWEPA and areas outside of the MWEPA.

These actions would be implemented through a Final Nonessential Experimental Rule, an Endangered Species Act (Act) Section 10(a)(1)(A) research and recovery permit, and provision of federal funding.

Four alternatives, including the no action alternative, are brought forward for further analysis:

<u>ALTERNATIVE ONE</u>:

- **MWEPA Expansion with Management Zones;**
- **Expanded Zone 1;**
- **Phased Management;**
- **Achieve an Experimental Population Objective of 300 to 325 wolves; and**
- **Modified provisions for take of Mexican wolves.**

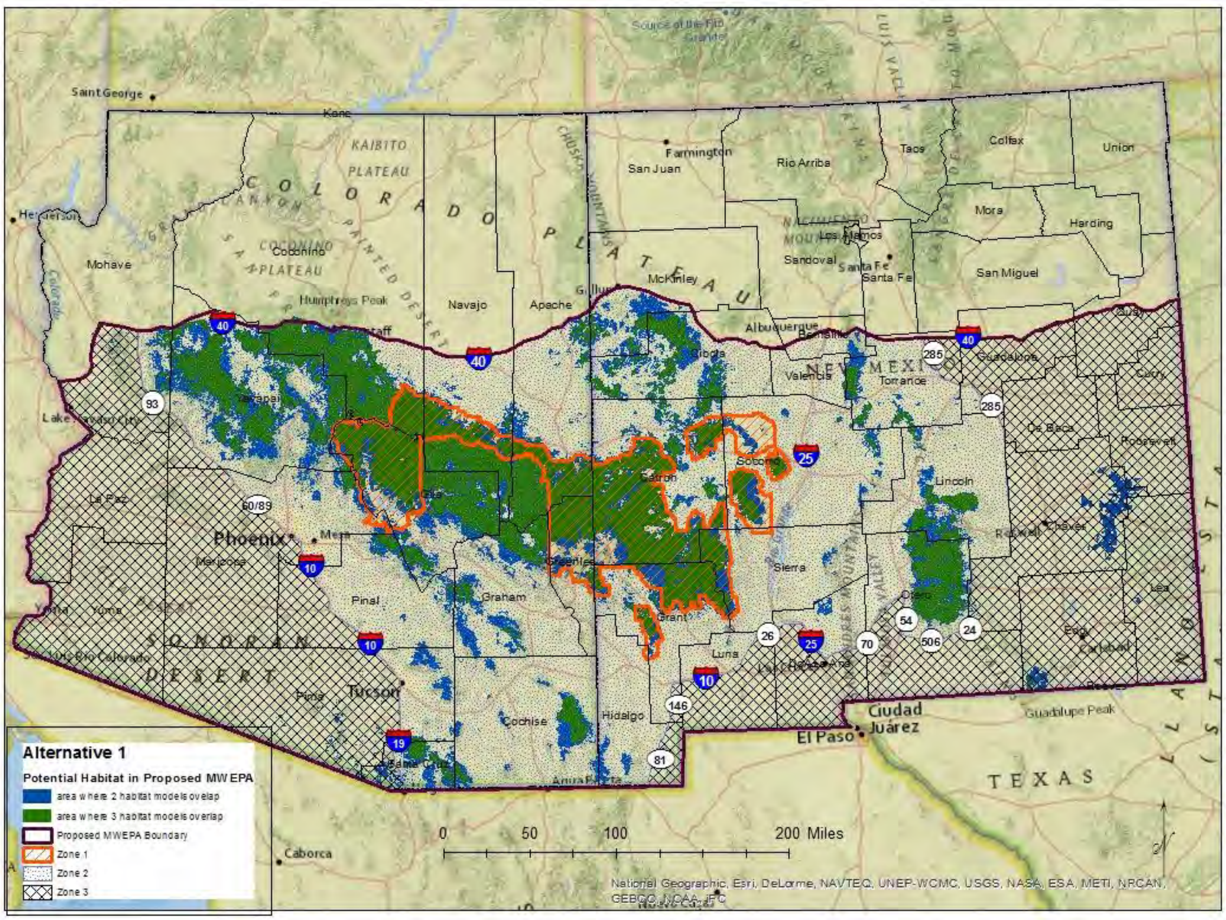

Figure ES-2. Alternative One (Proposed Action and Preferred Alternative)

Alternative One is our proposed action and preferred alternative. Under this alternative we would:

- Make geographic boundary changes that:
  - Remove the designation of the White Sands Wolf Recovery Area (WSWRA) as the back-up area for the initial release of Mexican wolves from captivity.
  - Remove from the MWEPA the small portion of Texas lying north of U.S. Highway 62/80 to the Texas-New Mexico boundary.

- Move the southern boundary of the MWEPA in Arizona and New Mexico from Interstate-10 to the United States-Mexico international border.
- Designate three wolf management zones within the expanded MWEPA and discontinue the designation of the BRWRA:
  - Zone 1 is an area of 12,507mi^2 (32,392 km^2) within the MWEPA where Mexican wolves would be allowed to naturally disperse into and occupy and where Mexican wolves may be initially released from captivity or translocated. Approximately 83 percent of Zone 1(10,359 mi^2/26,830 km^2) has suitable habitat for wolves (Figure 2-6). Zone 1 would include all of the Apache and Gila National Forests (the existing BRWRA); the Sitgreaves National Forest; 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 is an area of 78,756 mi^2 (203,978 km2) within the MWEPA where Mexican wolves would 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 would be limited to pups less than five months old to allow for the cross-fostering of pups from the captive population into the wild, and to enable 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 could also be initially released under Service and state approved management agreements with private landowners or a Service approved management agreements with tribal governments. Approximately 27 percent (21,004mi^2/54,339 km^2) of Zone 2 has suitable habitat for wolves (Figure 2-1). The northern boundary of Zone 2 is Interstate Highway 40; the western boundary extends south from Interstate Highway 40 and follows Arizona State Highway 93, Arizona State Highway 89/60, Interstate Highway 10, and Interstate Highway 19 to the United States-Mexico international border; the southern boundary is the United States-Mexico international border heading east, then follows New Mexico State Highway 81/146 north to Interstate Highway 10, then along New Mexico State Highway 26 to Interstate Highway 25; the boundary continues along New Mexico State Highway 70/54/506/24; the eastern boundary follows the eastern edge of Otero County, New Mexico, to the north and then along the southern and then eastern edge of Lincoln County, New Mexico, until it intersects with New Mexico State Hwy 285 and follows New Mexico State Highway 285 north to the northern boundary of Interstate Highway 40. Zone 2 excludes the area in Zone 1.
  - Zone 3 is an area of 62,590 mi^2 (162,108 km2) within the MWEPA where Mexican wolves would be allowed to disperse into and occupy but neither initial releases nor translocations would occur. Zone 3 is an area of less suitable Mexican wolf habitat where Mexican wolves would be more actively managed under the authorities of the proposed rule to reduce human conflict. Approximately 1 percent (882 mi^2/2,283 km^2) of Zone 3 has suitable habitat for wolves (Figure 2-1). Zone 3 is two separate geographic areas on the eastern and western sides of the MWEPA. One area of Zone 3 is in western Arizona and the other in eastern New Mexico. In Arizona, the northern boundary of Zone 3 is Interstate Highway 40; the eastern boundary extends south from Interstate Highway 40 and follows State Highway 93, State Highway 89/60, Interstate Highway 10, and Interstate Highway 19 to the United States–Mexico international border; the southern boundary is the United States–Mexico international border; the western boundary is the Arizona–California State border. In New Mexico, the northern boundary of Zone 3 is Interstate Highway 40; the eastern boundary is the New Mexico–Texas State border; the southern boundary is the United States–Mexico international border heading west, then follows State Highway 81/146 north to Interstate Highway 10, then

along State Highway 26 to Interstate Highway 25, the southern boundary continues along State Highway 70/54/506/24; the western boundary follows the eastern edge of Otero County to the north and then along the southern and then eastern edge of Lincoln County until it follows State Highway 285 north to the northern boundary of Interstate Highway 40

- Make management changes that:
  - Allow initial release of Mexican wolves throughout the entire Zone 1 in accordance with a phased management approach.
  - Allow Mexican wolves to disperse naturally from Zone 1 into, and within the MWEPA (Zones 2 and 3) and occupy the MWEPA (Zones 1, 2 and 3) in accordance with a phased management approach.
  - Allow the translocation of wolves at selected release sites on federal land within Zones 1 and 2 of the MWEPA in accordance with a phased management approach.
  - Allow wolves to occupy federal and non-federal land in the MWEPA except in the case of depredation or other nuisance behavior that cannot be effectively managed through non-removal techniques.
  - Capture and remove wolves on tribal land if requested by the tribal government.
  - Implement a phased management approach so that in:
    - Phase 1: Initial release of Mexican wolves would be conducted throughout Zone 1 **with the exception of** the area west of State Highway 87 in Arizona. No translocations would be conducted west of State Highway 87 in Arizona in Zone 2. Mexican wolves would be allowed to disperse naturally from Zone 1 into, and within the MWEPA (Zones 2 and 3) and occupy the MWEPA (Zones 1, 2 and 3). However, during Phase 1 dispersal and occupancy in Zone 2 west of State Highway 87 would be limited to the area north of State Highway 260 and west to Interstate 17.
    - Phase 2: If determined to be necessary by either the 5-Year or 8-Year evaluation: initial release of Mexican wolves would occur throughout Zone 1 **including** the area west of State Highway 87 in Arizona; No translocations would be conducted west of Interstate Highway 17 in Arizona. Mexican wolves would be allowed to disperse naturally from Zone 1 into, and within the MWEPA (Zones 2 and 3) and occupy the MWEPA (Zones 1, 2 and 3) **with the exception** of those areas in Zone 2 west of State Highway 89 in Arizona.
    - Phase 3: If determined to be necessary by the 5-Year or 8- Year evaluation: Initial release of Mexican wolves would be conducted throughout the entire Zone 1 **including** the area west of State Highway 87 in Arizona; no translocations would be conducted west of State Highway 89 in Arizona; Mexican wolves would be allowed to disperse naturally from Zone 1 into, and within the MWEPA (Zones 2 and 3) and occupy the MWEPA (Zones 1, 2 and 3).
    - Year 12 and beyond: Phased management approach ends: Initial release of Mexican wolves could be conducted throughout entire Zone 1; Translocations could be conducted at selected translocation sites on federal land and on non-federal private and tribal land with voluntary management agreements within Zones 1 and 2 of the MWEPA. Mexican wolves would be allowed to disperse naturally from Zone 1 into, and within the MWEPA (Zones 2 and 3) and occupy the MWEPA (Zones 1, 2 and 3).
  - Revise the regulations for the take of Mexican wolves on federal and non-federal land within the entire MWEPA (Zones 1, 2 and 3):

    - Revise the conditions that determine when we would issue a permit to allow livestock owners or their agents to take (including intentional harassment or kill) any Mexican wolf that is in the act of biting, wounding or killing livestock (see definition of *livestock* in the List of Definitions) on federal land;
    - Allow domestic animal owners or their agents to take (including kill or injure) any Mexican wolf that is in the act of biting, wounding or killing domestic animals (see definition of *domestic animal* in the List of Definitions) on non-federal land anywhere within the MWEPA;
    - Pursuant to a removal action authorized by the Service or a designated agency, the Service or designated agency may issue permits to allow domestic animal owners or their agents (e.g., employees, land manager, local officials) to take (including intentional harassment or kill) any Mexican wolf that is present on non-federal land where specified in the permit.
    - Revise the conditions under which take will be authorized in response to unacceptable impacts of Mexican wolf predation on wild native ungulate herds. An unacceptable impact would be determined by a state agency based upon ungulate management goals, or a 15 percent decline in an ungulate herd as documented by a State 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.
    - Maintain an experimental Mexican wolf population of 300 to 325 wolves in the MWEPA.

- Subject to Service and state approved management agreements, the Service or a designated agency may develop and implement management actions on private land in management Zones 1 and 2 within the MWEPA in voluntary cooperation with private landowners, including but not limited to initial release and translocation of wolves onto private lands if requested by the landowner.
- Subject to agreements with tribal governments, the Service may develop and implement management actions on tribal trust land in management Zones 1 and 2 within the MWEPA in voluntary cooperation with tribal governments including but not limited to initial release, translocation onto Tribal trust lands, capture, and removal of Mexican wolves from Tribal trusts lands if requested by the tribal government.
- Revise and reissue the Mexican Wolf Recovery Program's section 10(a)(1)(A) research and recovery permit (TE-091551-8 dated 04/04/2013) so that it applies to both the MWEPA and areas outside of the MWEPA. Under this permit we would authorize removal of Mexican wolves that can be identified as coming from the experimental population that disperse to establish territories in areas outside of the MWEPA. Based in part on their genetic value relative to the Mexican wolf population, we may make a determination to maintain these wolves in captivity, translocate them to areas of suitable habitat within the MWEPA, or transfer them to Mexico.

<u>ALTERNATIVE TWO</u>:

- **MWEPA Expansion with Management Zones;**
- **Modified Provisions for Take of Mexican Wolves**

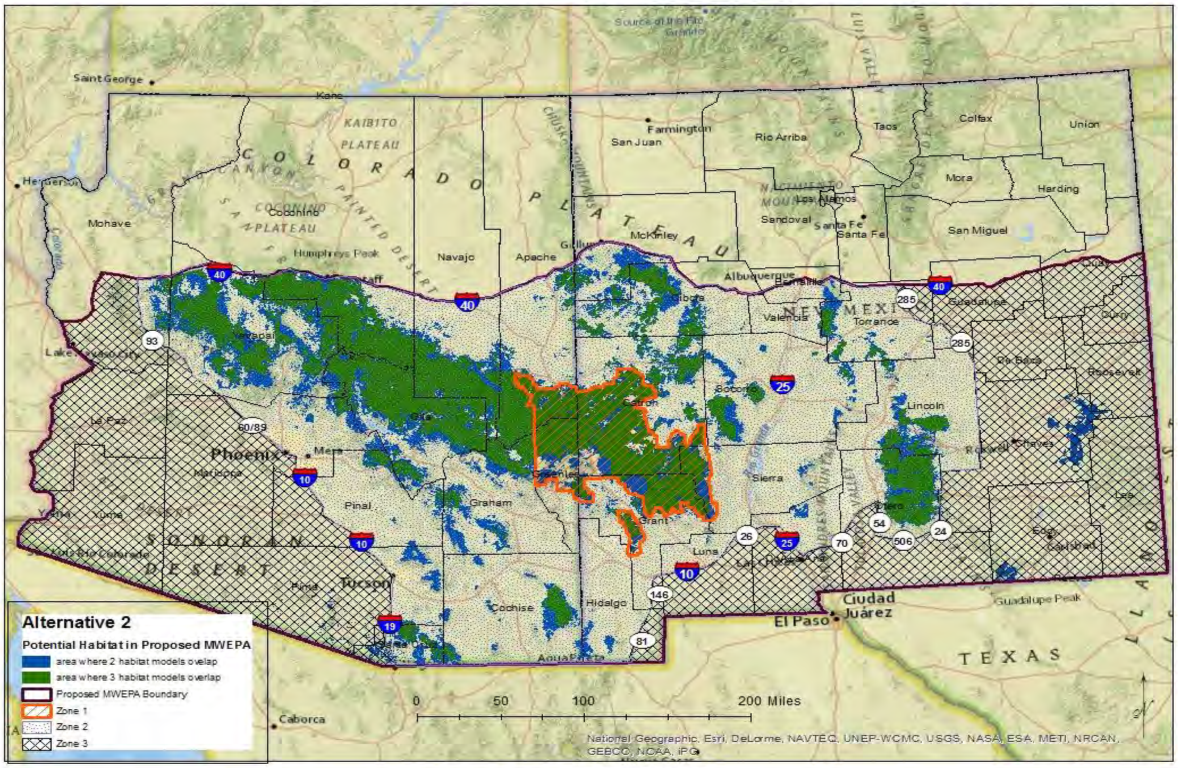

Figure ES-3. Alternative Two

Alternative Two would include all the initiatives proposed under Alternative One except under this alternative we would not: adopt a phased management approach or; establish a Mexican wolf experimental population objective of from 300 to 325 wolves within the entire MWEPA or; expand the geographic boundaries of the proposed management Zone 1 beyond the Apache and Gila National Forests (the existing BRWRA).

<u>ALTERNATIVE THREE</u>:

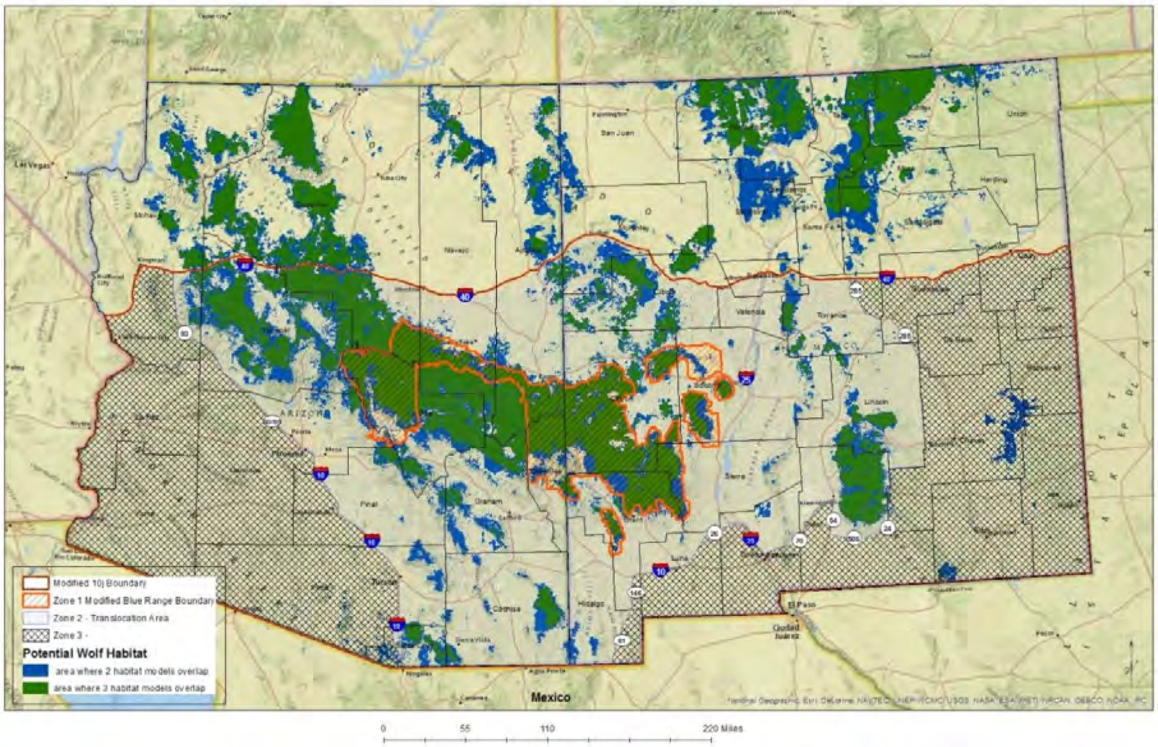

Figure ES-4. Alternative Three

Alternative Three would include all the initiatives proposed under Alternative One except under this alternative we would not adopt adopt a phased management approach or; establish a Mexican wolf experimental population objective of from 300 to 325 wolves within the entire MWEPA; or include proposed management changes that would modify the regulations for take of Mexican wolves within the MWEPA.

ALTERNATIVE FOUR:

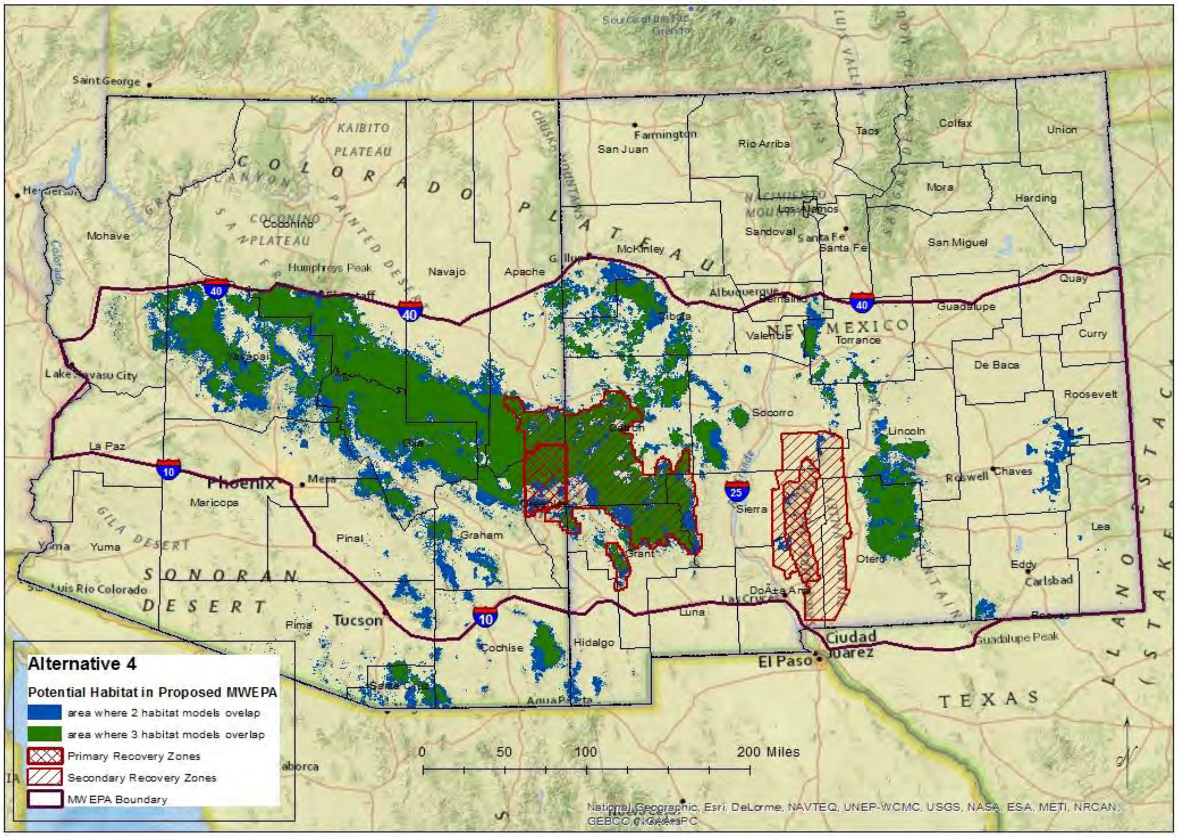

Figure ES-5. Alternative Four (No Action)

Under Alternative Four no changes to the 1998 Final 10(j) Rule for the Mexican wolf or the Mexican Wolf Recovery Program's section 10(a)(1)(A) research and recovery permit (TE-091551-8 dated 04/04/2013) would be made.

SUMMARY OF ACTIONS BY ALTERNATIVE

Below we provide a tabular comparison of the proposed action and action alternatives.

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	Alternative			
	One (Proposed Action and Preferred Alternative)	**Two**	**Three**	**Four (No Action)**
Remove the designation of the White Sands Wolf Recovery Area (WSWRA) as the back-up area for the initial release of Mexican wolves from captivity.	X	X	X	
Remove from the MWEPA the small portion of Texas lying north of U.S. Highway 62/80 to the Texas-New Mexico boundary.	X	X	X	
Move the southern boundary of the MWEPA in Arizona and New Mexico from Interstate 10 to the United States-Mexico international border.	X	X	X	
Designate three wolf management zones with a larger Zone 1 within the expanded MWEPA and discontinue the designation of the BRWRA: Zone 1 is an area within the MWEPA where Mexican wolves would be allowed to naturally disperse into and occupy and where Mexican wolves may be initially released from captivity or translocated. Zone 1 would include all of the Apache and Gila National Forests (the existing BRWRA), the 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 is an area within the MWEPA where Mexican wolves would be allowed to naturally disperse and occupy and where Mexican wolves may be translocated. On federal land in Zone 2 initial releases of Mexican wolves would be limited to pups less than five months old to allow for the cross-fostering of pups from the captive population into the wild, and to enable 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, could also be initially released under Service and state approved management agreements with private landowners or Service-approved management agreements with tribal governments. Zone 2 would include the area of the MWEPA not included in Zone 1or 3 south of I-40 to the international border with Mexico Zone 3 is an area within the MWEPA where Mexican wolves would be allowed to	X		X	

	Alternative			
	One (Proposed Action and Preferred Alternative)	**Two**	**Three**	**Four (No Action)**
disperse into and occupy but neither initial releases nor translocations would occur. Zone 3 is an area of less suitable Mexican wolf habitat where Mexican wolves would be more actively managed under the authorities of the proposed rule to reduce human conflict. Zone 3 would include the area of the MWEPA not included in Zone1 or 2 south of I-40 to the international border with Mexico.				
Designate three wolf management zones within the expanded MWEPA and discontinue the designation of the BRWRA: Zone 1 is an area within the MWEPA where Mexican wolves would be allowed to occupy and where wolves may be initially released or translocated. Zone 1 would include all of the Apache and Gila National Forests (the existing BRWRA). Zone 2 is an area within the MWEPA where Mexican wolves would 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 would be limited to pups less than five months old to allow for the cross-fostering of pups from the captive population into the wild, and to enable 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 could also be initially released under Service and state approved management agreements with private landowners or a Service approved management agreements with tribal governments. Zone 2 would include the area of the MWEPA not included in Zone 1or 3 south of I-40 to the international border with Mexico Zone 3 is an area within the MWEPA where Mexican wolves would be allowed to disperse into and occupy but neither initial releases nor translocations would occur. Zone 3 is an area of less suitable Mexican wolf habitat where Mexican wolves would be more actively managed under the authorities of the proposed rule to reduce human conflict. Zone 3 would include the area of the MWEPA not included in Zone 1 or 2 south of I-40 to the international border with Mexico.		X		

	Alternative			
	One (Proposed Action and Preferred Alternative)	**Two**	**Three**	**Four (No Action)**
Allow initial release of Mexican wolves throughout the entire Zone 1.		X	X	
Allow Mexican wolves to disperse naturally from Zone 1 into, and within the MWEPA (Zones 2 and 3) and occupy the MWEPA (Zones 1, 2 and 3).		X	X	
Allow the translocation of wolves at selected release sites on federal land within Zones 1 and 2 of the MWEPA.		X	X	
Allow wolves to occupy federal and non-federal land in the MWEPA except in the case of depredation or other nuisance behavior that cannot be effectively managed through non-removal techniques.	X	X	X	
Capture and remove wolves on tribal land if requested by the tribal government.	X	X	X	
Implement a phased management approach so that in: • Phase 1: Initial release 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 Zone 1 into, and within the MWEPA (Zones 2 and 3) 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. • Phase 2: If determined to be necessary by either the 5-Year or 8-Year evaluation: initial release 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 Zone 1 into, and within the MWEPA (Zones 2 and 3) and occupy the MWEPA (Zones 1, 2 and 3) **with the exception** of those areas in Zone 2 west of State	X			

	Alternative			
	One (Proposed Action and Preferred Alternative)	**Two**	**Three**	**Four (No Action)**
Highway 89 in Arizona. • Phase 3: If determined to be necessary by the 5-Year or 8- Year evaluation: Initial release of Mexican wolves can occur throughout the entire Zone 1 **including** the area west of State Highway 87 in Arizona; no translocations can be conducted west of State Highway 89 in Arizona; Mexican wolves can disperse naturally from Zone 1 into, and within the MWEPA (Zones 2 and 3) and occupy the MWEPA (Zones 1, 2 and 3). • Year 12 and beyond: Phased management approach ends: Initial release of Mexican wolves can occur throughout entire Zone 1; Translocations can be conducted at selected translocation sites on federal land and on non-federal private and tribal land with voluntary management agreements within Zones 1 and 2 of the MWEPA. Mexican wolves can disperse naturally from Zone 1 into, and within the MWEPA (Zones 2 and 3) and occupy the MWEPA (Zones 1, 2 and 3).				
Revise the regulations for the take of Mexican wolves on federal and non-federal land within the MWEPA (Zones 1, 2 and 3): - Revise the conditions that determine when we would issue a permit to allow livestock owners or their agents to take (including intentional harassment or kill) any Mexican wolf that is in the act of biting, wounding or killing livestock on federal land; - Allow domestic animal owners or their agents to take (including kill or injure) any Mexican wolf that is in the act of biting or killing domestic animals on non-Federal land anywhere in the MWEPA; - Pursuant to a removal action authorized by the Service or a designated agency, the Service or designated agency may issue permits to allow domestic animal owners or their agents (e.g., employees, land manager, local officials) to take (including intentional harassment or kill) any Mexican wolf that is present on non-federal land	X	X		

	Alternative			
	One (Proposed Action and Preferred Alternative)	**Two**	**Three**	**Four (No Action)**
where specified in the permit; and - Revise the conditions under which take will be authorized in response to unacceptable impacts of Mexican wolf predation on wild native ungulate herds. An unacceptable impact will be determined determined by a state agency based upon ungulate management goals,or; a 15 percent decline in an ungulate herd as documented by a State 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.				
Revise the regulations for the take of Mexican wolves on federal and non-federal land within the MWEPA (Zones 1, 2 and 3): - Maintain an experimental Mexican wolf population of 300 to 325 wolves in the MWEPA.	X			
Subject to Service and state approved management agreements develop and implement management actions on private land in management Zones 1 and 2 within the MWEPA by the Service or an authorized agency in voluntary cooperation with private landowners.	X	X	X	
Subject to agreements with tribal governments, the Service may develop and implement management actions on tribal trust land in management Zones 1 and 2 within the MWEPA in voluntary cooperation with tribal governments including but not limited to initial release, translocation onto Tribal trust lands, capture, and removal of Mexican wolves from Tribal trusts lands if requested by the tribal government.	X	X	X	
Revise and reissue the Mexican Wolf Recovery Program's section 10(a)(1)(A) research and recovery permit (TE-091551-8 dated 04/04/2013) so that it applies to both the MWEPA and areas outside of the MWEPA. Under this permit we would authorize removal of Mexican wolves that can be identified as coming from the experimental population that disperse to establish territories in areas outside of the MWEPA.	X	X	X	

SUMMARY OF ENVIRONMENTAL IMPACTS

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

Resource Area	Alternative One (Proposed Action)	Alternative Two	Alternative Three	Alternative Four (No Action)
Land Use	No significant adverse direct or indirect impacts in Zones 1-3	No significant adverse direct or indirect impacts in Zones 1-3	No significant adverse direct or indirect impacts in Zones 1-3	No significant adverse direct or indirect impacts
Biological Resources (vegetation)	No significant direct or indirect adverse impact in Zones 1-3	No significant adverse direct or indirect impacts in Zones 1-3	No significant adverse direct or indirect impacts in Zones 1-3	No significant adverse direct or indirect impacts
Biological Resources (wild ungulate prey)	No significant direct adverse impact in Zones 1-3 with mitigation. No significant direct adverse impact Zone 3.	No significant direct adverse impact in Zones 1-3 with mitigation. No significant impact Zone 3.	Less than significant direct adverse impact Zones 1 and 2. No significant direct adverse impact Zone 3.	Less than significant direct adverse impacts in the BRWRA.
Biological Resources (other predator, scavenger and non-ungulate wild prey species) including special status and listed T/E species)	No significant impacts to other predators or non-ungulate wild prey in Zones 1-3. Less than significant beneficial impact to scavengers in Zones 1 and 2.	No significant impacts to other predators or non-ungulate wild prey in Zones 1-3. Less than significant beneficial impact to scavengers in Zones 1 and 2.	No significant impacts to other predators or non-ungulate wild prey in Zones 1-3. Less than significant beneficial impact to scavengers in Zones 1 and 2.	Less than significant direct and indirect adverse impact in the BRWRA.
Biological Resources (special status and listed T/E species)	No significant impact in Zones 1-3	No significant impact in Zones 1-3	No significant impact in Zones 1-3	No significant impact
Biological Resources (listed T/E species: the Mexican wolf experimental population and subspecies)	Significant beneficial impact	Significant beneficial impact	Significant beneficial impact	Significant direct and indirect adverse impact

Resource Area	Alternative One (Proposed Action)	Alternative Two	Alternative Three	Alternative Four (No Action)
Economic Activity (ranching /livestock production)	Less than significant direct adverse impact in Zones 1 and 2; no significant adverse direct or indirect impact in Zone 3	Less than significant direct adverse impact in Zones 1 and 2; no significant adverse direct or indirect impact in Zone 3	Less than significant direct adverse impact in Zones 1 and 2; no significant adverse direct or indirect impact in Zone 3	Less than significant direct adverse impact in the BRWRA
Economic Activity (hunting)	No significant adverse direct or indirect impacts in Zones 1-3 with mitigation	No significant adverse direct or indirect impacts in Zones 1-3 with mitigation	Less than significant adverse indirect impacts in Zones 1-2; no significant adverse direct or indirect impact in Zone 3.	Less than significant adverse indirect impacts in the BRWRA.
Economic Activity (tourism and outdoor recreation)	No significant beneficial impact	No significant beneficial impact	No significant beneficial impact	No significant beneficial impact
Human Health/Public Safety	No significant adverse direct or indirect impact in Zones 1-3	No significant adverse direct or indirect impact in Zones 1-3	No significant adverse direct or indirect impact in Zones 1-3	No significant adverse direct or indirect impact
Environmental Justice	Mitigated less than significant disproportionately high and adverse impacts to population groups of concern	Mitigated less than significant disproportionately high and adverse impacts to population groups of concern	Mitigated less than significant disproportionately high and adverse impacts to population groups of concern	Mitigated less than significant disproportionately high and adverse impacts to population groups of concern
Cumulative Impacts	No significant adverse cumulative impacts on wild prey (elk). No significant cumulative beneficial effects on other wildlife species (scavengers). No significant beneficial	No significant adverse cumulative impacts on wild prey (elk). No significant cumulative beneficial effects on other wildlife species (scavengers). No	No significant adverse cumulative impacts on wild prey (elk). No significant cumulative beneficial effects on other wildlife species (scavengers). No	N/A

Resource Area	Alternative One (Proposed Action)	Alternative Two	Alternative Three	Alternative Four (No Action)
	cumulative impact on the federally listed Mexican wolf or experimental population. Less than significant adverse cumulative impacts on ranching/livestock production.	significant beneficial cumulative impact on the federally listed Mexican wolf or experimental population. Less than significant adverse cumulative impacts on ranching/livestock production.	significant beneficial cumulative impact on the federally listed Mexican wolf or experimental population. Less than significant adverse cumulative impacts on hunting and ranching/livestock production.	
Relationship Between Short-Term Uses of Man's Environment and the Maintenance 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.	N/A
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.	N/A

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LIST OF FIGURES AND TABLES

LIST OF ACRONYMS AND ABBREVIATIONS

3-Year Review	Mexican Wolf Recovery: Three Year Program Review and Assessment
5-Year Review	Mexican Wolf Blue Range Reintroduction Project 5-Year Review
ADG	Average Daily Weight Gain
AGFD	Arizona Game and Fish Department
AMOC	Adaptive Management Oversight Committee
AMOC and IFT	Adaptive Management Oversight Committee and Interagency Field Team, commonly used as a literature citation referencing these committees as authors of sections of the 5-Year Review, including the Technical Component (TC), Administrative Component (AC), or AMOC Recommendations Component (ARC)
APA	Administrative Procedures Act of 1946
AUM	Animal Unit Month
AZA	Association of Zoos and Aquariums
BAE	Biological Assessment and Evaluation
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)
CCP	Comprehensive Conservation Plan
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CONANP	Comisión Nacional de Areas Naturales Protegidas
CWD	Chronic Wasting Disease
DEIS	Draft Environmental Impact Statement
DOA	Department of Agriculture
DOD	Department of Defense
DOE	Department of Energy
DOI	Department of Interior
Defenders	Defenders of Wildlife
DPS	Distinct Population Segment
EOY	End-of-year, typically referring to our annual population count
EIS	Environmental Impact Statement
EPA	U.S. Environmental Protection Agency

ESA	Endangered Species Act of 1973, as amended
FAIR	Fort Apache Indian Reservation of the White Mountain Apache Tribe
FEA	Final Environmental Assessment
FEIS	Final Environmental Impact Statement
Final Rule	Final "nonessential experimental population" or "10(j)" rule of 1998 for Mexican wolf reintroduction in Arizona and New Mexico, 50 CFR 17.84(k)
FLPMA	Federal Land Policy and Management Act
FR	Federal Register
GMP	General Management Plan
GMU	Game Management Unit
GYA	Greater Yellowstone Area
HM	Head Month
IFT	Interagency Field Team (for the Reintroduction Project
INRMP	Integrated Natural Resource Management Plan
IPT	Interdisciplinary Project Team
IRA	Inventoried Roadless Area
LRMP	Land and Resource Management Plan
MWEPA	Mexican Wolf Experimental Population Area
NASS	National Agricultural Statistics Service
NEPA	National Environmental Policy Act of 1969
NF	National Forest
NFMA	National Forest Management Act
NHPA	National Historic Preservation Act of 1966
NMDGF	New Mexico Department of Game and Fish
NPS	National Park Service
Northern Rockies	USFWS gray wolf recovery program administered out of the Mountain-Prairie Region (Region 6) and Pacific Region (Region 1)
NRM	Northern Rocky Mountain
NWR	National Wildlife Refuge
OMB	White House Office of Management and Budget
PDEA	Preliminary Draft Environmental Assessment
PRZ	Primary Recovery Zone
RACR	Roadless Area Conservation Rule
RD	Ranger District

Reintroduction Project	Mexican Wolf Reintroduction Project
Recovery Program	Mexican Wolf Recovery Program
RMP	Resource Management Plan
SCAR	San Carlos Apache Reservation
SEMARNAT	Secretaría de Medio Ambiente y Recursos Naturales
SOP	Standard Operating Procedure for the Reintroduction Project
SRZ	Secondary Recovery Zone
SSP	Species Survival Program
TES	Threatened Endangered Species
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
USFS	U.S. (Department of Agriculture) Forest Service
USFWS or Service	US Fish and Wildlife Service
WGL	Western Great Lakes
WMAT	White Mountain Apache Tribe
WSMR	White Sands Missile Range
WSWRA	White Sands Wolf Recovery Area
WUI	Wildland Urban Interface

LIST OF DEFINITIONS

Active den means a den or a specific site above or below ground that is used by Mexican wolves on a daily basis to bear and raise pups, typically between on or about April 1 and July 31. More than one den site may be used in a single season.

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 activity means any activity on Federal lands within a 1-mi (1.6-km) radius around release pens when Mexican wolves are in them, around active dens between April 1 and July 31, and around active Mexican wolf rendezvous sites between June 1 and September 30, that the Service determines could adversely affect reproductive success, natural behavior, or persistence of Mexican wolves. Such activities may include, but are not limited to—timber or wood harvesting, prescribed fire, mining or mine development, camping outside designated campgrounds, livestock husbandry activities (e.g. livestock drives, roundups, branding, vaccinating, etc.), off-road vehicle use, hunting, and any other use or activity with the potential to disturb wolves. The following activities are specifically excluded from this definition:

(i) Lawfully present livestock and use of water sources by livestock;

(ii) Livestock drives if no reasonable alternative route or timing exists;

(iii) Vehicle access over established roads to non-Federal land where legally permitted activities are ongoing if no reasonable alternative route exists;

(iv) Use of lands within the National Park or National Wildlife Refuge Systems as safety buffer zones for military activities and Department of Homeland Security border security activities;

(v) Fire-fighting activities associated with wildfires; and

(vi) Any authorized, specific land use that was active and ongoing at the time Mexican wolves chose to locate a den or rendezvous site nearby.

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.

Feral dog means any dog (*Canis familiaris*) or wolf–dog hybrid that, because of absence of physical restraint or conspicuous means of identifying it at a distance as non-feral, is reasonably thought to range freely without discernible, proximate control by any person. Feral dogs do not include domestic dogs that are penned, leashed, or otherwise restrained (e.g., by shock collar) or which are working livestock or being lawfully used to trail or locate wildlife.

Harass means intentional or negligent actions or omissions that create the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt normal behavioral patterns, which include, but are not limited to, breeding, feeding, or sheltering.

In the act of biting, killing, or wounding means grasping, biting, wounding, or feeding upon a live domestic animal on non-Federal land or live livestock on Federal land. The term does not include a Mexican wolf feeding on an animal carcass.

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.

Intentional harassment means deliberate, pre-planned harassment of Mexican wolves, including by less-than-lethal means (such as 12-gauge shotgun rubber-bullets and bean-bag shells) designed to cause physical discomfort and temporary physical injury, but not death. Intentional harassment includes situations where the Mexican wolf or wolves may have been unintentionally attracted, or intentionally tracked, waited for, chased, or searched out; and then harassed. Intentional harassment of Mexican wolves is only allowed under a permit issued by the Service or its designated agency.

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) (definition from 1998 Final Rule) means an area in Arizona and New Mexico that lies south of Interstate Highway 40 to Interstate Highway 10 into which Mexican wolves are allowed to disperse from the blue Range Wolf Recovery Area and establish, but are managed by reducing conflicts with humans and land uses through such means as hazing, trapping, translocations, and removals. Under the proposed action and action alternatives 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.

Opportunistic harassment means scaring any Mexican wolf from the immediate area by taking actions such as discharging firearms or other projectile-launching devices in proximity to, but not in the direction of, the wolf, throwing objects at it, or making loud noise in proximity to it. Such harassment might cause temporary, non-debilitating physical injury, but is not reasonably anticipated to cause permanent physical injury or death. Opportunistic harassment of Mexican wolves can occur without a permit issued by the Service or its designated agency.

Problem wolves mean Mexican wolves that, for purposes of management and control by the Service or its designated agent(s), are:

(i) Individuals or members of a group or pack (including adults, yearlings, and pups greater than 4 months of age) that were directly involved in a depredation on lawfully present domestic animals;

(ii) Habituated to humans, human residences, or other facilities regularly occupied by humans; or

(iii) Unprovoked and aggressive towards humans.

Rendezvous site means a gathering and activity area regularly used by Mexican wolf pups after they have emerged from the den. Typically, these sites are used for a period ranging from about 1 week to 1 month in the first summer after birth during the period from June 1 to September 30. Several rendezvous sites may be used in succession within a single season.

Service-approved management plan means management plans approved by the Regional Director or Director of the Service through which Federal, State, or tribal agencies may become a designated agency. The management plan must address how Mexican wolves will be managed to achieve conservation goals in compliance with the Act, the experimental population rule, and other Service policies. If a Federal, State, or tribal agency becomes a designated agency through a Service-approved management plan, the Service will help coordinate their activities while retaining authority for program direction, oversight, guidance, and authorization of Mexican wolf removals.

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 shall 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.

Unacceptable impacts from wolf predation on game populations (definition from 1998 Final Rule) means two consecutive years with a cumulative 35 percent decrease in population or hunter harvest estimates for a particular species of ungulate in a game management unit or distinct herd segment compared to the pre-wolf 5-year average (unit or herd must contain average of greater than 10 animals). If wolf predation is shown to be a primary cause of ungulate population declines (greater than 50 percent of documented adult or young mortality), then wolves may be moved to reduce ungulate mortality rates and assist in herd recovery, but only in conjunction with application of other common, professionally acceptable, wildlife management techniques.

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. Taking a Mexican wolf by poisoning or shooting will not be considered unintentional take.

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

Wounded means exhibiting scraped or torn hide or flesh, bleeding, or other evidence of physical damage caused by a Mexican wolf bite.

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1 INTRODUCTION, PURPOSE, AND NEED FOR ACTION

This Environmental Impact Statement (EIS) has been prepared by the Department of Interior, United States Fish and Wildlife Service (USFWS) 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.

1.1 INTRODUCTION

The Mexican wolf (*Canis lupus baileyi*) (also known as the Mexican gray wolf) is listed as an endangered species protected by the Endangered Species Act of 1973, as amended (ESA, the Act). Efforts to reestablish the Mexican wolf in the wild are being conducted in both the United States and Mexico. In the United States the U.S. Fish and Wildlife Service (USFWS, we, us, the Service) is the Federal agency responsible for the recovery of the Mexican wolf. Under section 10(j) of the Act and our regulations at 50 CFR 17.81, 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. We established regulations for the experimental population of Mexican wolves in our Final 10(j) Rule entitled "*Establishment of a Nonessential Experimental Population of the Mexican Gray Wolf in Arizona and New Mexico*" (63 FR 1752, January 12, 1998, "1998 Final Rule"). This rule provides the regulatory guidelines under which the Mexican Wolf Reintroduction Project operates.

In 1998 we began reintroducing captive-bred Mexican wolves into the wild in the Blue Range Wolf Recovery Area (BRWRA) in Arizona and New Mexico as part of our strategy to recover the Mexican wolf. The BRWRA is part of the larger Mexican Wolf Experimental Population Area (MWEPA). The BRWRA consists of the entire Gila and Apache National Forests in east-central Arizona and west-central New Mexico. The MWEPA is a larger area surrounding the BRWRA that extends from Interstate Highway 10 to Interstate Highway 40 across Arizona and New Mexico and includes a small portion of Texas north of U.S. Highway 62/180 (63 FR 1752, January 12, 1998). The Mexican Wolf Recovery Program's Section 10(a)(1)(A) research and recovery permit (TE-091551-8 dated 04/04/2013) issued under 50 CFR 17.32 covers management activities for the nonessential experimental population of Mexican wolves. Authorized permittees may take any Mexican wolf in the nonessential experimental population in a manner consistent with a USFWS-approved management plan or special management measure adopted by the USFWS pursuant to the provisions of 50 CFR 17.84(k)(3)(ix), as well as to conduct activities related directly to the conservation, protection, and recovery of reintroduced nonessential experimental populations of Mexican gray wolves within Arizona and New Mexico.

The Service proposes to revise the regulations established in our 1998 Final Rule for the nonessential experimental population of the Mexican wolf. We also propose to extend the authority of the Mexican Wolf Recovery Program's Section 10(a)(1)(A) research and recovery permit to areas that are outside of the MWEPA. In this EIS we analyze the environmental consequences of a range of alternatives, including the Proposed Action and No Action alternative, for our proposal. The action would be implemented through a final nonessential experimental rule, a revised Section 10(a)(1)(A) research and recovery permit and the provision of federal funding.

1.1.1 Regulatory Background

The Mexican wolf was listed as an endangered subspecies (*Canis lupus baileyi*) on April 28, 1976 (41 FR 17740). The entire gray wolf species (*Canis lupus)* in North America south of Canada was listed as endangered on March 9, 1978, except in Minnesota where it was listed as threatened (43 FR 9607). Although this listing of the gray wolf species subsumed the previous Mexican wolf subspecies listing, the rule stated that the USFWS would continue to recognize valid biological subspecies for purposes of research and conservation (43 FR 9607). On August 4, 2010, we published a 90-day finding on two petitions to list the Mexican wolf as an endangered subspecies with critical habitat (75 FR 46894). In the 90-day finding, we determined that the petitions presented substantial scientific information that the Mexican wolf may warrant reclassification as a subspecies or Distinct Population Segment (DPS). As a result of this finding, we initiated a status review. On October 9, 2012, we published our 12-month finding in the Federal Register (77 FR 61375) stating that the listing of the Mexican wolf as a subspecies or DPS was not warranted at that time because Mexican wolves already receive the protections of the Act under the species-level gray wolf listing of 1978. During 2011 and 2012, we conducted a 5-year review of the gray wolf finding that the entity currently described on the List of Endangered and Threatened Wildlife should be revised to reflect the distribution and status of gray wolf populations in the lower 48 States and Mexico by removing all areas currently included in its range, as described in the CFR, except where there is a valid species, subspecies, or DPS that is threatened or endangered (USFWS 2012).

On June 13, 2013 we published a proposed rule (*Proposed Revision to the Nonessential Experimental Population of the Mexican Wolf*, 78 FR 35719) (proposed 10(j) rule) for the Mexican wolf nonessential experimental population in Arizona and New Mexico. This action was taken in coordination with our proposed rule, published on the same date in the Federal Register**,** to list the Mexican wolf as an endangered subspecies and delist the gray wolf [*Removing the Gray Wolf (Canis lupus) From the List of Endangered and Threatened Wildlife and Maintaining Protections for the Mexican Wolf (Canis lupus baileyi) by Listing It as Endangered (*78 FR 35664)]. We published the proposed 10(j) rule to associate the nonessential experimental population of Mexican wolves with the Mexican wolf subspecies listing, if finalized, rather than with the listing of the gray wolf at the species level and because we are proposing revisions to the current Mexican wolf nonessential experimental population regulations. Following review of public comments submitted on the proposed 10(j) rule, we published a revised proposed rule (*Proposed Revision to the Nonessential Experimental Population of the Mexican Wolf*, 79 FR 43358) (revised proposed 10(j) rule) on July 25, 2014. In the same Federal Register notice we announced the availability of a Draft Environmental Impact Statement (DEIS) for the *Proposed Revision to the Nonessential Experimental Population of the Mexican Wolf (Canis lupus baileyi).*

1.1.2 Previous Environmental Review

The environmental effects of the reintroduction of the Mexican wolf have been previously analyzed in the following National Environmental Policy Act (NEPA) documents:

- Final Environmental Impact Statement (FEIS) for the Reintroduction of the Mexican Wolf within its Historic Range in the Southwestern United States. November 06, 1996 (USFWS 1996).
- Final Environmental Assessment (FEA) for the Translocation of Mexican Wolves Throughout the Blue Range Wolf Recovery Area in Arizona and New Mexico. February 10, 2000 (USFWS 2000).
- Decision Memo, Mexican Wolf Reintroduction, Pen Installation and Associated Temporary Camp at Twenty-two Release Sites, 2008-2012. USDA Forest Service, Apache-Sitgreaves National Forest. February 18, 2009 (USFS 2009).
- Decision Memo, Installation of Temporary Mexican (Gray) Wolf Holding Pens, USDA Forest Service, Gila National Forest. March 16, 2006 (USFS 2006).

These documents are incorporated, where appropriate, by reference into this Environmental Impact Statement (CEQ, Sec 1502.21) in an effort 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).

1.1.3 Description of the Mexican Wolf

The Mexican wolf is the rarest, southern-most occurring, and most genetically distinct subspecies of all the North American gray wolves (Parsons 1996, Wayne and Vilá 2003, Leonard et al. 2005). The distinctiveness of the Mexican wolf and its recognition as a subspecies is supported by both morphometric (physical measurements) and genetic evidence (78 FR 35664, June 13, 2013). Mexican wolves tend to be patchy black, brown to cinnamon, and cream in color and are somewhat smaller than other gray wolves (Figure 1-1). Adults are about five feet (1.5 meters) in length and generally weigh between 50-90 pounds (23-41 kilograms) with a height at the shoulder of approximately 2-2.5 feet (0.6-0.8 meters) (78 FR 35664, June 13, 2013).

(Credit: Jacquelyn M. Fallon)

Figure 1-1. Mexican wolves

Mexican wolves historically inhabited montane woodlands and adjacent grasslands in northern Mexico, New Mexico, Arizona, and the Trans-Pecos region of western Texas (Brown 1988) at elevations of 4000-5000 ft. where ungulate prey were numerous (Bailey 1931). The subspecies may have also ranged north into southern Utah and southern Colorado within zones of intergradation where interbreeding with other gray wolf subspecies may have occurred (Parsons 1996, Leonard et al. 2005).

Numbering in the thousands before European settlement, Mexican wolf populations declined rapidly in the 20th century primarily due to concerted Federal, state, and private predator control and eradication efforts (Mech and Boitani 2003). By the early 1970s, the Mexican wolf was considered extirpated from its historical range in the southwestern United States (USFWS 1982). No Mexican wolves were known to exist in the wild in the United States or Mexico from 1980 until the beginning of our Reintroduction Project in 1998 (USFWS 2010).

1.1.4 Description of the Mexican Wolf Recovery Program

The Service has been engaged in efforts to conserve and ensure the survival of the Mexican wolf for over three decades. The first Mexican Wolf Recovery Team was formed in 1979, and the United States and

Mexico signed the Mexican Wolf Recovery Plan in September 1982. The 1982 Mexican Wolf Recovery Plan did not provide recovery/delisting criteria, but did provide a prime objective:

"*To conserve and ensure the survival of Canis lupus baileyi by maintaining a captive breeding program and re-establishing a viable, self-sustaining population of at least 100 Mexican wolves in the middle to high elevations of a 5,000 square mile area within the Mexican wolf's historic range"* (USFWS 1982).

This prime objective has since guided the reintroduction effort for the Mexican wolf in the United States under the auspices of the Mexican Wolf Recovery Program.

The current management structure of the Mexican wolf recovery effort distinguishes between the Service's Mexican Wolf Recovery Program (Recovery Program) and the interagency Mexican Wolf Blue Range Reintroduction Project (Reintroduction Project). The Recovery Program encompasses captive breeding, reintroduction, and all related conservation activities for the Mexican wolf (USFWS 2010). The primary statute governing the Mexican Wolf Recovery Program is the Endangered Species Act. Section 4(f)(1) of the ESA states that the Secretary of the Interior shall develop and implement recovery plans for the conservation and survival of endangered species. Guidance for the specific activities conducted under the Mexican Wolf Recovery Program is provided within several documents including: (1) the 1982 Mexican Wolf Recovery Plan (USFWS 1982); (2) the 1996 Final Environmental Impact Statement (FEIS) (USFWS 1996) (3) the 1998 Final Rule; (4) the 1998 Mexican Wolf Interagency Management Plan (USFWS 1998); and (5) Federal Fish and Wildlife Permit number TE091551-8, dated 04 April 2013, issued under 50 CFR 17.32. The programmatic permit covers management activities for nonessential experimental wolves in Arizona and New Mexico (USFWS 2013a). The Reintroduction Project encompasses the management activities associated with the experimental population.

A comprehensive description of the Recovery Program and the Reintroduction Project is provided in the 2010 Mexican Wolf Conservation Assessment (USFWS 2010) and in annual reports available online at http://www.fws.gov/southwest/es/mexicanwolf/.

1.1.4.1 Captive Breeding Program

A binational captive-breeding program between the United States and Mexico was initiated in the late 1970s with the capture of the last remaining Mexican wolves in the wild. Referred to as the Mexican Wolf Species Survival Plan (SSP) the captive breeding program's ultimate objective is to provide healthy offspring for release into the wild (Figure 1-2), while conserving the Mexican wolf subspecies genome (Lindsey and Siminski 2007). The establishment and success of the captive breeding program temporarily prevented immediate absolute extinction of the Mexican wolf and, by producing surplus animals, has enabled us to undertake the reestablishment of the Mexican wolf in the wild (USFWS 2010, 78 FR 35664, June 13, 2013). The wolves in the captive population are the only source of animals for release into the wild. All Mexican wolves alive today originated from three lineages (Ghost Ranch, Aragon and McBride) consisting of a total of seven wolves. From the breeding of these original seven "founding" Mexican wolves and generations of their offspring, the captive population has expanded to its current (July 2014) size of 248 wolves in 55 facilities (Figure 1-3) in the United States and Mexico (Siminski and Spevak 2013). The small number of founders upon which the existing Mexican wolf population was established has resulted in pronounced genetic challenges, including inbreeding (mating of related individuals), loss of heterozygosity (a decrease in the proportion of individuals in a population that have two different alleles for a specific gene), and loss of adaptive potential (the ability of populations to maintain their viability when confronted with environmental variations) (Fredrickson et. al 2007, 78 FR 35664, June 13, 2013).

(Credit: U.S. Fish and Wildlife Service)

Figure 1-2. Saddle Pack litter at the Sevilleta Wolf Management Facility Facility

(Credit: U.S. Fish and Wildlife Service)

Figure 1-3. The Sevilleta Wolf Management Facility

1.1.4.2 The Mexican Wolf Blue Range Reintroduction Project

The Mexican Wolf Blue Range Wolf Reintroduction Project (Reintroduction Project) has been working to restore a self-sustaining population of "at least 100" wild Mexican wolves distributed over 5,000 square miles (12,950 km²) of the Blue Range Wolf Recovery Area (BRWRA), consistent with the prime objective of the 1982 Mexican Wolf Recovery Plan (USFWS 1982, Paquet et al. 2001). The Reintroduction Project is a collaborative effort among Federal, state, county, and tribal agencies that: (a) have regulatory jurisdiction and management authority over Mexican wolves or the lands that Mexican wolves occupy in Arizona and New Mexico; or (b) are responsible for representing constituency interests while striving to make reintroduction compatible with current and planned human activities, such as livestock grazing and hunting (MOU 2010).

Under the provisions of the 1998 Final Rule we established two recovery areas, the BRWRA and the White Sands Wolf Recovery Area (WSWRA), within the Mexican Wolf Experimental Population Area (MWEPA) (Figure 1-4). We designated primary recovery zones within each of these recovery areas where the initial release of Mexican wolves from captivity to the wild is authorized. Natural dispersal and translocations (re-release of wolves with previous wild experience) are allowed throughout the recovery areas. Wolves which establish territories wholly outside of the recovery areas must be captured and returned or placed in captivity (63 FR 1752, January 12, 1998). In collaboration with our partners in the Reintroduction Project, we began reintroducing Mexican wolves into the BRWRA in 1998. In 2000, the

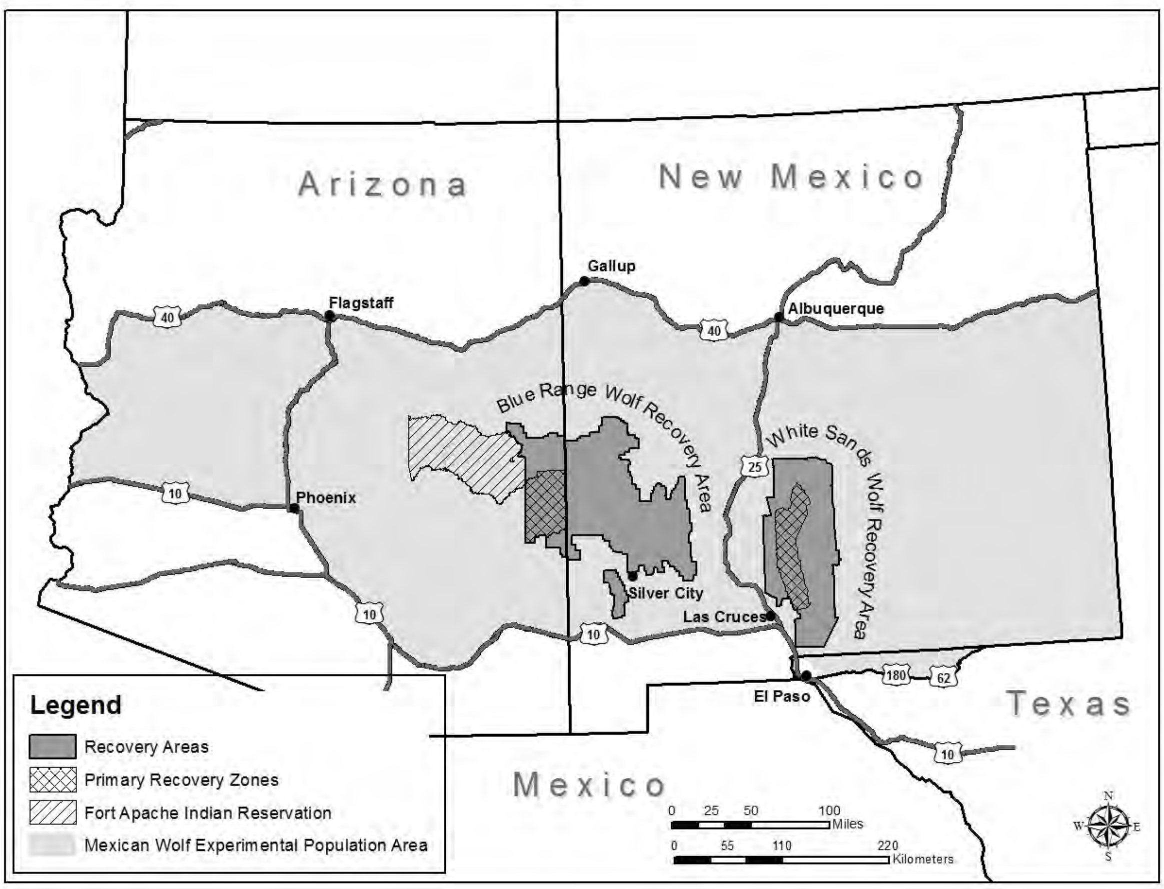


Figure 1-4. Geographic boundaries for the nonessential experimental population of the Mexican wolf as established under the 1998 Final Rule.

White Mountain Apache Tribe (WMAT) agreed to allow free-ranging Mexican wolves to inhabit the Fort Apache Indian Reservation (FAIR). Continued occupancy of Mexican wolves on the FAIR is dependent upon tribal agreement. We have only released Mexican wolves into the BRWRA and the FAIR. We have never utilized the WSWRA for the release of wolves.

(Credit: U.S. Fish and Wildlife Service)

Figure 1-5. Blue Range Wolf Recovery Area sign

The BRWRA is located wholly within the Apache and Gila National Forests in east-central Arizona and west-central New Mexico. It encompasses 7,212 square miles (mi^2) (18,679 square kilometers (km^2)). The adjoining FAIR provides an additional 2,627 mi^2 (6,804 km^2) for wolf occupancy and releases subject to tribal agreement. The BRWRA is characterized by mixed conifer forests (Figure 1-6) in the higher elevations and semi-desert grasslands in the lower elevations, with ponderosa pine (*Pinus ponderosa*) forests dominating the area in between (USFWS 1996).

(Credit: Jacquelyn M. Fallon)

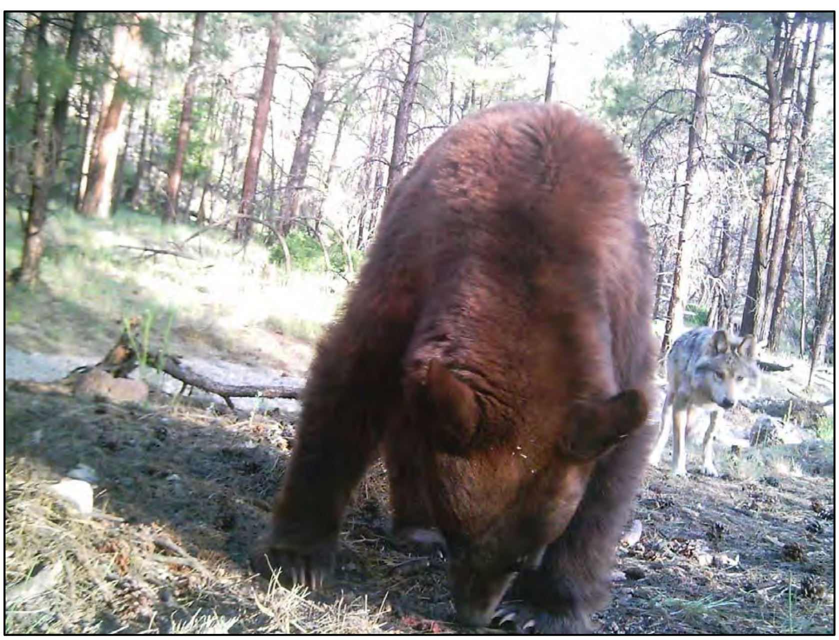
Figure 1-6. Mixed conifer forest within the Blue Range Wolf Recovery Area

Potential native ungulate prey of Mexican wolves within the BRWRA include elk (*Cervus elaphus*) (Figure 1-7), white-tailed deer (*Odocoileus virginianus*), mule deer (*O. hemionus*), and to a lesser extent, pronghorn antelope (*Antilocapra americana*), javelina (*Tayassu tajacu*), and Rocky Mountain bighorn sheep (*Ovis canadensis*) (Parsons 1996). Other sources of prey include small mammals and birds (Reed et. al 2006).

(Credit: U.S. Fish and Wildlife Service)

Figure 1-7. Elk in the Blue Range Wolf Recovery Area

Other large predators in the BRWRA include coyotes (*Canis latrans*), cougars (*Puma concolor*), and black bears (Figure 1-8) (*Ursus americanus*) (USFWS 1996).



(Credit: Mexican Wolf Interagency Field Team)

Figure 1-8. Black bear and Mexican wolf in the Blue Range Wolf Recovery Area

Cattle and sheep grazing are permitted within the BRWRA; some allotments are grazed year-round. The actual numbers of cattle (Figure 1-9) and sheep varies each year relative to environmental factors and are generally lower under drought conditions.

More information on the BRWRA is provided in Chapter 3 and can be found in the 5-Year Review (AMOC and IFT 2005) and the 1996 Final Environmental Impact Statement (USFWS 1996).

(Credit: Mexican Wolf Interagency Field Team)

Figure 1-9. Cattle grazing in the Blue Range Wolf Recovery Area

Nonessential experimental status, as established by the 1998 Final Rule, allows for the reintroduction and ongoing management of wolves, including relaxing prohibitions on take (see the definition of "take" provided in the Definition of Terms), removal of problem wolves, and the translocation of wolves within the BRWRA. An Interagency Field Team (IFT), consisting of field staff from the Service and our partner agencies, carries out the majority of the routine management activities of the Reintroduction Project. The IFT has the primary responsibilities of collecting data, monitoring (Figure 1-10), and managing the experimental Mexican wolf population. On a daily basis IFT management activities and field work may include:

<u>Monitoring individual wolves and pack movements</u>

Adult and juvenile wolves and pups of appropriate size and weight that are released from captivity or trapped in the wild are radio collared with a goal to maintain a minimum of two collared wolves per pack. Collared wolves are radio-tracked periodically from the ground and a minimum of once a week from the air (weather permitting). Locational data are entered into the Reintroduction Project's database to be correlated with reports for specific incidents (e.g., depredations, nuisance reports), management actions (e.g., captures, translocations, initial releases) and pack activities (e.g., denning, predation, mortalities).

<u>Depredation response, outreach and education</u>

In order to minimize the occurrence of depredation incidents and nuisance behavior IFT activities may include proactive outreach and education efforts with livestock producers and local residents. Response

(Credit: Mexican Wolf Interagency Field Team)

Figure 1-10. Helicopter count and capture methods

to reports of depredation incidents or nuisance behavior may include the use of non-lethal techniques such as: capture/radio collar; guard animals; fladry; taste aversion; harassment using scare devices and noise (e.g., cracker shells) and/or non-lethal munitions (e.g., rubber bullets, bean bag rounds, paintballs); den disturbance; manipulation of pack movements using food caches; and movement of cattle away from dens and rendezvous sites (Figure 1-11, Figure 1-12, Figure 1-13). If the problem persists or becomes chronic the wolf (or wolves) may be captured and translocated or removed to captivity. Lethal control may be used in accordance with approved management plans, protocols, and with the authorization of the Service's Mexican Wolf Recovery Coordinator.

(Credit: U.S. Fish and Wildlife Service)

Figure 1-11. Non-lethal munitions

(Credit: U.S. Fish and Wildlife Service)

Figure 1-12. Range rider, fladry and fencing

(Credit: Mexican Wolf Interagency Field Team)

Figure 1-13. Fladry and fencing

Initial releases and translocations

Wolves that are released from captivity or translocated may be transported by vehicle, all-terrain vehicle, mule, or helicopter to release areas (Figure 1-14). At the release sites approved by the U.S. Forest Service, IFT personnel may build temporary mesh or chain link paneled pens (Figure 1-15). Food caches may be maintained as necessary until the wolves leave the area or demonstrate their ability to hunt and provide for themselves in the wild. Personnel often camp near the release site to monitor the wolves.

(Credit: George Andrejko, Arizona Game and Fish Department)

Figure 1-14. Transport by mule into wilderness area release site

(Credit: Mexican Wolf Interagency Field Team)

Figure 1-15. Pair of Mexican wolves inside a modified soft release pen

Conduct research and collect information

These activities may include: aerial and ground telemetry monitoring; observation of wolves to obtain visual counts on pack size and composition (i.e. number of adults, juveniles, pups in a pack); depredation investigations; predation analysis; howling surveys; collection of biological data (blood, feces, physical measurements and examination); and collaboration with researchers for data collection and analysis on approved projects (Figure 1-16, Figure 1-17).

(Credit: Mexican Wolf Interagency Field Team)

Figure 1-16. A Mexican wolf being processed and fitted with a radio-telemetry collar

(Credit: Mexican Wolf Interagency Field Team)

Figure 1-17. Trail camera picture used for remote monitoring

We select wolves from the captive population for release to the wild based on several factors, including their genetic makeup, reproductive performance, behavior, physical suitability, and overall response to the adaptation process in pre-release facilities (Figure 1-18) (USFWS 2010). We conducted the initial release of 93 wolves from captivity into the Primary Recovery Zone (PRZ) of the BRWRA and the FAIR between 1998 and the end of 2013. The PRZ is approximately 1171 square miles (3033 km^2) in area, or approximately 16 percent of the entire BRWRA (Figure 1-4). It is situated entirely within the southern portion of the Apache National Forest in Arizona. The Secondary Recovery Zone (SRZ) encompasses all of the Gila National Forest in New Mexico and the northern part of the Apache National Forest in Arizona. It is the remainder of the BRWRA not included in the PRZ. Wolves released in the PRZ of the BRWRA or on the FAIR are allowed to naturally disperse into the SRZ.

(Credit: U.S. Fish and Wildlife Service)

Figure 1-18. Release of a collared Mexican wolf

We may translocate or temporarily place in captivity wild wolves for authorized management purposes such as: depredation behaviors that do not warrant removal from the BRWRA; nuisance behaviors that do not warrant removal from the BRWRA; boundary violations (e.g., wolves establishing territories wholly outside of the BRWRA or FAIR); necessary veterinary care; and facilitation of pair bonding. Wolves that we temporarily place in captivity may be translocated into the PRZ and SRZ of the BRWRA as well as the FAIR (contingent on WMAT concurrence); however, additional management considerations may prevent re-release of such animals (i.e. genetics, behavior). The Mexican Wolf Recovery Coordinator may authorize removals by lethal or non-lethal (capture and removal from the BRWRA) methods due to severe depredation or nuisance behavior. For the period 1998-2013, we permanently removed 36 wolves. This total includes 12 animals removed by lethal control. In summary, from 1998 to 2013 we released 93 wolves from captivity, permanently removed 36 wolves and conducted 124 temporary removals and 107 translocations (Table 1-1).

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

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
Total	93	36[1]	124[2]	107[2]

[1] Permanent removals include 12 animals removed by lethal control.
[2] Temporary removals in excess of translocations equal net loss to population of 17 animals.

The IFT conducts an end- of -year count each January in order to establish the minimum number of wolves in the experimental population (Figure 1-19). The Mexican wolf minimum population count was 83 wolves in 2013 (Table 1-2).

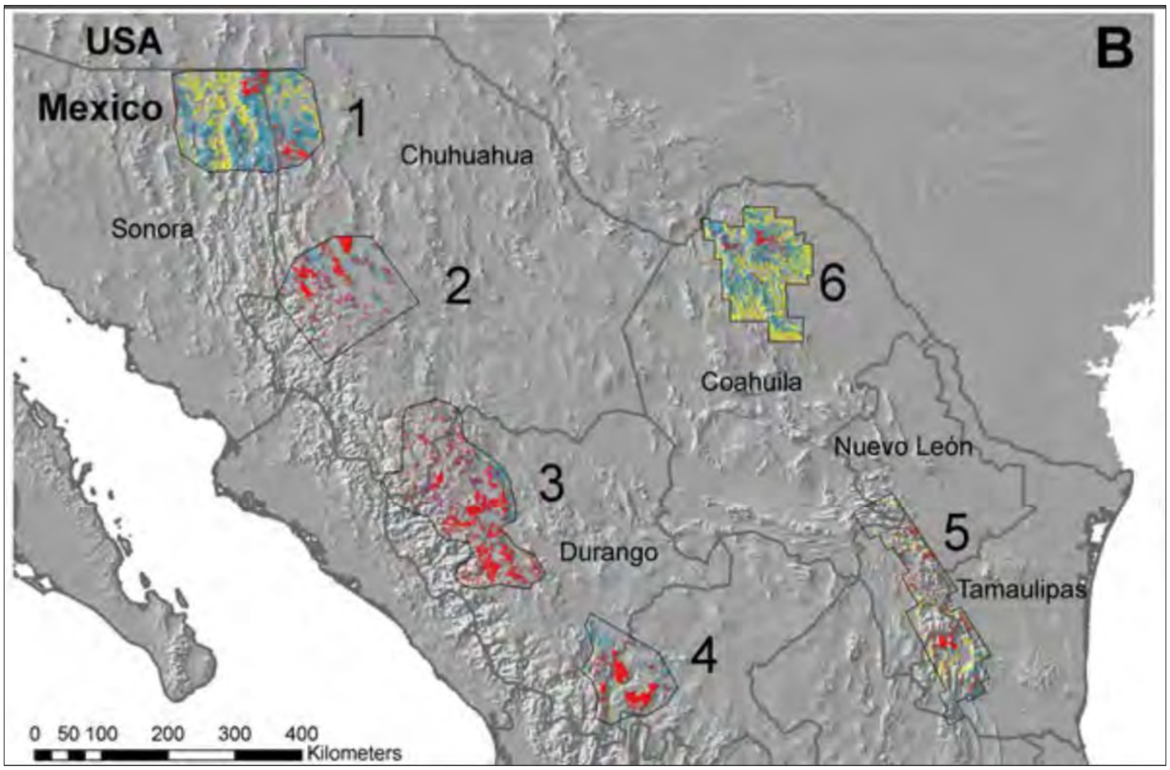
(Credit: Mexican Wolf Interagency Field Team)

Figure 1-19. Mexican wolves in the Blue Range Wolf Recovery Area observed from aircraft during January end of year count

1.1.5 Mexican Wolf Recovery in Mexico

Responsibility for the reintroduction of the Mexican wolf in Mexico is shared by two Federal agencies, Comisión Nacional de Areas Naturales Protegidas (CONANP) and Secretaría de Medio Ambiente y Recursos Naturales (SEMARNAT's) Dirección General de Vida Silvestre. In October 2011, Mexico initiated the reestablishment of Mexican wolves to the wild with the release of five captive-bred Mexican wolves into the San Luis Mountains just south of the U.S.–Mexico border. Mexico has continued to release animals into the wild during the past few years. Through August 2014, Mexico released a total of 14 adult Mexican wolves, of which 11 died or are believed dead, and 1 was removed for veterinary care. Of the 11 Mexican wolves that died or are believed dead: six were due to illegal killings (Four from poisoning and two were shot); one wolf was presumably killed by a mountain lion; three causes of mortality are unknown (presumed illegal killings because collars were found, but not the carcasses); and one disappeared (neither collar nor carcass has been found). The remaining two adult Mexican wolves were documented with five pups in 2014, marking the first successful reproductive event in Mexico.

The Mexican government has informed the Service of their plans to continue releases of Mexican wolves. Mortality due to illegal killing has resulted in setbacks to the reestablishment of a population of wolves in Mexico. However, with the likelihood of additional releases, we expect the number of Mexican wolves in the wild in Mexico to fluctuate from zero to several wolves or packs of wolves in or around Sonora, Chihuahua, or other Mexican States.



(Modified from Araiza et al. 2012)

Figure 1-20. Potential reintroduction areas in northern Mexico.

1, Sonora-Chihuahua; 2, Central Chihuahua; 3, Chihuahua-Durango; 4, Durango-Zacatecas; 5, Nuevo Leon-Tamaulipas; 6, Coahuila). Colored areas have intermediate probability of anthropogenic mortality within the reintroduction area. Red, Blue, and Yellow colors indicate high, intermediate and low quality habitat, respectively.

1.2 PURPOSE AND NEED FOR THE PROPOSED ACTION

We are proposing revisions to the regulations established for the Mexican wolf reintroduction in the 1998 Final Rule and the Mexican Wolf Recovery Program's section 10(a)(1)(A) research and recovery permit (TE-091551-8 dated 04/04/2013). The **purpose** of our proposed action is to further the conservation of the Mexican wolf by improving the effectiveness of the Reintroduction Project in managing the experimental population. We intend to do this by: (1) modifying the geographic boundaries in which Mexican wolves are managed south of Interstate-40 in Arizona and New Mexico under section 10(j) of the Endangered Species Act; (2) modifying the management regulations that govern the initial release, translocation, removal and take (see the definition of "take" provided in the List of Definitions) of Mexican wolves; and (3) issuing a section 10(a)(1)(A) permit for the MWEPA and areas outside of the MWEPA. Revisions to the 1998 Final Rule and the section 10(a)(1)(A) permit are **needed** because: (1) under the current regulations we will not be able to achieve the necessary population growth, distribution and recruitment that would contribute to the persistence of, and improve the genetic variation within, the experimental population; (2) there is a potential for Mexican wolves to disperse into southern Arizona and New Mexico from reintroduction areas in the states of Sonora and Chihuahua in northern Mexico; and (3) certain provisions lack clarity, are inadequate, and/or limit the efficacy and flexibility of our management of the experimental population of Mexican wolves.

1.2.1 Our Purpose: To Further the Conservation of the Mexican Wolf

The mission statement of the U.S. Fish and Wildlife Service is:

"Working with others, to conserve, protect, and enhance fish, wildlife, plants, and their habitats for the continuing benefit of the American people."

Under the provisions of the Endangered Species Act of 1973 (16 USC §1531-1544), as amended (ESA, the Act), we have primary responsibility for the conservation of terrestrial and freshwater organisms. Section 4(f)(1) of the ESA directs the Secretary of the Interior to "develop and implement recovery plans for the conservation and survival of endangered species". Section 10(j)(2)(A) of the Act specifies that the Secretary of the Interior may authorize the release…of any population…of an endangered species…if the Secretary determines that such release will further the conservation of such species. At the time the 1982 Mexican Wolf Recovery Plan was written the Mexican Wolf Recovery Team saw "no possibility for complete delisting of the Mexican wolf". The team felt that "conserving and ensuring the survival of the Mexican wolf is the most that can be achieved today" and "worded its prime objective accordingly" (see Section 1.1.4) (USFWS 1982). The Mexican Wolf Recovery Team also recognized that, as written, the prime objective represented "a working hypothesis" which would be "subject to amendment as more data on the Mexican wolf are acquired" (USFWS 1982). We recognize that the reestablishment of a single experimental population of Mexican wolves is inadequate for recovery and we are fully cognizant that a small isolated wolf population such as the experimental population now occupying the BRWRA can neither be considered "viable" nor "self-sustaining" - regardless of whether it grows to a number of "at least 100" (USFWS 2010, Carroll et al. 2014). The successful reestablishment of an experimental population of Mexican wolves in the BRWRA was envisaged "as the first step toward recovery" (USFWS 1982; 63 FR 1752-1772). While we intend for the experimental population of Mexican wolves that we reestablish within the MWEPA to contribute to recovery, full recovery is beyond the scope of this EIS. Our intention, under Section 10(j)(2)(A) of the Act, is to "further the conservation" of the Mexican wolf by improving the effectiveness of the Reintroduction Project in managing the experimental population of Mexican wolves.

1.2.2 Our Need: Population Growth, Distribution and Recruitment

We have gained extensive knowledge over the last 16 years of the Reintroduction Project regarding the efficacy of the 1998 Final Rule. In particular, we have documented the synergistic or antagonistic interaction of our regulations and our management actions and their effect on the persistence and growth of, and the genetic variation within, the experimental population (USFWS 2010). For example, we have observed additive negative population effects of the regulations that restrict initial release and cause boundary removals and increased management related to removal of nuisance or depredating wolves. In the years 1998 through 2002, we conducted a high number of initial releases and translocations (n = 110) and a moderate number of removals (n = 58), which contributed to a net gain of 38 wolves in the overall population and the highest average population growth rate (1.003) (*e.g.* the average population growth was approximately 100 percent per year: calculated as the population count at year two minus the population count at year one divided by the population at year one) experienced by the population. From 2003 through 2007, we conducted a moderate number of initial releases and translocations (*n* = 68) and a high number of temporary and permanent removals (*n* = 84), resulting in a net gain of 10 wolves in the overall population and an average population growth rate that was relatively flat (0.069). Between 2008 and 2013, which was characterized by a low number of releases and translocations (*n* = 21) but also a low number of temporary and permanent removals (*n* = 17), we observed a net gain of 31 wolves and a higher average population growth rate (0.095) than the previous phase (Tables 1-2 and 1-3).

Table 1-2. Mexican Wolf Experimental Population Growth from 1998 to 2013

Year	Releases and Translocations	Number of Mortalities[1]	Removals (Both permanent and temporary)[2,3]	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	83
Total	200	100	160	N/A

[1]Mortalities include 55 due to illegal mortality (55%), 14 due to vehicle collision (14%), 18 due to natural causes (18%), 8 due to unknown causes (8%), 0 awaiting necropsy results, and 5 due to other causes (5%).
[2]Permanent removals include 12 animals removed by lethal control.
[3]Temporary removals in excess of translocations equal net loss to population of 17 animals.

Table 1-3. Mexican Wolf Experimental Population Growth Rate from 1998 to 2013

Period	Releases and Translocations	Number of Mortalities[1]	Removals (Both permanent and temporary)[2,3]	Net Gain in Population	Growth Rate
1998-2002	110	25	58	38	1.003
2003-2007	68	29	84	10	0.069
2008-2013	21	46	17	31	0.095

The effects of our management regime related to initial releases, translocations, and removals are apparent when assessing the status of the population. Our progress in establishing and growing the population has been much slower than expected (USFWS 1996, USFWS 2010). We expected to reach a population size of at least 100 wolves in 2006. We have yet to reach that objective based on our end-of-year minimum population counts (Table 1-2). The growth rates we have documented over time in the Mexican wolf population are within the range, but on the low side, of those documented in other wild wolf populations, which generally vary between 0.07 and 1.40 (Fuller et al. 2003). In a managed wild population such as ours, management removals are similar to mortality and releases are similar to recruitment (Paquet et al. 2001). Our observation of the growth rates of the experimental population, which have been near static over much of the reintroduction, correlated with the general phases of our management activity, validate the recommendations in the three (Paquet et al. 2001) and five year (AMOC and IFT 2005) reviews and our Mexican Wolf Conservation Assessment (USFWS 2010). These reports universally identified inflexible regulations resulting in a low number of initial releases and limits to dispersal as counterproductive to the achievement of the population growth and distribution needed for the successful establishment of an experimental population of Mexican wolves.

The size, growth and distribution of a population are important because they influence its likelihood of persistence. A species with a small population, narrowly distributed, is less likely to persist (in other words it has a higher risk of extinction) than a species that is widely and abundantly distributed. This is due to the sensitivity of small populations to stochastic (i.e., uncertain) demographic events such as low litter size or high adult mortality and to environmental stochasticity such as variation in prey base, catastrophic fire, drought, or disease epidemic. Small populations are also thought to be more vulnerable to extinction because of the deleterious effects of inbreeding (Lynch et al. 1995, Bijlsma et al. 2000, Whitlock 2000, Keller and Waller 2002, Fredrickson et al. 2007, USFWS 2010, Hoffman et al. 2014). The combination of a small number of animals with low genetic variation can have antagonistic effects on the population. When that happens, a self-amplifying cycle can be created in which mortality results in additional reduction in genetic variation, which leads to decreased fitness and lower survival rates. Because of this self-amplifying cycle, sometimes termed an "extinction vortex", the rate of extinction for small populations is higher than predicted from the population size alone (Fagan and Holmes 2006, Palomares et al. 2012). Conversely, supporting the maintenance of genetic variation, once it is established, can be achieved by establishing larger, rather than smaller, effective (i.e., animals in the breeding population) population sizes. In other words, a larger population with more breeding animals has better potential maintenance of genetic variation than a small population with a small number of breeding animals. The Mexican wolf, in particular, is more susceptible to population decline than other gray wolf populations because of smaller litter sizes, less genetic variation, lack of immigration from other populations, and potential low pup recruitment (USFWS 2010).

We intend for the experimental population of Mexican wolves that we reestablish within the MWEPA to contribute to recovery. Until future recovery planning efforts are able to determine a population goal for range-wide recovery setting a population objective for the experimental population, based on the best available information, can help us achieve “the first step toward recovery” as envisaged in the 1982 Mexican Wolf Recovery Plan. There are several studies in the scientific literature that help inform our establishment of a population objective for the MWEPA. The recommendations of Wayne and Hedrick (2010) are based on the genetic aspects (effective population size) of the Mexican wolf relative to that of the Northern Rockies gray wolf. Because of the degree of inbreeding, higher level of human-caused mortality, and lower likelihood of persistence of Mexican wolves they suggest that the recovery goals for the Northern Rocky Mountains should serve as a starting point for Mexican wolf recovery goals. They conclude that for the successful recovery of the Mexican wolf a metapopulation with at least three connected subpopulations of 250 wolves would likely be necessary to achieve recovery. They also suggest that if natural gene flow (i.e., through natural dispersal and breeding) does not occur between these subpopulations then artificial movement (i.e., management actions such as translocations and initial releases) may be necessary (Wayne and Hedrick 2010).

Carroll et al. (2014) performed analyses of potential recovery scenarios for the Mexican wolf using a population viability model, pedigree analyses of Mexican wolves currently in the BRWRA or captivity, and habitat models related to connectivity. Carroll et al. (2014) analyzed the variation of mortality and dispersal metrics relative to extinction and quasi-extinction (i.e., the probability of being relisted as threatened from a delisted status) probabilities in a metapopulation structure consisting of three populations that were connected via dispersal. The metapopulation extinction threshold was established as a 5 percent population extinction risk, as is commonly used in recovery plans (Carroll et al. 2014). The risk of extinction varied by both population size and the number of effective migrants per generation (an effective migrant is an animal that comes from outside a population and successfully reproduces within the population). The risk of extinction for population sizes below 200 was affected by the number of migrants exchanging genetic information with the population. A population of 100 had a greater than 5 percent extinction risk, even with 3 effective migrants per generation, while a population of 125 was more secure with 2.5 to 3.0 effective migrants per generation, and a population of 150 was secure with greater than 0.5 effective migrants per generation (Carroll et al. 2014). This effect occurred because the migrants provided genetic exchange between the populations. Genetic exchange between populations leads to increased genetic variation within the population which improves the probability of persistence for each population and reduces the extinction and quasi-extinction risk. Carroll et al. (2014) also examined a quasi-extinction threshold. In this analysis, they demonstrated that at certain population sizes with higher levels of effective migration the probability of quasi-extinction was reduced (Carroll et al. 2014). A population comprised of between 175 and 200 wolves had a less than 50 percent probability of quasi-extinction depending on whether the population had 0.5 to 1.0 effective migrants per generation. Population sizes of 300 to 325 achieved closer to a 10 percent probability of quasi-extinction regardless of the number of effective migrants per generation. This analysis suggests that for larger population sizes (above 300) with adequate genetic variation, migration between populations becomes a less important factor affecting the probability of persistence (Carroll et al. 2014). Based on this best available information, we consider a population objective of 300 to 325 Mexican wolves within the MWEPA throughout both Arizona and New Mexico to be adequate as a “first step” that could contribute to recovery.

The genetic status of the Mexican wolf population in captivity and the wild is an important factor in our conservation efforts. Higher levels of genetic variation within the experimental population are critically important to minimize the risk of inbreeding and support individual fitness and ecological and evolutionary processes. The Mexican wolf captive breeding effort was initiated with seven founders from three Mexican wolf lineages. It was not managed to retain genetic variation until several years into the effort (Siminski and Spevak 2013). This captive population is the only source of Mexican wolves for initial release into the experimental population. The experimental population of Mexican wolves now currently occupying the BRWRA has poor representation of the genetic variation remaining in the captive population. The wolves in the experimental population have Founder Genome Equivalents (FGE) that are 33 percent lower than found in the captive population and the estimated relatedness (population mean kinship) of these animals suggest that on average they are as related to one another as outbred full siblings are related to each other (Siminski and Spevak 2012). When gene diversity falls below 90% of that in the founding population, reproduction may be increasingly compromised by, among other factors, lower birth weights, smaller litter sizes, and greater neonatal mortality (Fredrickson et al. 2007, Siminski and Spevak 2012). As of July 2014, the experimental population of wolves in the BRWRA has a retained gene diversity of 74.52%, and when compared to 2010 has shown a slight decline in both retained gene diversity and FGE (Siminski and Spevak 2014). Currently, the animals in the experimental population (mean kinship = 0.2548) are 50% more closely related to one another than those in the captive population (mean kinship = 0.166) due to inadequate representation of two of the three Mexican wolf lineages in the wild population (Siminski and Spevak 2014). There is evidence of inbreeding depression in the experimental population (Fredrickson et al. 2007) and without management action to improve its genetic composition, inbreeding will accumulate and heterozygosity and alleles will be lost much faster than in the captive population (78 FR 35664, June 13, 2013).

Table 1-4. Population Projections Compared to Mexican Wolf End of Year Minimum Population Counts in New Mexico and Arizona from 1998 to 2013

Year	Minimum Population Count (Observed)	Population Projected in 1996 Final Environmental Impact Statement (FEIS)[1]
1998	4	7
1999	15	14
2000	22	23
2001	26	35
2002	42	45
2003	55	55
2004	46	68
2005	42	83
2006	59	102
2007	52	-
2008	52	-
2009	42	-
2010	50	-
2011	67	-
2012	80	-
2013	83	-

[1]FEIS projections were made only through 2006 (USFWS 1996)

Our management regime, especially related to initial releases, has had significant effect on the maintenance and improvement of the genetic variation of the population. We are able to influence the maintenance or improvement of the genetic variation in the experimental population by the selection for initial release of genetically appropriate wolves from the captive population. Over the course of the Reintroduction Project we have not been able to conduct the number of initial releases that would give us the level of effective migrants per generation sufficient to establish or maintain adequate genetic variation in the experimental population. An effective migrant is an animal that comes from outside a population and successfully reproduces within the population. For wolves, a generation is every four years.

With its current level of genetic variation and at its current size of a minimum of 83 wolves the experimental population is considered small (Shaffer 1987, Boyce 1992, Mills 2007, USFWS 2010), genetically impoverished, and significantly below estimates of viability appearing in the scientific literature (Carroll et al. 2014, Wayne and Hedrick 2010). This would be true even at the 1982 Recovery Plan objective of “at least 100 wolves”. Due to wolves’ social structure and based on documented Mexican wolf pack size in the experimental population a census population of approximately 100 Mexican wolves would have an effective population (i.e. the number of breeding animals) of approximately 28 animals (Packard 2003 http://www.fws.gov/southwest/es/mexicanwolf/pdf/MW_popcount_web.pdf). An effective population size of 28 wolves is inadequate to ensure short or long-term genetic fitness for the experimental population of Mexican wolves in the BRWRA (USFWS 2010).

Current literature suggests that the single experimental population of Mexican wolves would have a higher likelihood of persistence if it is able to increase in size and have an adequate number of effective migrants to contribute to enhancing the population’s genetic variation (Carroll et al. 2014, Wayne and Hedrick 2010). The most commonly proposed rule of thumb for connectivity between populations states that one genetically effective migrant per generation into a population is sufficient to minimize the loss of polymorphism and heterozygosity within populations (Allendorf 1983 as cited in Carrol et al. 2014). However, a Vortex (population viability) model used by Carroll et al. (2014), which incorporated genetic data to evaluate the relationship between connectivity and persistence for a restored Mexican wolf metapopulation of three subpopulations of equal size, demonstrates that higher levels of effective migration are necessary to ensure persistence of the Mexican wolf, particularly until the population reaches a size of at least 250.

In the context of a metapopulation, effective migration is achieved through dispersal from one population to another. In the context of our current single experimental population we intend to apply the information from these studies (Carroll et al. 2014, Wayne and Hedrick 2010) by using initial releases from the captive population as a source of effective migrants to the experimental population. To do so we need to modify our regulations to increase the flexibility of the Reintroduction Project to conduct initial releases. If the genetic variation within the experimental population can be substantially improved by releasing more wolves from captivity with appropriate genetic background and the population is allowed to grow and disperse, natural reproduction and integration of those offspring into the population (i.e., recruitment) will serve to maintain genetic variation and lessen our need over time to conduct initial releases. Based on the best available information in current literature (Carroll et al. 2014, Wayne and Hedrick 2010), we need to integrate two effective migrants into the population each generation while the population is around 100-250 animals. This number could decrease to one effective migrant per generation at population sizes greater than 250 (see Appendix D). Under its current regulations the Reintroduction Project has not achieved this level of “effective migration” via initial releases in the last 8 years (Table 1-5).

Table 1-5. Success Rate and Number of Initial Releases of Mexican Wolves in the Blue Range Wolf Recovery Area from 1998 to 2013

Year	No. of Wolves Initially Released From Captivity	No. of Initially Released Wolves with Known Outcomes1	No. of Initially Released Wolves Considered Successful2	Percentage of Initially Released Wolves that Were Successful3
1998	13	12	1	8.3
1999	21	14	0	0.0
2000	16	12	5	41.7
2001	15	12	2	16.7
2002	9	6	3	50
2003	8	5	1	20
2004	5	5	2	40
2005	0	0	0	N/A
2006	4	4	1	25
2007	0	0	0	N/A
2008	1	1	0	0
2009	0	0	0	N/A
2010	0	0	0	N/A
2011	0	0	0	N/A
2012	0	0	0	N/A
2013	1	1	0	0
Total	93	72	15	20.8

[1]Some wolves disappeared prior to determining the success of the animal. Generally, these animals were pups that were too young to have a radio collar.
[2]Success was defined as wolves that bred and produced pups in the wild prior to removal from the wild or mortality. In some cases animals that were removed were translocated back into the wild.
[3]Calculated as the successful releases divided by the number of released animals with known outcomes.

1.2.2.1 Expanding the area available for the initial release of captive-born Mexican wolves

The regulatory constraints imposed by the designation of Primary and Secondary Recovery Zones within the BRWRA have impeded our ability to conduct initial releases of Mexican wolves. The availability of additional suitable, unoccupied wolf habitat is needed to increase the opportunities for, and the probability of, successful initial releases. A greater number of successful initial releases would be expected to lead to an increase in the number of effective migrants per generation into the experimental population from the captive population. An increase in the number of effective migrants per generation is needed to improve and maintain adequate genetic variation in the experimental population. The initial release of wolves from the captive population may also be required for other management purposes.

Our implementation of the 1998 Final Rule, which limits the initial release of Mexican wolves to the PRZ, a comparatively small subunit (16 percent) of the BRWRA, has resulted in a lack of management flexibility to conduct initial releases. Release sites in approximately half of the PRZ are ranked among the lowest in overall suitability when compared to sites in the Gila and Aldo Leopold Wilderness Areas in the SRZ which are currently available only for translocations (IFT 2009). The southern half of the PRZ is situated below the Mogollon Rim where livestock are present year round and deer, rather than elk, are the primary native prey species (USFWS 2000). Although deer were expected to be the primary native prey species utilized by wolves when the Reintroduction Project began, observation of reintroduced Mexican wolves suggest that elk is their preferred prey species and constitute the majority of their diet (Paquet et al. 2001, AMOC and IFT 2005, Reed et al. 2006, Merkle et al. 2009). Wolves are territorial and defend large areas from other wolves (Mech and Boitani 2003). The experimental population of wolves has established home ranges within much of the PRZ where elk are present (USFWS 2013b). As a result, suitable sites for initial releases in the PRZ have become increasingly difficult to identify. The number of Mexican wolves released into the wild has significantly decreased from the early years of the Reintroduction Project when a large area of unoccupied suitable habitat was available in the PRZ. In the seven years from 1998 through 2004 we were able to release 87 wolves from captivity. In contrast, only two wolves were released from captivity in the seven year period from 2007 through 2013 (Table 1-1).

Experience in the Reintroduction Project has shown that initial releases are more likely to be successful when wolves are released at sites in areas that have a relatively abundant prey base of elk, limited or no livestock calving in the area, and clear separation from established wolf pack territories (AMOC and IFT 2005). Our experience indicates that wolves with no wild experience are more likely to be involved in nuisance behavior following initial release (AMOC and IFT 2005). Conducting initial releases at approved release sites in wilderness or other remote locations is intended to lessen the likelihood of wolf interaction with humans or livestock during their initial post-release acclimation period. This is supported by research identifying factors important for wolf reestablishment, including those that reduce the potential for wolf-human conflict and human-caused mortality, such as the absence of roads, low human population density and limited livestock grazing (Mladenoff et al. 1995, Carroll et al. 2003, Oakleaf et al. 2006). Release success is defined as a wolf that ultimately breeds and produces pups in the wild (Phillips et al. 2003, AMOC and IFT 2005).

Paquet et al. (2001) stated in the 3-Year Review that the small size of the PRZ was hindering rapid establishment of the experimental population and recommended that the 1998 Final Rule be modified to allow releases in the SRZ. AMOC/IFT concluded in the 5-Year Review that the provision governing release of wolves solely into the PRZ "restricts the pool of available release candidates, restricts release of wolves for management purposes such as genetic augmentation, and causes public perception issues between the states of Arizona and New Mexico, and thus is not sufficient to achieve the current population objective" (AMOC and IFT 2005). Opening the entire BRWRA to the initial release of wolves would allow us to select optimal release sites in remote locations such as the Gila and Aldo Leopold Wilderness Areas in the Gila National Forest. A proposal to allow initial releases throughout the BRWRA combined with an expansion of the BRWRA would increase the number of available potential release sites in remote locations, including additional wilderness areas. The availability of more potential release sites throughout the entire BRWRA would provide greater management flexibility in selecting optimal sites for initial releases with the goal to: (1) maximize the probability of release success; (2) increase the number of effective migrants per generation into the experimental population from the captive population; (3) minimize the potential for wolf-human interaction; (4) reduce the potential for intraspecific (i.e. wolf against wolf) strife and mortality; and (4) minimize depredation opportunities for initial-released wolves. Without an increase in the number of initial releases and without a better release success rate, the number of effective migrants per generation needed to improve the genetic fitness of the Mexican wolf experimental population will not be achieved and the negative effects of inbreeding depression will continue - potentially contributing to the self-amplifying cycle discussed in Section 1.2.2. In such a scenario, high rates of mortality, combined with low rates of effective migration, would result in additional reduction in genetic variation, leading to decreased fitness and lower survival rates and ultimately causing an extinction vortex for the experimental population of Mexican wolves.

Increasing the number of initial releases we conduct could also have beneficial effects on the captive breeding program. In absence of additional holding facilities, the captive breeding program is currently constrained by space limitations. Releasing captive animals to the wild would provide space for captive animals to be moved between facilities as necessary for pairing and for housing offspring subsequent to breeding (Siminski and Spevak 2012).

The ability to select the optimum release site from a greater number of suitable sites distributed over a larger area would give us the management flexibility necessary to improve the success rate of our initial releases. It would also benefit the captive breeding program by moving animals out of holding facilities into the wild thus freeing needed space within the facilities. An improved success rate for initial releases would increase the number of effective migrants per generation from the captive population into the experimental population resulting in an improvement in the genetic fitness of the experimental population. A larger experimental population with wider distribution and greater genetic variation as a result of more animals having been successfully recruited from the captive population will be more persistent and can be managed more effectively in response to wolf-livestock conflict, nuisance behaviors, and mortality factors. For these reasons we believe that allowing the initial release of Mexican wolves throughout the BRWRA, particularly if the BRWRA is expanded to include additional areas of national forest, would substantially contribute to our efforts to further the conservation of the Mexican wolf by improving the effectiveness of our Reintroduction Project in managing the experimental population of Mexican wolves.

1.2.2.2 Allow Mexican wolves to naturally disperse from the Blue Range Wolf Recovery Area (BRWRA) and to occupy and establish territories within the Mexican Wolf Experimental Population Area (MWEPA)

The area of Arizona and New Mexico south of I-40 contains approximately 32,244 mi^2 (83,512 km^2) of suitable wolf habitat. Approximately 6,263 mi^2 (16,221 km^2) (19.4 %) of this habitat is within the BRWRA. The FAIR has an additional 2,561 mi^2 (6,632 km^2) (7.9%) of habitat. Together, the BRWRA and the FAIR encompass 27.3 percent of the total suitable wolf habitat in Arizona and New Mexico south of I-40 (Figure 1-21). Under the 1998 Final Rule, Mexican wolves are not allowed to disperse and establish territories wholly outside of the BRWRA. Wolves that do so are captured and translocated back into the BRWRA or taken to captivity regardless of whether they have been engaged in depredation or nuisance behavior. Allowing Mexican wolves to naturally disperse from the BRWRA and occupy and establish territories in areas of suitable habitat within the entire MWEPA would better support natural wolf biology and behavior and remove restrictions that have artificially constrained the natural growth of the experimental population. Natural dispersal and colonization of new areas would be expected to contribute to achieving the numerical growth and range expansion that is needed to improve the resilience and probability of persistence of the experimental population.

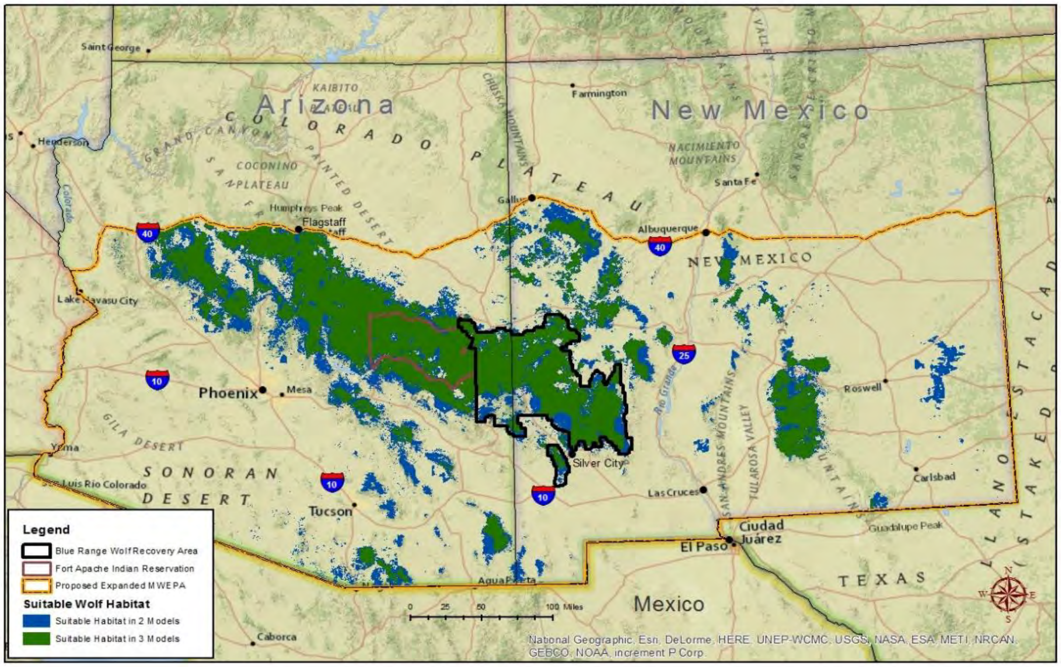


Figure 1-21. Areas of suitable wolf habitat in the proposed expanded Mexican Wolf Experimental Population Area south of I-40 in Arizona and New Mexico

Unless a wolf becomes a breeder within its natal pack, it will disperse (Mech and Boitani 2003). Wolves naturally disperse from their natal pack in response to a variety of factors including food competition, mating opportunities, environmental disruptions, social aggression and/or pressures associated with pack dominance hierarchy (Boyd and Pletscher 1999, Mech and Boitani 2003). Wolves of both sexes disperse, some as young as five months of age, while others may remain with the pack for up to three years or occasionally longer (Mech and Boitani 2003). The potential benefits of dispersal include increased reproductive success, decreased probability of inbreeding, release from intraspecific competition for resources and range expansion (Shields 1987, Jozwiak 1997, Boyd and Pletscher 1999). Successful dispersing wolves are those that find a mate and either usurp (take from another wolf), carve out (from an existing territorial mosaic), or find an unoccupied (by other wolves) area with adequate food resources to establish a territory (Mech and Boitani 2003). Wolves are highly territorial and dispersal from established packs drives the colonization or recolonization of areas unoccupied by breeding wolves (Fritts and Mech 1981, Boyd and Pletscher 1999, Mech and Boitani 2003). Dispersal and colonization/recolonization of unoccupied habitat expands the species' range (Mech and Boitani 2003) and is vital to establishing long-term population viability (Boyd and Pletscher 1999). Neighboring wolf packs tend to be genetically related, as infrequent (once per generation) immigration of dispersers from another population can result in a degree of genetic mixing between unrelated wolves (Mech and Boitani 2003).

Both the 3-Year (Paquet et al. 2001) and 5-Year Review (AMOC and IFT 2005) agree that removal of wolves for no other reason than being outside of the BRWRA "increases the cost of the overall recovery program…(and) excludes habitat that could enhance recovery efforts and artificially restricts natural dispersal" (AMOC and IFT 2005). A Mexican wolf experimental population that is larger and more widely dispersed across a broader landscape would be more resilient to stochastic demographic and environmental events, as well as human-caused mortality. A management change to allow wolves to disperse from the BRWRA and occupy suitable habitat within the MWEPA would be expected to substantially improve the effectiveness of our Reintroduction Project in achieving the population growth and distribution needed to improve the likelihood of persistence of the Mexican wolf experimental population.

1.2.2.3 Management actions on Federal and non-Federal land within the Mexican Wolf Experimental Population Area (MWEPA)

Allowing Mexican wolves to naturally disperse from the BRWRA and to occupy and establish territories in areas of suitable habitat within the MWEPA would create a need to manage wolves on both federal and non-federal land (see definition of *Federal* and *non-Federal land* in the List of Definitions) in a larger area than the national forests that make up the current BRWRA.

We would not remove wolves on Federal land or on non-Federal private or state land except in the case of depredation and nuisance behavior or unacceptable impacts to native ungulate herds that cannot be effectively managed through non-removal techniques. We would remove wolves from tribal land at the request of the tribal government. We would translocate wolves onto Federal land pursuant to an authorized management purpose. With the concurrence of the states of Arizona and New Mexico we would seek to enter into management agreements with willing landowners for the management of wolves on private land within the MWEPA. Although federal lands provide the majority of potential suitable habitat for wolves within the MWEPA there are also large tracts of private land that contain habitat that could support wolves. Service and state approved management agreements with private landowners would be important not only to benefit wolf reintroduction but to also establish protocols and procedures to minimize or preclude depredation incidents and nuisance behavior. Management agreements can specify pro-active management actions (i.e., livestock husbandry techniques, hazing, and provision of range riders) that may serve to preclude and/or minimize wolf depredation or nuisance behavior and benefit both the landowner and the Reintroduction Project. Agreements with landowners who have private landholdings containing suitable habitat adjacent to large tracts of federally controlled land would be expected to be particularly important.

The Service acknowledges the trust responsibility and treaty obligations of the United States toward Indian tribes and tribal members and its government-to-government relationship with tribes in order to achieve the common goal of promoting and protecting the health of ecosystems, as defined by Secretarial Order 3206 *American Indian Tribal Rights, Federal-Tribal Trust Responsibilities* (June 5, 1997). Pursuant to Secretarial Order 3206, we recognize, respect, and shall consider the value that tribal traditional knowledge provides to federal land management decision making processes. In accordance with this order we will continue to manage any Mexican wolf present within the MWEPA under the guidance contained in section (k)(10) the 1998 Final Rule so that; "If any wolves move onto tribal reservation land outside the designated recovery area(s), but within the Mexican Wolf Experimental Population Area, the Service, or an authorized agency, will develop management actions in cooperation with the tribal government including capture and removal of the wolf or wolves if requested by the tribal government." We would seek to continue the agreement entered into in 2000 with the White Mountain Apache Tribe to allow wolves to occupy the Fort Apache Indian Reservation and, because we now propose to allow wolves to naturally disperse from the BRWRA, we would seek to enter into agreements for the management of wolves with other tribes within the MWEPA. These agreements would be subject to successive renewal, in which the Tribe has the option of allowing or prohibiting wolf re-establishment, whether through natural dispersal, initial release, or translocation, on recognized tribal lands or reservations. These agreements can also specify pro-active management actions (e.g., livestock husbandry techniques, carcass removal, hazing, and provision of range riders) that may serve to preclude and/or minimize wolf depredation or nuisance behavior and benefit both the tribal government and the Service's wolf reintroduction efforts.

Service approved agreements made in voluntary cooperation with tribal governments as well as Service and state approved management agreements with private landowners can benefit Mexican wolf conservation while pro-actively minimizing nuisance behavior and depredations. Agreements with tribal governments and management agreements with willing landowners are intended to build trust and cooperation between tribal governments and private landowners and the Service and to minimize wolf management removals. All of these outcomes would be expected to substantially contribute to our efforts to improve the effectiveness of our Reintroduction Project in managing the experimental population of Mexican wolves.

1.2.3 Our Need: Management of Mexican Wolves which may disperse from Mexico into Southern Arizona and New Mexico

The reintroduction effort for Mexican wolves now being undertaken by the Mexican government has established a need to manage wolves that may disperse into southern Arizona and New Mexico from reestablished wolf populations in Mexico. Designating the international border with Mexico as the southern boundary of the MWEPA would allow us to manage all Mexican wolves in Arizona and New Mexico south of Interstate-40 under the nonessential experimental population 10(j) rule.

Movement of the MWEPA boundary in Arizona and New Mexico from Interstate-10 (I-10) south to the international border with Mexico would add an area with 1,580 mi^2 (4,091 km^2) of suitable wolf habitat to be managed under the 10(j) experimental population rules (Figure 1-21). Wolves persisted in the mountainous parts of this area into the 1960s (Brown 1988). The international border between the United States and Mexico has in recent years become the focus of illegal immigration and drug smuggling activity. An expansion of law enforcement efforts to stop or curtail this activity has resulted in the construction of pedestrian and vehicle fencing and related tactical infrastructure (roads, fences, lights, gates, boat ramps, and barriers) in some areas along the border in southern Arizona and New Mexico. Fragmentation of wildlife habitat can occur in the corridors where this fencing is placed. Although pedestrian fencing can impede wildlife movement, the effect from vehicle fencing is minimal because the fencing design does not pose a barrier to most animals. Beneficial impact on wildlife populations can also occur as a result of protecting habitat to the north of the corridor from illegal border traffic (US CBP 2008). Although pedestrian fencing may impede the movement of wolves in small sections of the border, we expect the dispersal corridors in the border region that were used by Mexican wolves before their extirpation could again be used by dispersing wolves from the reintroduction areas in northern Mexico as well as by dispersing wolves from the BRWRA. The designated reintroduction areas (Chihuahua/Sonora) in Mexico extend north to within approximately 30 miles (48 km) south of the United States border at the Arizona/New Mexico state line (Figure 1-20). The distance from the most southern boundary of the BRWRA to I-10 is seven miles (12 km). Gray wolves are capable of dispersing > 500 miles (>800 km) (Fritts 1983, Boyd et al. 1995). The observed dispersal distance for wolves in the BRWRA population has averaged 54 +/- 6 miles (87 km) (IFT 2005). Dispersal and natural re-colonization of areas of suitable habitat in Arizona and New Mexico south of I-10 to the international border with Mexico is possible both from the reintroduction areas in Mexico and, if we were to allow wolves to disperse into the MWEPA, from the BRWRA.

Evidence from natural gray wolf recolonization along the U.S./Canada border suggests that, even when adequate source populations exist, lone wolves or breeding pairs may repeatedly appear in an area but then die out or be accidentally or illegally killed without establishing a self-sustaining population (USFWS 1996). Management actions available under the proposed 10(j) rule, such as translocations, could supplement natural dispersal, and the establishment of management agreements with private landowners could facilitate the linkage between the core wolf habitat to the north of I-10 and wolf habitat in the reintroduction areas in the states of Chihuahua and Sonora in northern Mexico. This type of active management would be expected to improve the survival of Mexican wolves dispersing across the borderlands. The extension of the proposed 10(j) rule south of I-10 would also improve the effectiveness of our Reintroduction Project to address depredation and nuisance behaviors in a manner that is responsive to the needs of the local community.

An expansion of the MWEPA south to the international border with Mexico would allow us to manage all Mexican wolves in this area, regardless of origin, under the experimental population 10(j) rule. The regulatory flexibility provided by our proposed 10(j) rule would allow us to take management actions within the MWEPA that further the conservation of the Mexican wolf while being responsive to needs of the local community in cases of depredation or nuisance behavior. For these reasons this expansion, particularly if we were to allow wolves to disperse into the MWEPA from the BRWRA, would substantially contribute to our efforts to improve the effectiveness of our Reintroduction Project in managing the experimental population of Mexican wolves.

1.2.4 Our Need: To redress a lack of clarity, inadequacies, inefficiencies and inflexibilities due to certain provisions in our 1998 Final Rule

We have identified changes that need to be made in several provisions of the 1998 Final Rule that established the geographic areas and boundaries for the Mexican wolf experimental population. These areas and boundaries define where specific management actions can take place and in several instances limit the efficacy and flexibility of our management of the experimental population of Mexican wolves. We have also identified a number of management changes needed to correct regulatory restrictions that have had antagonistic effects on the persistence, growth, and genetic fitness of the population and/or lack clarity, are inadequate and/or limit the efficacy and flexibility of our management of the experimental population of Mexican wolves.

1.2.4.1 Removal of the designation of the White Sands Wolf Recovery Area (WSWRA) as an area for the reintroduction of Mexican wolves

In our 1998 Final Rule, we established two recovery areas, the BRWRA and the White Sands Wolf Recovery Area (WSWRA), within the MWEPA. Under the rule these recovery areas are the only areas within the MWEPA that Mexican wolves are allowed to occupy and where management actions such as initial release and translocation can take place. We designated the WSWRA as a wolf recovery area primarily because it lies within the probable historical range of the Mexican wolf, has a low density of human use and is largely free of livestock. However, we have never utilized the WSWRA and have since revaluated it as an area that is unlikely to consistently support occupancy by wolves primarily due to the lack of an adequate prey base of native ungulates.

The WSWRA encompasses 4,028 mi^2 (10,311 km^2) in south-central New Mexico. It includes all of the White Sands Missile Range (WSMR) and Holloman Air Force Base, White Sands National Monument, the San Andres National Wildlife Refuge (NWR) and the Jornada Experimental Range. The San Andres and the Oscura mountain ranges are within the WSWRA with the San Andres Mountains making up most of the primary recovery zone (USFWS 1996). Non-native African oryx (*Oryx gazella*) are the most abundant ungulate followed by mule deer (*Odocoileus hemionus*) and pronghorn antelope (*Antilocapra americana*) (Rodden 2014, pers.com.). There is a small population of approximately 100 desert bighorn sheep (*Ovis canadensis mexicana*) in the southern San Andres Mountains including within the San Andres NWR. Under the 1998 Final Rule, the reintroduction of wolves into the WSWRA through initial release is authorized, "if the Service finds it necessary and feasible" (63 FR 1752, January 12, 1998). Wolf population numbers are directly related to ungulate biomass (Fuller 1989). Due to a low density of ungulate prey, two independent assessments suggest that the WSWRA could only support 20 to 30 wolves (Bednarz 1988, Green-Hammond 1994). Deer populations have declined since these assessments were conducted. We therefore consider this to be an overestimate of how many Mexican wolves this area could support in the present environment and have reevaluated the WSWRA as unlikely to be an area that can consistently support occupancy by wolves. The 3-Year Review concluded that a population of 20-30 wolves in the WSWRA "is not viable" and recommended that "the USFWS should not expend resources on reintroducing wolves to WSWRA (Paquet et al. 2001). The 5-Year Review also recommended that "any amended or new Mexican Wolf Nonessential Experimental Population Rule drafted…. not include White Sands Missile Range as a Mexican Wolf Recovery Area or as a Reintroduction Zone" (AMOC and IFT 2005).

We have never utilized the WSWRA for the release or translocation of wolves because of the low density of ungulates and our reevaluation of it as an area that is not suiTable Dor wolf reintroduction and release. Therefore, even if we were to retain the designation of the WSWRA as a wolf recovery area we would not expect to use the area for the initial release of captive wolves. If Mexican wolves were to be allowed to naturally disperse throughout the MWEPA they could on their own, traverse or establish territories in the San Andres and Oscura mountain ranges which are within the boundaries of the currently designated WSWRA. However, due to the lack of an adequate prey base we consider it unlikely that these areas would support long term occupancy by wolves. Because of these limitations and based on the recommendations of the 3-Year and 5-Year Reviews, we do not consider that the continued designation of the WSWRA as a recovery area would improve the effectiveness of our Reintroduction Project in managing the experimental population of Mexican wolves.

1.2.4.2 Modification of the geographic boundaries of the Mexican Wolf Experimental Population Area (MWEPA)

The small portion of Texas lying north of US Highway 62/180 that is included in the current MWEPA encompasses the southern extent of the Guadalupe Mountains and includes Guadalupe Mountains National Park. We do not believe that retaining this area within the MWEPA will substantially contribute to the population growth or range expansion necessary to improve the persistence of, and the genetic variation within, the experimental Mexican wolf population. Nor do we believe that continuing to include a small part of Texas within the MWEPA will contribute to improving the effectiveness of the Reintroduction Project in managing the experimental population of Mexican wolves.

The MWEPA as currently configured encompasses 119,876 mi^2 (310,477 km^2) with 44,155 mi^2 (114,361 km^2) of potential wolf habitat. The portion of the MWEPA that is in Texas is 1,456 mi^2 (3,771 km^2) with 16 mi^2 (41 km^2) of suitable wolf habitat. The montane areas of the Guadalupe National Park in Texas contain the majority of this small area of suitable wolf habitat with coniferous forests dominated by Douglas fir, southwestern white pine, and ponderosa pine within which there are mule deer and small elk populations. These forests provide habitat to several prey and competitor species including elk, mule deer, black bear, gray foxes, and mountain lions (NPS 2013).

If Mexican wolves are allowed to disperse from the BRWRA throughout the MWEPA they could naturally recolonize areas of suitable habitat in central and south-eastern New Mexico. East of the Rio Grande River Valley, the Sacramento and Capitan mountain ranges that are part of the Lincoln National Forest and the Mescalero Apache Tribe Reservation provide the largest areas of contiguous suitable habitat for wolves. While individual wolves might disperse into the montane areas of the Guadalupe Mountains in southeastern New Mexico and Guadalupe National Park in Texas it is unlikely that they would persist or establish territories in these areas because of the small size and extent of suitable habitat and lack of adequate food resources.

Modifying the geographic boundaries of the MWEPA to eliminate Texas would remove 1.2 percent of the MWEPA as currently configured and 0.9 percent of a MWEPA expanded south of I-10 to the international border with Mexico. Because there is no suitable habitat large enough to support long-term occupancy by recolonizing wolves we would not use this area for translocations and we consider it unlikely that Mexican wolves would persist if they dispersed into it from the core areas of suitable habitat found within the MWEPA in Arizona and New Mexico. Therefore, we do not expect that this portion of the MWEPA would substantially contribute to the population growth or range expansion necessary to improve the persistence of, and the genetic variation within, the experimental Mexican wolf population. In addition, modifying the eastern boundary of the MWEPA to conform to state political boundaries by ending at the New Mexico/Texas state line would both streamline state agency involvement in the Reintroduction Project and facilitate the Federal and state interagency cooperation necessary to effectively manage the experimental population of Mexican wolves in Arizona and New Mexico. For these reasons we do not consider that the continued designation of the small area of Texas lying north of US Highway 62/180 to the Texas-New Mexico boundary as a part of the MWEPA will contribute to our efforts to improve the effectiveness of our Reintroduction Project in managing the experimental population of Mexican wolves.

1.2.4.3 Modification to the provisions for take of a Mexican wolf within the Mexican Wolf Experimental Population Area (MWEPA)

Modification of the 1998 Final Rule's provisions for the take of Mexican wolves in the experimental population is needed in order to provide clarity and consistency in our take determinations, anticipate Mexican wolf populations that are larger and more widely distributed, and be responsive to the needs of the local community in cases of depredation or nuisance behavior by wolves. Some form of wolf management is usually necessary when wolves prey on livestock or engage in nuisance behavior (Fritts et al. 2003). Accordingly, we recognize the importance of obtaining an appropriate balance between enabling wolf population growth and minimizing nuisance and depredation impacts on local communities, and we understand that removal of wolves to address conflicts with livestock (depredation) or humans (nuisance) is a useful component of reintroduction efforts (AMOC and IFT 2005). Therefore, we believe clear guidelines defining the management response, which may include the use of lethal take, to depredation and nuisance behavior are needed to improve the effectiveness of the Reintroduction Project in managing the experimental population of Mexican wolves.

Minimizing wolf-human conflicts through active management is an essential ingredient to establish and maintain public tolerance of wolves, particularly from those communities living close to wolf populations (Jimenez 2013, Bangs et al. 2005, Fritts et al. 2003, Bangs et al. 1998, Mech 1995, Bangs et al. 1995, Fritts and Carbyn 1995). While wolf control undertaken by a government agency is the primary tool we use to manage problem wolves, control measures implemented by landowners and livestock owners or their agents is also a necessary element of the Reintroduction Project. Aversive and preventative non-lethal management techniques include the use of fladry and hazing, the use of non-lethal projectiles, livestock husbandry assistance, the use of calving pastures, and purchase of feed/hay to reduce the risk of depredation. While these non-lethal measures can be effective in some situations, lethal control of chronic depredating wolves may still be necessary (Bangs et al. 2005). Lethal control measures may be taken by a government agency or through the authorization of take by landowners and livestock owners or their agents under specific limited circumstances.

A pro-active and effective response by the Service to reports of depredation incidents or nuisance behavior builds trust and cooperation with the Reintroduction Project and greater social tolerance for wolves by members of the affected community (Jimenez 2013, Bangs et al. 2005, Fritts et al. 2003, Bangs et al. 1998, Mech 1995, Bangs et al. 1995, Fritts and Carbyn 1995). We recognize the importance for landowners on non-Federal lands within the MWEPA to have the ability to protect their domestic animals (see the definition of *domestic animal* in the List of Definitions) and that in order to do so this may, under certain circumstances, involve the lethal take of Mexican wolves. We also recognize the importance for livestock owners or their agents on Federal lands within the MWEPA to have the ability to protect their livestock (see the definition of *livestock* in the List of Definitions) and that in order to do so this may, under certain circumstances and when authorized by a Service-issued permit, involve the lethal take of Mexican wolves. Other allowable forms of take of Mexican wolves for which we recognize the need to modify the definitions and/or provisions of the 1998 Final Rule in order to provide clarity and consistency in our take determinations include: opportunistic harassment; intentional harassment; take in response to wild ungulate impacts; take by Service personnel or a designated agency; unintentional take; take for research purposes; additional take for Federal agencies; and the definition of due care when using traps, snares, or other types of capture devices within occupied Mexican wolf range.

With a larger and more widely distributed population of Mexican wolves the Service and our partner agencies in the Reintroduction Project must be responsive to the needs of the local community in cases of depredation or nuisance behavior by wolves. We expect that modifying the definitions and/or provisions governing the take of Mexican wolves in order to provide clarity in our take determinations will contribute to our efforts to find the appropriate balance that supports wolf population growth while minimizing nuisance and depredation impacts on local communities. For these reasons we consider these modifications necessary to improve the effectiveness of our Reintroduction Project in managing the experimental population of Mexican wolves.

1.2.4.4 Revise and reissue the Mexican Wolf Recovery Program's Section 10(a)(1)(A) research and recovery permit (TE-091551-8 dated 04/04/2013)

The 1998 Final Rule designated Mexican wolves reestablished in the MWEPA as one nonessential experimental population. This designation provides for administrative and management flexibility under the Act by relaxing prohibitions on take and allows for the active management of wolves. Under a revised and reissued section 10(a)(1)(A) research and recovery permit we would authorize removal of Mexican wolves that can be identified as coming from the experimental population that disperse to establish territories outside of the MWEPA. These wolves would, dependent on a determination based in part on their genetic value relative to the Mexican wolf population, be translocated to areas of suitable habitat within proposed management zones 1 or 2 of the MWEPA, transferred to the reintroduction project in Mexico, or maintained in captivity.

Our purpose in proposing changes to the 1998 Final Rule is to further the conservation of the Mexican wolf by improving the effectiveness of the Reintroduction Project in managing the experimental population. Our reintroduction of the experimental population of Mexican wolves is focused on the area in Arizona and New Mexico defined as the MWEPA. Returning wolves to the MWEPA will ensure that these animals continue to contribute to achieving the population growth and distribution needed to improve the likelihood of persistence of the Mexican wolf experimental population. We recognize that natural dispersal and colonization/recolonization of unoccupied habitat which expands the species' range (Mech and Boitani 2003) may be important to the recovery of the Mexican wolf. However, a new recovery plan has not yet been completed that indicates the most appropriate area (or areas) for the establishment of a metapopulation of Mexican wolves or that specifies objective and measurable recovery criteria. While we intend for the experimental population in the MWEPA to contribute to recovery, full recovery is beyond the scope of this EIS. For this reason at this time we are not considering whether or not allowing Mexican wolves to disperse and establish territories beyond the boundaries of the MWEPA will contribute to the achievement of our objective to further the conservation of the Mexican wolf by improving the effectiveness of our Reintroduction Project in managing the experimental population.

1.3 SUMMARY

We intend to further the conservation of the Mexican wolf by improving the effectiveness of the Reintroduction Project in managing the experimental population. In summary, in order to satisfy our purpose and need, our Proposed Action is intended to:

- Increase the total number of wolves in the experimental population and allow for their distribution over a larger area. A larger population of wolves distributed over a larger area has a higher probability of persistence than a small population in a small area.

- Provide additional areas for initial release of Mexican wolves into unoccupied suitable habitat thereby increasing the likelihood that those releases will be successful. More successful releases can provide the number of effective migrants per generation into the experimental population needed to improve the genetic variation within the population and to replace wolves that may be lost from the population due to management removal actions or mortalities.
- Improve the genetic variation within the experimental population. Higher levels of genetic variation decrease the risk of inbreeding depression and increase the probability of persistence (i.e., lowers the extinction risk) of a small population. With better representation of genetic variation, the experimental population is also better able to support the loss of individual wolves with a particular genetic make-up.
- Use the captive Mexican wolf population as the source population that will provide the genetic interchange necessary to improve the genetic variation within the experimental population. Until there are other populations of Mexican wolves established in the wild, the captive population is the only source of effective migrants to the experimental population.
- Accommodate natural dispersal behavior by allowing the experimental population to occupy and establish territories in areas of suitable habitat throughout an expanded MWEPA. Natural dispersal and colonization of new areas will improve the probability of persistence of the experimental population.
- Improve the effectiveness of the Reintroduction Project through the use of voluntary management agreements. Such agreements can further the conservation of the Mexican wolf through the proactive implementation of management actions taken in cooperation with willing private land owners and tribal governments.
- Effectively manage Mexican wolves within an expanded MWEPA in a manner that furthers the conservation of the Mexican wolf while being responsive to the needs of the local community in cases of depredation or nuisance behavior by wolves. We expect that modifying the provisions governing the take of Mexican wolves to provide clarity and consistency will contribute to our efforts to find the appropriate balance that supports wolf population growth while minimizing nuisance and depredation impacts on local stakeholders.
- Establish a coherent management regime under the proposed 10(j) rule in an expanded MWEPA. The area of Arizona and New Mexico south of I-10 may provide stepping stone habitat and dispersal corridors for wolves dispersing north from Mexico and south from the experimental population in the BRWRA. Management of all Mexican wolves in this area under the proposed 10(j) rule will improve the effectiveness of the Reintroduction Project in minimizing and mitigating wolf-human conflict.

(Credit: Mexican Wolf Interagency Field Team)

Figure 1-22. Mexican Wolf in the Blue Range Wolf Recovery Area

2 DESCRIPTION OF PROPOSED ACTION AND ALTERNATIVES

This chapter presents the alternatives we eliminated from further study and the Proposed Action and alternatives that we brought forward for further analysis. In section 2.1 we discuss the criteria we used to make those decisions.

The National Environmental Policy Act (NEPA) and Council on Environmental Quality (CEQ) implementing regulations (40 CFR 1502.14) provide guidance to Federal agencies on the consideration of alternatives in an Environmental Impact Statement (EIS). In accordance with this guidance the range of alternatives considered should include reasonable alternatives, which must be rigorously and objectively explored, as well as other alternatives that are eliminated from detailed study. To be "reasonable," an alternative must substantially meet the stated purpose of, and need for, the Proposed Action and should be technically and economically practical or feasible. The No Action Alternative serves as a baseline, or representative "status quo". The purpose of including a No Action Alternative in an environmental impact analysis is to ensure that agencies compare the potential impacts of the proposed Federal action to the known impacts of maintaining the status quo. NEPA regulations require that the Federal action proponent study methods to mitigate adverse environmental impacts which may result from going forward with the Proposed Action or an alternative (40 C.F.R. § 35 1502.16). Additionally, an EIS is required to include study of appropriate mitigation measures not already included in the Proposed Action or alternatives (40 C.F.R. § 1502.14 [h]). The alternatives we consider in this EIS include mitigation measures intended to reduce the environmental effects that could occur from their implementation.

We have developed a range of alternatives, including the Proposed Action and No Action alternative, for our proposal to revise the regulations established in our 1998 Final Rule for the nonessential experimental population of the Mexican wolf. This rule provides the regulatory guidelines under which the Mexican Wolf Reintroduction Project (Reintroduction Project) operates. We also propose to extend the authority of the Mexican Wolf Recovery Program's Section 10(a)(1)(A) research and recovery permit (TE-091551-8 dated 04/04/2013) issued under 50 CFR 17.32 to areas that are outside of the MWEPA. Section 10(a)(1)(A) of the Act provides for the issuance of such permits for "any act otherwise prohibited by section 9 for scientific purposes or to enhance the propagation or survival of the affected species, including, but not limited to, acts necessary for the establishment and maintenance of experimental populations pursuant to subsection (j)" (16 USC §1531-1544). The Mexican Wolf Recovery Program's section 10(a)(1)(A) research and recovery permit (TE-091551-8) authorizes take of any Mexican wolf (*Canis lupus baileyi*) in the experimental population in a manner consistent with a Service-approved management plan or special management measure adopted by the Service pursuant to the provisions of 50 CFR 17.84(k)(3)(ix), as well as to conduct activities related directly to the conservation, protection, and recovery of reintroduced experimental populations of Mexican gray wolves within Arizona and New Mexico. The action would be implemented through a final nonessentialexperimental rule (final 10(j) rule), a revised Section 10(a)(1)(A) research and recovery permit, and the provision of federal funding.

The proposed 10(j) rule provides additional definitions and includes clarifications to the language contained in the 1998 Final Rule. The first clarification is to identify Section 6 of the ESA as potential authorizing language for limited take pursuant to 50 CFR 17.31 under the nonessential experimental population rule. Not including Section 6 authorities was an oversight of the Service in the original language of the 1998 Final Rule. The proposed 10(j) rule also provides clarifying language for existing take provisions (those already authorized under the 1998 Final Rule <u>not</u> the several proposed new forms of take of Mexican wolves that we include in Alternative One and Alternative Two) and provides definitions for intentional harassment, opportunistic harassment and research activities. We have also specified the due care criteria in regard to trapping activities. And, we have provided language to clarify that U.S. Department of Agriculture Animal and Plant Health Inspection Service's Wildlife Services personnel will not be in violation of the Act or this rule for take of a Mexican wolf that occurs while conducting official duties associated with predator damage management activities for species other than Mexican wolves. These changes are consistent with current wolf management practices as authorized under the 1998 Final Rule. They have neither added more forms of take nor changed the circumstances under which a Mexican wolf might be subject to take. Therefore, they are not included in the proposed action or any of the alternatives for this EIS and no further analysis is provided within this document.

2.1 ALTERNATIVE SELECTION CRITERIA

The alternatives we selected for further consideration and evaluation were developed based on the experience and information we have gained since we began the reintroduction of Mexican wolves in the United States in 1998 and the recommendations of our three and five year program reviews (Paquet et al. 2001, AMOC and IFT 2005) and our 2010 Mexican Wolf Conservation Assessment (USFWS 2010). We also incorporated input received from the public, cooperating agencies, tribes, stakeholder groups, agencies, and local governments during scoping and the public comment periods on the proposed experimental population rule and draft EIS. We used the following criteria to evaluate whether a proposed alternative, or component of an alternative, substantially meets the purpose of, and need for, the Proposed Action:

- Contributes to improving the probability of persistence of the experimental population of Mexican wolves.
- Contributes to improving the genetic variation within the experimental population of Mexican wolves.
- Improves the recruitment of wolves from the captive population into the experimental population of Mexican wolves.
- Contributes to increasing the total number of wolves in the experimental population of Mexican wolves.
- Contributes to natural dispersal behavior and facilitates the colonization of suitable habitat within the MWEPA, especially in wilderness areas or other areas that have limited or no livestock grazing and minimal human use.
- Provides flexibility to the Reintroduction Project in making decisions related to the release, translocation, take and removal of Mexican wolves necessary to improve the effectiveness of our management of the experimental population of Mexican wolves.
- Facilitates the federal, state agency, local and tribal cooperation and coordination necessary to improve the effectiveness of the management of the experimental population of Mexican wolves.
- Provides for the management of Mexican wolves that may disperse from Mexico into Arizona and New Mexico.
- Provides for the management of Mexican wolves that may disperse to areas outside of the MWEPA.

2.2 ALTERNATIVES ELIMINATED FROM FURTHER CONSIDERATION

Each proposed alternative or component of an alternative identified in this section was eliminated from further consideration because we determined, using the selection criteria, that either they were not economically or technically practical or feasible and/or they did not substantially meet the purpose of, and need for, the Proposed Action.

2.2.1 Geographic Boundary Changes

2.2.1.1 Expand the Primary Recovery Zone (PRZ) boundaries to include only the Apache National Forest in Arizona

An alternative that included this proposed revision would expand the boundaries of the existing PRZ to incorporate only the Apache National Forest in Arizona. This expansion would provide additional areas of suitable wolf habitat available for the initial release of wolves from the captive population.

The currently established PRZ is bounded on the north by the Apache-Greenlee County line; on the east by the Arizona-New Mexico State line; on the south by the San Francisco River (eastern half) and the southern boundary of the Apache National Forest (western half; and on the west by the Greenlee-Graham County line (San Carlos Apache Reservation boundary). Expansion of the PRZ boundaries is feasible where the additional land to be incorporated is within the Apache National Forest. However, the release sites within the remaining area of the Apache National Forest have been evaluated and scored poorly in overall suitability based on the specific site selection criteria developed by the IFT (IFT 2009). Potential additional release sites in this part of the Apache National Forest in Arizona are constrained by the presence of established wolf pack territories, proximity to the BRWRA boundaries, and/or proximity to livestock and/or areas of human use.

Use of only the Apache National Forest for the initial release of Mexican wolves would not provide additional highly rated release sites in remote locations such as wilderness or other areas with limited or no livestock grazing and minimal human use. Without the greater management flexibility provided by additional highly rated release sites the Reintroduction Project will continue to be constrained in its ability to (1) maximize the probability of successful initial releases, (2) increase the number of effective migrants per generation into the experimental population from the captive population, (3) minimize the potential for wolf-human interaction, (4) reduce the potential for intraspecific (i.e., wolf against wolf) strife and mortality, and (4) minimize depredation opportunities for initial-released wolves. Without an increase in the number of initial releases (and without a better release success rate) the number of effective migrants per generation needed to improve the genetic variation in the Mexican wolf experimental population will not be achieved and the negative effects of inbreeding depression will continue - potentially contributing to the self-amplifying cycle discussed in Section 1.2.2. In such a scenario, high rates of mortality, combined with low rates of effective migration, would result in additional reduction in genetic variation, leading to decreased fitness and lower survival rates and ultimately causing an extinction vortex for the experimental population of Mexican wolves. For these reasons we rejected this proposed revision for the use of only the Apache National Forest for the initial release of Mexican wolves for inclusion as an alternative because, using our established selection criteria, it did not substantially meet the purpose of, and need for, the Proposed Action.

2.2.1.2 Expand the BRWRA to include all of the Tonto National Forest

An alternative that included this proposed revision would expand the boundaries of the existing BRWRA to include all of the Tonto National Forest in Arizona. Inclusion of the entire Tonto National Forest would add an additional 4,489 mi2 (11,627 km^2) to the BRWRA.

The Tonto National Forest is the largest of the six national forests in Arizona. It spans a range of ecosystems from the Sonoran Desert through a variety of chaparral and piñon pine-juniper up to the mixed conifer and ponderosa pine of the Mogollon Rim. The majority of potential wolf habitat and five of the Forest's eight designated wilderness areas are within the Payson, Pleasant Valley, and Tonto Basin Ranger Districts which are on the northern and eastern edges of the Forest. The Cave Creek, Globe and Mesa Ranger Districts of the Forest are on the western and southern edges of the Forest where Sonoran desert, chaparral and piñon pine-juniper vegetation types are predominant. These ranger districts include a number of locations where varied desert terrain and proximity to the metropolitan Phoenix area promote on and off road motorized recreation. Highly concentrated motorized use occurs within these ranger districts and prohibitions on cross-country travel are difficult to enforce (USFS 2012).

Expanding the BRWRA to include the use of the Cave Creek, Globe and Mesa Ranger Districts of the Tonto National Forest for the initial release of Mexican wolves would not provide additional highly rated release sites in remote locations such as wilderness or other areas with limited or no livestock grazing and minimal human use. These ranger districts have a high level of human use, including vehicle traffic. The success rate for inexperienced wolves released in these districts would be expected to be low because of a higher probability of mortality (vehicle impact is the second leading cause of death for Mexican wolves) and the higher propensity of inexperienced wolves to engage in nuisance behavior (potentially requiring post-release removal) in areas of high human presence. Therefore, this proposal would not improve the flexibility of the Reintroduction Project in making management decisions related to the release of Mexican wolves nor would it contribute, through more initial releases with a higher release success rate, to improving the recruitment of captive born wolves into the experimental population. For these reasons we rejected this proposed revision for inclusion as part of an alternative because, using our established selection criteria, it did not substantially meet the purpose of, and need for, the Proposed Action.

2.2.1.3 Expand the BRWRA to include the Fort Apache Indian Reservation (FAIR) of the White Mountain Apache Tribe (WMAT)

An alternative that included this proposed revision would expand the boundaries of the existing BRWRA to include the Fort Apache Indian Reservation (FAIR) of the White Mountain Apache Tribe (WMAT) in Arizona. Inclusion of the FAIR would add an additional 2,627 mi^2 (6.804km^2), 97% of which is suitable wolf habitat to the BRWRA. In 2000, the WMAT entered into an agreement with the Service to allow wolves to occupy its Tribal land. This agreement is subject to successive renewal, in which the Tribe has the option of allowing or prohibiting wolf re-establishment on the FAIR. In 2003, a pair of adult wolves, with previous wild experience (i.e., translocations), and four dependent pups without wild experience (i.e., initial released animals) were released on the FAIR. Subsequently in 2005, a single female wolf was translocated to the FAIR; however, a routine program of initial releases and/or translocations onto the FAIR has not been established. Under our Proposed Action we would seek to continue the agreement entered into in 2000 with the WMAT to allow wolves to occupy the FAIR, and we would conduct initial releases and translocations on the FAIR subject to WMAT approval. The WMAT maintains its own Mexican wolf management program and, under the Tribe's sovereign authority, has the option of allowing Mexican wolves that currently occupy, enter or are released on the FAIR to either remain or be removed. Continued occupancy of wolves on the FAIR is dependent upon tribal agreement, therefore we neither consider it practical nor feasible to include the WMAT as part of the BRWRA. Neither do we consider that an expansion of the BRWRA to include the FAIR would provide the increased management flexibility needed to improve the effectiveness of the Reintroduction Project in making management decisions related to initial release, translocation, take or removal of Mexican wolves. For these reasons we rejected this proposed revision because, using our established selection criteria, it does not substantially meet the purpose of, and need for, the Proposed Action.

2.2.1.4 Allow the initial release of Mexican wolves within the Sacramento and Smokey Bear Ranger Districts of the Lincoln National Forest

An alternative that included this proposed revision would allow the initial release of Mexican wolves into the Sacramento and Smokey Bear Ranger Districts of the Lincoln National Forest. The 1,698 mi^2 (4398.9 km^2) Lincoln National Forest in south-eastern New Mexico lies within the Mexican wolf's probable historical range and contains portions of four mountain ranges that provide suitable habitat for wolves. Mule deer and elk are abundant in the Lincoln National Forest, and the Capitan Mountains and White Mountain Wilderness Areas provide protected primitive areas with no roads, low human usage, and limited livestock grazing that could provide optimal initial release and translocation sites. Allowing initial releases of Mexican wolves in the Sacramento and Smokey Bear Ranger Districts of the Lincoln National Forest combined with our proposal to allow the natural dispersal of wolves from the BRWRA into and throughout the MWEPA could lead to the establishment of packs of Mexican wolves in areas of suitable habitat in the Sacramento, Capitan and Sierra Blanca Mountains. However, no large blocks of suitable habitat are available between the BRWRA and the Lincoln National Forest. We would therefore expect that any wolf packs that were to become established in the Lincoln National Forest through natural recolonization, or through management actions (initial release or translocation), would be semi-disjunctive with linkage to the Mexican wolves in the BRWRA maintained by dispersal across the Rio Grande River valley and White Sands Missile Range.

The consideration to allow initial releases of Mexican wolves into the Sacramento and Smokey Bear Ranger Districts of the Lincoln National Forest must also take into account other factors. The Forest is managed for multiple uses including recreation, grazing and timber operations (USFS 1986). Numerous private in-holdings are scattered throughout the Forest, and the Mescalero Apache Indian Reservation, which lies between the Smokey Bear and Sacramento Mountains Ranger Districts, runs cattle operations, the Ski Apache Ski Resort and the Inn of the Mountain Gods Resort Casino. The Mescalero Apache Reservation bisects the Sacramento and Smokey Bear Ranger Districts. Under our proposed rule we could seek to enter into a voluntary agreement with the Mescalero Apache Tribal government for the management of wolves on the Reservation. However, under any agreement, the Tribe would maintain its own Mexican wolf management program and, under the Tribe's sovereign authority, would have the option of allowing Mexican wolves that enter or are released on the Reservation to either remain or be removed.

The management flexibility needed to improve the effectiveness of the Reintroduction Project in making management decisions related to initial release of Mexican wolves would be constrained in the Sacramento and Smokey Bear Ranger Districts of the Lincoln National Forest because of numerous private in-holdings and significant grazing and logging operations on this part of the Forest. Additionally, because these districts are bisected by the Mescalero Apache Reservation where any releases or occupancy by wolves on the Reservation would be dependent upon tribal agreement, we do not believe that initial releases in these districts would facilitate the colonization of new areas of suitable habitat within the MWEPA, including wilderness areas or other areas that have limited or no livestock grazing and minimal human use. Therefore, we neither consider it practical nor feasible to provide for initial releases of Mexican wolves onto the Lincoln National Forest and we rejected this proposed revision because, using our established selection criteria, it does not substantially meet the purpose of, and need for, the Proposed Action.

2.2.1.5 Establish an expanded MWEPA that extends north of I-40

An alternative that included this proposed revision would extend the northern boundary of the existing MWEPA to include all of the states of Arizona and New Mexico, or, even further north, into the southern portions of the states of Utah and Colorado, bounded on the north by I-70. One proposal would expand the MWEPA north of I-40 to include all of the states of New Mexico and Arizona and the portion of Utah and Colorado south of I-70. Under this proposal, Mexican wolves would be allowed to occupy the entire MWEPA. A second proposal for an expanded MWEPA would include all of the states of Arizona and New Mexico and designate areas entitled "the Blue Range Mexican Wolf Recovery Area (BRMWRA)" and the "Mexican Wolf Management Area (MWMA)." Under this proposal, Mexican wolves would be allowed to occupy the BRMWRA and MWMA but would be removed from areas north of I-40.

Moving the MWEPA boundary in Arizona and New Mexico north to the state border with Utah and Colorado would add an area with 30,973 mi^2 (80,219 km^2) of suitable wolf habitat to be managed under the 10(j) experimental population rules. In northern Arizona/southern Utah, suitable wolf habitat is found in Grand Canyon National Park and large areas of adjacent federal lands. In northern New

Mexico/southern Colorado, large areas of suitable Mexican wolf habitat are found in national forest lands adjacent to private lands with conservation management (Carroll et al. 2006). Within the Colorado Plateau ecoregion, which extends south from Colorado/Utah into northern Arizona and New Mexico, the primary wild ungulate prey species available to support dispersing and/or recolonizing wolves are elk (*Cervus elaphus*) and mule deer (*Odocoileus hemionus).* The largest elk herds in North America are found here and deer and elk are sympatric throughout much of the region (Watkins et al. 2007). The counties in the northern parts of Arizona and New Mexico (north of I-40) are primarily rural, with few incorporated municipalities and, with the exception of Colfax County, New Mexico, all have a large proportion of land under Federal or tribal control. The effects of climate change in the southwestern United States and northern Mexico could make the area north of I-40 in Arizona and New Mexico increasingly important for the full recovery of the Mexican wolf. All of North America is very likely to warm during this century and localized projections suggest the southwestern U.S. may experience the greatest temperature increase of any area in the lower 48 states (IPCC 2007). It is very likely that hot extremes, heat waves, and heavy precipitation will increase in frequency with a high confidence that many semi-arid areas like the western U.S. will suffer a decrease in water resources due to climate change (IPCC 2007). The result of predicted climate change trends could include reduced summer base flow in streams, increased runoff and erosion during storm events, and the earlier onset of summer low-flow conditions (Mote et al. 2005). Reduced water in the system may reduce or localize big game populations in the summer months; such changes have the potential to adversely affect the wolf within the next 50 to 100 years through reductions or distributional shifts in wild ungulate populations.

As specified in our 1998 Final Rule, the reintroduction of the Mexican wolf into the BRWRA was envisaged in the 1982 Mexican Wolf Recovery Plan "as the first step toward recovery of the Mexican wolf in the wild" (63 FR 1752, January 12, 1998). A binational captive-breeding program between the United States and Mexico was initiated in the late 1970s with the capture of the last remaining Mexican wolves in the wild. The 1998 Final Rule enabled us to release Mexican wolves from the captive population into the BRWRA to determine if it was possible to reestablish a wild population. Since 1998, we have demonstrated success in establishing a wild population (e.g., a minimum of 83 Mexican wolves in the wild, all of which were wild born as of December 2013). We are now proposing the expansion of the MWEPA and revisions of the regulations to the 1998 Final Rule so that we can improve the effectiveness of the reintroduction project to achieve the necessary population growth, distribution, and recruitment, as well as genetic variation within the Mexican wolf experimental population so that it can contribute to recovery in the future. Following the initiation of this phase of improving the conservation status of the existing experimental population, we intend to revise the Mexican wolf recovery plan so that it provides a recovery goal and objective recovery criteria. Implementation of the revised recovery plan may necessitate revision to this regulation for the experimental population in the MWEPA or the development of regulations associated with the establishment of one or more populations in other areas in the future. If actions are proposed to place Mexican wolves north of I-40, coordination with the states of Colorado and Utah, in addition to Arizona and New Mexico, would be required. Such actions would also require review in accordance with NEPA. Because we do not have a sound, peer reviewed, scientific basis to guide us on where Mexican wolves are needed to reach full recovery (i.e., delisting), we are limiting the revised MWEPA to areas south of Interstate 40 in Arizona and New Mexico. Furthermore, we are constrained by time limits placed upon us by the stipulated settlement agreement reached in *Center for Biological Diversity v. Jewell,* Case No. 12-cv-1920 (August 2013). Pursuant to that agreement, the Service must publish this rule by January 12, 2015. Therefore, we do not have time to finalize a new recovery plan or conduct the NEPA analysis required to place Mexican wolves north of I-40 or expand the MWEPA north of I-40 at this time.

We do not consider that an expansion of the MWEPA in Arizona and New Mexico north of I-40, coupled with the proposed management provision that would require removal of any wolf in the expanded area, regardless of its involvement in depredation or nuisance behavior, would improve the effectiveness of our management of the experimental population. Conversely, an expansion of the MWEPA north of I-40 into southern Colorado and Utah with provisions to allow wolves to disperse into and occupy the expanded area would provide a large area of suitable habitat for the Mexican wolf and increased flexibility to the Reintroduction Project. However, understanding that it is not mandatory for any individual or entity to implement actions found in a recovery plan, a new recovery plan has not yet been completed that indicates the most appropriate area (or areas) for the establishment of a metapopulation of Mexican wolves or that specifies objective and measurable recovery criteria. Even if we had a new recovery plan, there is no requirement that any of the recovery actions in that plan be implemented by any particular entity or individual. Thus, there is no guarantee that even if we had a new recovery plan we would expand the MWEPA north of I-40 at this time. The size of the metapopulation of Mexican wolves needed for recovery, the number of semi-disjunctive but viable subpopulations that might make up that metapopulation, the areas in which those subpopulations should be established, and the degree of connectivity needed between those areas are some of the many issues associated with the development of a new recovery plan that are the subject of ongoing review and discussion.

The need to utilize the area north of I-40 for the recovery of the Mexican wolf has not been established, and the actions we would need to take to manage Mexican wolves in this area are not reasonably foreseeable. In contrast, we have fully analyzed our proposal to extend the MWEPA south to the international border with Mexico would add an area of 33,995mi^2/88,065 km^2 to be managed under the 10(j) experimental population rules. We believe this addition, which would incrementally increase the size of the existing MWEPA by 28 percent, to be practical and feasible because it would better align our reintroduction efforts with the reintroduction of Mexican wolves now underway in Mexico. It is also expected to improve the effectiveness of our management for Mexican wolves which may disperse into the United States from Mexico and for wolves which may disperse from the experimental population of Mexican wolves now occupying the BRWRA.

The area north of I-40 in Arizona and New Mexico contains extensive suitable habitat for Mexican wolves. However, whether or not this area would contribute to Mexican wolf recovery, particularly in light of the potential threat of climate change, would be expected to be addressed in the development of a new recovery plan. Until a new recovery plan is completed, we intend to focus our efforts to further the conservation of the Mexican wolf by improving the effectiveness of the Reintroduction Project in managing the the experimental population south of I-40 so that it can contribute to recovery in the future. Returning wolves to the MWEPA south of I-40 will ensure that these animals continue to contribute to achieving the population growth and distribution needed to improve the likelihood of persistence of the Mexican wolf experimental population. While we understand the need to consider the potential effects of climate change and we recognize the importance of natural dispersal and colonization/recolonization of unoccupied habitat which expands the species' range, we consider that including an expansion of the MWEPA north of I-40 in Arizona and New Mexico in our proposed action and alternatives to be outside the scope of this EIS. Therefore, we rejected this proposed revision because, using our established selection criteria, it does not substantially meet the purpose of, and need for, the Proposed Action.

2.2.1.6 Allow natural dispersal from the BRWRA into the MWEPA but no translocations within the MWEPA.

An alternative that included this proposed revision would allow wolves to disperse from the BRWRA into, and within, the MWEPA but would limit translocations by the Reintroduction Project to only the BRWRA.

We expect the natural dispersal of wolves from the BRWRA to lead to the establishment of new wolf packs in the surrounding MWEPA. As they disperse from the BRWRA we expect wolves to establish pack territories in areas of suitable unoccupied (by wolves) habitat in the t MWEPA. If these new packs are successful and reproduce we expect young wolves to disperse into additional areas of unoccupied suitable habitat within the MWEPA. This process should expand the range of the experimental population of wolves and increase its numbers.

Under an alternative where we would allow natural dispersal and the establishment of wolf packs in the MWEPA but would not allow translocations within the MWEPA, a management removal of a wolf would lead to either putting that wolf into captivity or translocating it to the BRWRA. If placed in captivity that wolf would neither be able to breed in the wild nor would the Reintroduction Project be able to translocate it to pair with a genetically appropriate mate in the MWEPA. Placement of a wolf in captivity could have a negative impact on our efforts to improve the genetic variation of the experimental population of Mexican wolves, as well as a negative impact on the ability to manage the captive population. A wolf returned to the BRWRA from the MWEPA could have a negative impact to our efforts to expand the range of the experimental population and thereby improve its probability of its persistence. It could also lead to intraspecific conflicts and wolf mortality if the wolf were translocated within an area where pack territories are already established.

Our proposal to allow wolves to disperse from the BRWRA into, and within, the MWEPA is expected to lead to the natural growth and wider distribution of the experimental population. Except as requested by tribal governments on their Tribal trust lands, we do not intend to remove wolves from federal or non-federal land in the MWEPA unless they engage in depredation or nuisance behavior that cannot be effectively managed through non-removal techniques. However, we recognize that wolf management, including removals, in response to depredations and nuisance behavior is an essential component of our reintroduction efforts (AMOC and IFT 2005, Mech and Boitani 2003). Accordingly, we view the ability to translocate wolves within the MWEPA, coupled with our proposal to allow them to naturally disperse, as a necessary management tool to achieve the population growth and distribution that would contribute to ensuring the persistence and improving the genetic variation of the experimental population. This proposed revision does not provide the increased management flexibility that would improve the effectiveness of the Reintroduction Project in managing the experimental population of Mexican wolves. Therefore, we rejected this proposed revision because, using our established selection criteria, it does not substantially meets the purpose of, and need for, the Proposed Action.

2.2.1.7 Implementation of a management plan (Mexican Wolf Management Plan) for the Mexican wolf (Canis lupus baileyi) for those portions of western Texas, Arizona and New Mexico outside of the MWEPA

The reintroduction effort for Mexican wolves now being undertaken by the Mexican government has established a need to manage wolves that may disperse into the southwestern United States from reestablished wolf populations in Mexico. An alternative that included this proposed revision would address the management of Mexican wolves in those portions of west Texas, Arizona, and New Mexico outside of the MWEPA through the implementation of a management plan for those areas. The intent of developing a management plan for these areas would be to describe our strategy to conserve and promote the recovery of the Mexican wolf while responding to reports of depredation and wolf-human/wolf-livestock interaction in a timely, professional, consistent and effective manner.

The implementation of a wolf management plan for Arizona, New Mexico and west Texas was the subject of the Proposed Action in our *Preliminary Draft Environmental Assessment (PDEA) for the Implementation of a Southwestern Gray Wolf (Canis lupus) Management Plan for Portions of Arizona, New Mexico and Texas*. We decided to withdraw the proposed action for this PDEA in response to early feedback during the agency/local government/tribal scoping review and in order to reevaluate the action in the context of our proposed revisions to the 1998 Final Rule. In our reevaluation of the need for the action we decided that because of the distance (approximately 130 miles/209 km) to the Texas border from the potential Nuevo Leon reintroduction site in Mexico, and the difficulties encountered in the initial release of Mexican wolves into the Sierra San Luis in the State of Sonora, dispersal and recolonization of west Texas by Mexican wolves is considered unlikely in the foreseeable future. Implementation of a Mexican wolf management plan for portions of Arizona and New Mexico outside of the MWEPA was included in the alternatives we considered in Chapter 2 of our preliminary draft EIS. The proposed *Mexican Wolf Management Plan* was intended to provide us a greater range of options under section 10 (a)(1)(A) of the ESA to prevent or respond to reports of livestock depredation incidents or nuisance behavior. However, we are now proposing to extend the boundary of the MWEPA in Arizona and New Mexico south from Interstate-10 (I-10) to the international border with Mexico. We are also now proposing to revise the Mexican Wolf Recovery Program's 10(a)(1)(A) permit so that it would apply both to the MWEPA and to areas outside the MWEPA. Under a revised and reissued section 10(a)(1)(A) research and recovery permit we would authorize removal of Mexican wolves that can be identified as coming from the experimental population that disperse to establish territories in areas outside of the MWEPA. These wolves would, dependent on a determination based in part on their genetic value relative to the Mexican wolf population be either translocated to areas of suitable habitat within the MWEPA, transferred to the reintroduction project in Mexico, or maintained in captivity.

Because of the low probability of Mexican wolves dispersing into Texas from reestablished Mexican wolf populations in Mexico we no longer consider it necessary to implement a wolf management plan for portions of west Texas where Mexican wolves will be listed as endangered. In the event that a Mexican wolf is found in Texas it would either be managed as endangered under the Act or, under our proposal to revise the Mexican Wolf Recovery Program's section 10(a)(1)(A) permit so that it would apply both to the MWEPA and to areas outside the MWEPA, it would be captured and returned to the MWEPA or placed in captivity if identified as coming from the experimental population. We expect any Mexican wolf found north of I-40 in Arizona and New Mexico to have come from the experimental population in the MWEPA. Under our proposal to revise the Mexican Wolf Recovery Program's section 10(a)(1)(A) permit so that it would apply both to the MWEPA and to areas outside the MWEPA, any Mexican wolf would be captured and returned to the MWEPA or placed in captivity. An expansion of the MWEPA south in Arizona and New Mexico to the international border with Mexico would allow us to manage all Mexican wolves in this area, regardless of origin, under the experimental population 10(j) rule. Management actions, available under the proposed 10(j) rule, such as translocations, could supplement natural dispersal, and the establishment of management agreements with private landowners could facilitate the linkage between the potential wolf habitat to the north of I-10 and wolf habitat in the reintroduction areas in the states of Chihuahua and Sonora in northern Mexico. The extension of the proposed 10(j) rule south of I-10 would also improve the effectiveness of our reintroduction project to address depredation and nuisance behaviors in a manner that is responsive to the needs of the local community.

Dispersal and recolonization of west Texas by Mexican wolves from Mexico is considered unlikely in the foreseeable future. We believe that allowing dispersing wolves from the experimental population to establish territories outside of the proposed expanded MWEPA would decrease the effectiveness of the reintroduction project (see Section 1.2.4.4). The regulatory flexibility provided by our proposed 10(j) rule would allow us to take management actions within the proposed expanded MWEPA that furthers the conservation of the Mexican wolf while being responsive to needs of the local community in cases of depredation or nuisance behavior (see Section 1.2.3). For these reasons, we do not consider that implementation of a management plan for those portions of west Texas, Arizona, and New Mexico outside of the MWEPA would provide the increased management flexibility that would improve the effectiveness of the Reintroduction Project in managing the experimental population of Mexican wolves. Therefore, we rejected this proposed revision because, using our established selection criteria, it does not substantially meet the purpose of, and need for, the Proposed Action.

2.2.1.8 Implement control measures that remove wolves from the experimental population if involved in three depredation incidents within a 12-month time.

An alternative that included this proposed management provision would establish mandatory removal actions for a Mexican wolf, or wolves, involved in three depredation incidents within a 12-month time frame. Under this proposal, problem wolves would be defined for the purposes of management and control as wolves that:

- Have depredated, killed, wounded, attacked, chased or molested livestock or domestic animals other than livestock in 3 or more confirmed incidents on private or public land within the past 365 days; or
- Are members of a group or pack (including adults, yearlings and young-of-the-year) that has depredated, killed, wounded, bitten, attacked or chased livestock or domestic animals other than livestock in 3 or more confirmed incidents on private or public land within the past 365 days; or
- Are young-of-the-year that have been fed by, or which are dependent on, adult wolves that have been involved with 2 or more confirmed livestock depredation incidents within the past 180 days (these thresholds are lower because such pups are more likely to acquire livestock depredation habits); or
- Are habituated to humans or to human residences or other facilities.

Some form of wolf management is usually necessary when wolves prey on livestock or engage in other nuisance behavior (Fritts et al. 2003). Accordingly, we recognize the importance of obtaining an appropriate balance between enabling wolf population growth and minimizing nuisance and depredation impacts on local stakeholders, and we understand that removal of wolves to address conflicts with livestock (depredation) or humans (nuisance) is an essential component of reintroduction efforts (AMOC and IFT 2005). However, management of problem wolves is most appropriately addressed in a management plan versus in a regulation because the management plan, which will comply with this new 10(j) rule, will be able to adapt to changes in our knowledge of wolf behavior and biology, as well as new technology. In addition, the proposed alternative is similar to the policy established in the now discontinued Standard Operating Procedure (SOP) 13.0: Control of Mexican Wolves. The period that SOP 13.0 was in practice (2003 through 2008) had the highest number of temporary and permanent removals, and a growth rate for the experimental population that was flat (Table 1-3). Based on this experience, this provision would not be expected to contribute to increasing the total number of wolves in the experimental population or improving its probablility of persistence or the genetic variation within the population. Conflicts between wild wolves and livestock do occur, but most should be addressed through management of the overall situation, not just management of the offending wolf (AMOC and IFT 2005). While such management may require removal of problem wolves, including the use of lethal take, translocations and other management responses such as hazing, fladry, movement of wolves or livestock, and removal of individual pack members can be also be employed to minimize and avoid livestock losses to wolf depredation (AMOC and IFT 2005). Accordingly, we believe that regulating the mandatory removal of problem wolves would constrain rather than provide needed flexibility to the Reintroduction Project in making decisions related to the release, translocation, take and removal of Mexican wolves. For these reasons we rejected this proposed revision because, using our established selection criteria, it does not substantially meet the purpose of, and need for, the Proposed Action.

2.3 PROPOSED ACTION AND ALTERNATIVES CONSIDERED

We are proposing revisions to the regulations established for the Mexican wolf reintroduction in the 1998 Final Rule and the Mexican Wolf Recovery Program's section 10(a)(1)(A) research and recovery permit (TE-091551-8 dated 04/04/2013). In summary we propose to:

- Modify the geographic boundaries in which Mexican wolves are managed south of Interstate-40 in Arizona and New Mexico under section 10(j) of the Endangered Species Act.
- Modify the management regulations that govern the initial release, translocation, removal and take (see the definition of "*take*" provided in the List of Definitions) of Mexican wolves.
- Issue a section 10(a)(1)(A) permit for the MWEPA and areas outside of the MWEPA.

These actions would be implemented through a final nonessential experimental population rule (final 10(j) rule), an Endangered Species Act (Act) Section 10(a)(1)(A) research and recovery permit, and provision of federal funding. Four alternatives, including the no action alternative, are brought forward for further analysis.

2.3.1 Alternative One (Proposed Action and Preferred Alternative)

- MWEPA Expansion with Management Zones;
- Expanded Zone 1;
- Phased Management;
- Achieve an Experimental Population Objective of 300 to 325 wolves; and
- Modified provisions for take of Mexican wolves.

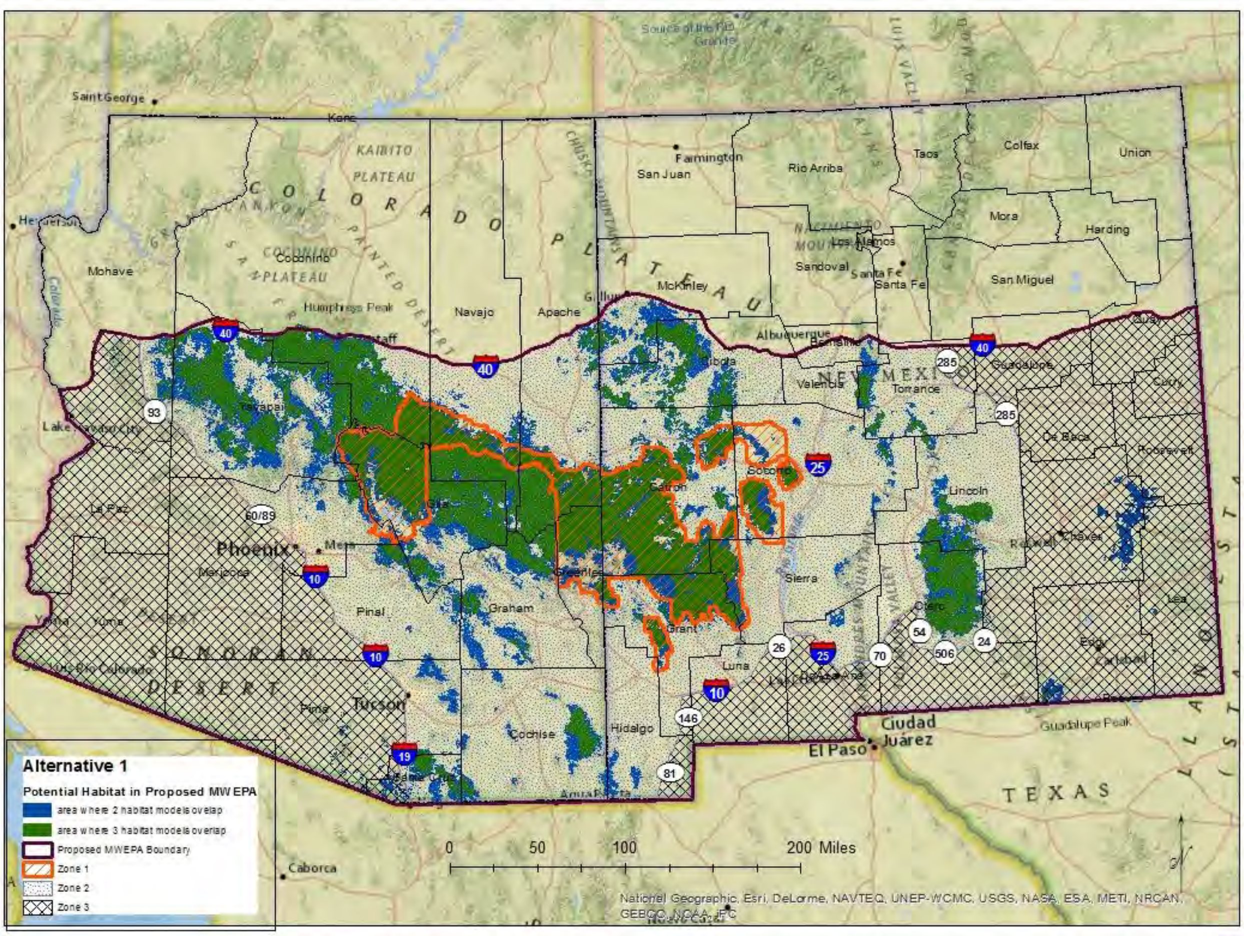


Figure 2-1. Alternative One (Proposed Action and Preferred Alternative)

Alternative One is our proposed action and preferred alternative. Under this alternative we would expand the area in which initial releases of Mexican wolves from captivity could occur and extend the southern boundary of the MWEPA in Arizona and New Mexico to the United States-Mexico international border. Within the expanded MWEPA, we would designate three wolf management zones and we would discontinue the designation of the BRWRA and its divisions of primary and secondary recovery zones. Within the proposed management zones we would conduct management actions intended to further the conservation of the Mexican wolf while being responsive to the needs of the local community in cases of depredation or nuisance behavior by wolves. Under this alternative we would adopt a phased management approach to minimize or avoid possible impacts to wild ungulate populations (specifically elk) in portions of western Arizona. We intend to achieve a Mexican wolf experimental population objective of from 300 to 325 wolves within the entire MWEPA. Phase 1 would be in effect in the first through the fifth year after the effective date of the final 10(j) rule. Execution of each subsequent phase would be dependent upon evaluations conducted in the fifth and eighth year after the effective date of the final rule. Each phase evaluation will consider adverse human interactions with Mexican wolves, impacts to wild ungulates, and whether or not the Mexican wolf population in the MWEPA is achieving a population number consistent with a 10 percent annual growth rate based on end-of-year counts, such that 5 years after the effective date of this rule the population is at least 150 Mexican wolves, and 8 years after the effective date of this rule the population is at least 200 Mexican wolves. If we have not achieved this population growth, we will move forward to the next phase. Regardless of the outcome of the two evaluations, at the beginning of year twelve from the effective date of the final 10(j) rule, we would move to full implementation of the rule throughout the MWEPA, and the phased management approach would no longer apply. Alternative One would:

- Make geographic boundary changes that:
  - Remove the designation of the White Sands Wolf Recovery Area (WSWRA) as the back-up area for the initial release of Mexican wolves from captivity.
  - Remove from the MWEPA the small portion of Texas lying north of U.S. Highway 62/80 to the Texas-New Mexico boundary.
  - Move the southern boundary of the MWEPA in Arizona and New Mexico from Interstate-10 to the United States-Mexico international border.
  - Designate three wolf management zones within the expanded MWEPA and discontinue the designation of the BRWRA:
    - Zone 1 is an area of 12,507mi^2 (32,392 km^2) within the MWEPA where Mexican wolves would be allowed to naturally disperse into and occupy and where Mexican wolves may be initially released from captivity or translocated. Approximately 83 percent of Zone 1(10,359 mi^2/26,830 km^2) has suitable habitat for wolves (Figure 2-6). Zone 1 would include all of the Apache and Gila National Forests (the existing BRWRA); the Sitgreaves National Forest; 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 is an area of 78,756 mi^2 (203,978 km^2) within the MWEPA where Mexican wolves would 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 would be limited to pups less than five months old to allow for the cross-fostering of pups from the captive population into the wild, and to enable 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 could also be initially released under Service and state approved management agreements with private landowners or a Service approved management agreements with

tribal governments. Approximately 27 percent (21,004mi^2/54,339 km^2) of Zone 2 has suitable habitat for wolves (Figure 2-1). The northern boundary of Zone 2 is Interstate Highway 40; the western boundary extends south from Interstate Highway 40 and follows Arizona State Highway 93, Arizona State Highway 89/60, Interstate Highway 10, and Interstate Highway 19 to the United States-Mexico international border; the southern boundary is the United States-Mexico international border heading east, then follows New Mexico State Highway 81/146 north to Interstate Highway 10, then along New Mexico State Highway 26 to Interstate Highway 25; the boundary continues along New Mexico State Highway 70/54/506/24; the eastern boundary follows the eastern edge of Otero County, New Mexico, to the north and then along the southern and then eastern edge of Lincoln County, New Mexico, until it intersects with New Mexico State Hwy 285 and follows New Mexico State Highway 285 north to the northern boundary of Interstate Highway 40. Zone 2 excludes the area in Zone 1.

- Zone 3 is an area of 62,590 mi^2 (162,108 km^2) within the MWEPA where Mexican wolves would be allowed to disperse into and occupy but neither initial releases nor translocations would occur. Zone 3 is an area of less suitable Mexican wolf habitat where Mexican wolves would be more actively managed under the authorities of the proposed rule to reduce human conflict. Approximately 1 percent (882 mi^2/2,283 km^2) of Zone 3 has suitable habitat for wolves (Figure 2-1). Zone 3 is two separate geographic areas on the eastern and western sides of the MWEPA. One area of Zone 3 is in western Arizona and the other in eastern New Mexico. In Arizona, the northern boundary of Zone 3 is Interstate Highway 40; the eastern boundary extends south from Interstate Highway 40 and follows State Highway 93, State Highway 89/60, Interstate Highway 10, and Interstate Highway 19 to the United States–Mexico international border; the southern boundary is the United States–Mexico international border; the western boundary is the Arizona–California State border. In New Mexico, the northern boundary of Zone 3 is Interstate Highway 40; the eastern boundary is the New Mexico–Texas State border; the southern boundary is the United States–Mexico international border heading west, then follows State Highway 81/146 north to Interstate Highway 10, then along State Highway 26 to Interstate Highway 25, the southern boundary continues along State Highway 70/54/506/24; the western boundary follows the eastern edge of Otero County to the north and then along the southern and then eastern edge of Lincoln County until it follows State Highway 285 north to the northern boundary of Interstate Highway 40

- Make management changes that:
  - Allow initial release of Mexican wolves throughout the entire Zone 1 in accordance with a phased management approach.
  - Allow Mexican wolves to disperse naturally from Zone 1 into, and within the MWEPA (Zones 2 and 3) and occupy the MWEPA (Zones 1, 2 and 3) in accordance with a phased management approach.
  - Allow the translocation of wolves at selected release sites on federal land within Zones 1 and 2 of the MWEPA in accordance with a phased management approach.
  - Allow wolves to occupy federal and non-federal land in the MWEPA except in the case of depredation or other nuisance behavior that cannot be effectively managed through non-removal techniques.
  - Capture and remove wolves on tribal land if requested by the tribal government.

- Implement a phased management approach so that in:
  - Phase 1: Initial release of Mexican wolves would be conducted throughout Zone 1 **with the exception of** the area west of State Highway 87 in Arizona. No translocations would be conducted west of State Highway 87 in Arizona in Zone 2. Mexican wolves would be allowed to disperse naturally from Zone 1 into, and within the MWEPA (Zones 2 and 3) and occupy the MWEPA (Zones 1, 2 and 3). However, during Phase 1 dispersal and occupancy in Zone 2 west of State Highway 87 would be limited to the area north of State Highway 260 and west to Interstate 17.
  - Phase 2: If determined to be necessary by either the 5-Year or 8-Year evaluation: initial release of Mexican wolves would occur throughout Zone 1 **including** the area west of State Highway 87 in Arizona; No translocations would be conducted west of Interstate Highway 17 in Arizona. Mexican wolves would be allowed to disperse naturally from Zone 1 into, and within the MWEPA (Zones 2 and 3) and occupy the MWEPA (Zones 1, 2 and 3) **with the exception** of those areas in Zone 2 west of State Highway 89 in Arizona.
  - Phase 3: If determined to be necessary by the 5-Year or 8- Year evaluation: Initial release of Mexican wolves would be conducted throughout the entire Zone 1 **including** the area west of State Highway 87 in Arizona; no translocations would be conducted west of State Highway 89 in Arizona; Mexican wolves would be allowed to disperse naturally from Zone 1 into, and within the MWEPA (Zones 2 and 3) and occupy the MWEPA (Zones 1, 2 and 3).
  - Year 12 and beyond: Phased management approach ends: Initial release of Mexican wolves could be conducted throughout entire Zone 1; Translocations could be conducted at selected translocation sites on federal land and on non-federal private and tribal land with voluntary management agreements within Zones 1 and 2 of the MWEPA. Mexican wolves would be allowed to disperse naturally from Zone 1 into, and within the MWEPA (Zones 2 and 3) and occupy the MWEPA (Zones 1, 2 and 3).
- Revise the regulations for the take of Mexican wolves on federal and non-federal land within the entire MWEPA (Zones 1, 2 and 3):
  - Revise the conditions that determine when we would issue a permit to allow livestock owners or their agents to take (including intentional harassment or kill) any Mexican wolf that is in the act of biting, wounding or killing livestock (see definition of *livestock* in the List of Definitions) on federal land;
  - Allow domestic animal owners or their agents to take (including kill or injure) any Mexican wolf that is in the act of biting, wounding or killing domestic animals (see definition of *domestic animal* in the List of Definitions) on non-federal land anywhere within the MWEPA;
  - Pursuant to a removal action authorized by the Service or a designated agency, the Service or designated agency may issue permits to allow domestic animal owners or their agents (e.g., employees, land manager, local officials) to take (including intentional harassment or kill) any Mexican wolf that is present on non-federal land where specified in the permit.
  - Revise the conditions under which take will be authorized in response to unacceptable impacts of Mexican wolf predation on wild native ungulate herds. An unacceptable impact would be determined by a state agency based upon ungulate management goals, or a 15 percent decline in an ungulate herd as documented by a State 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.

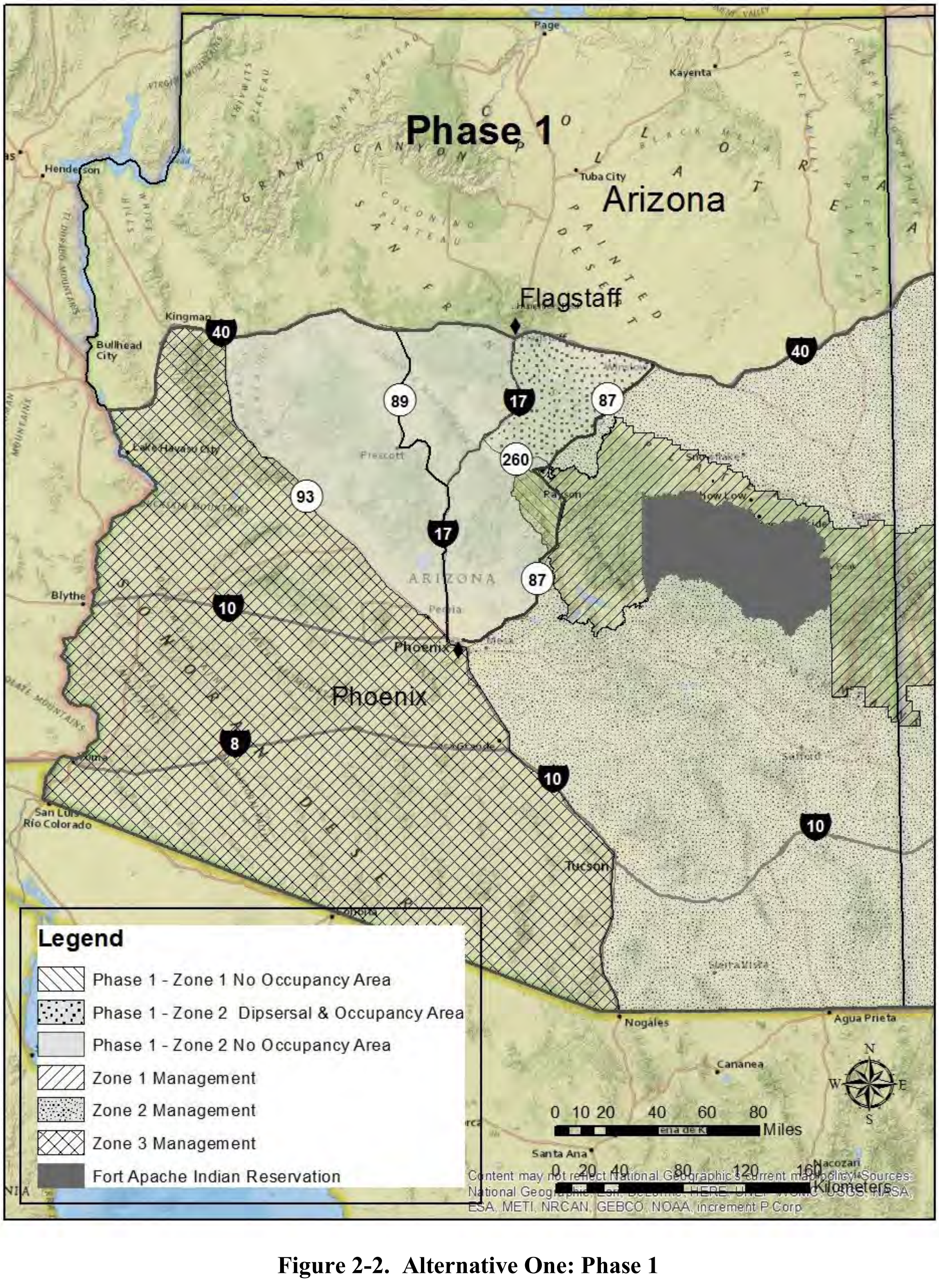


Figure 2-2. Alternative One: Phase 1

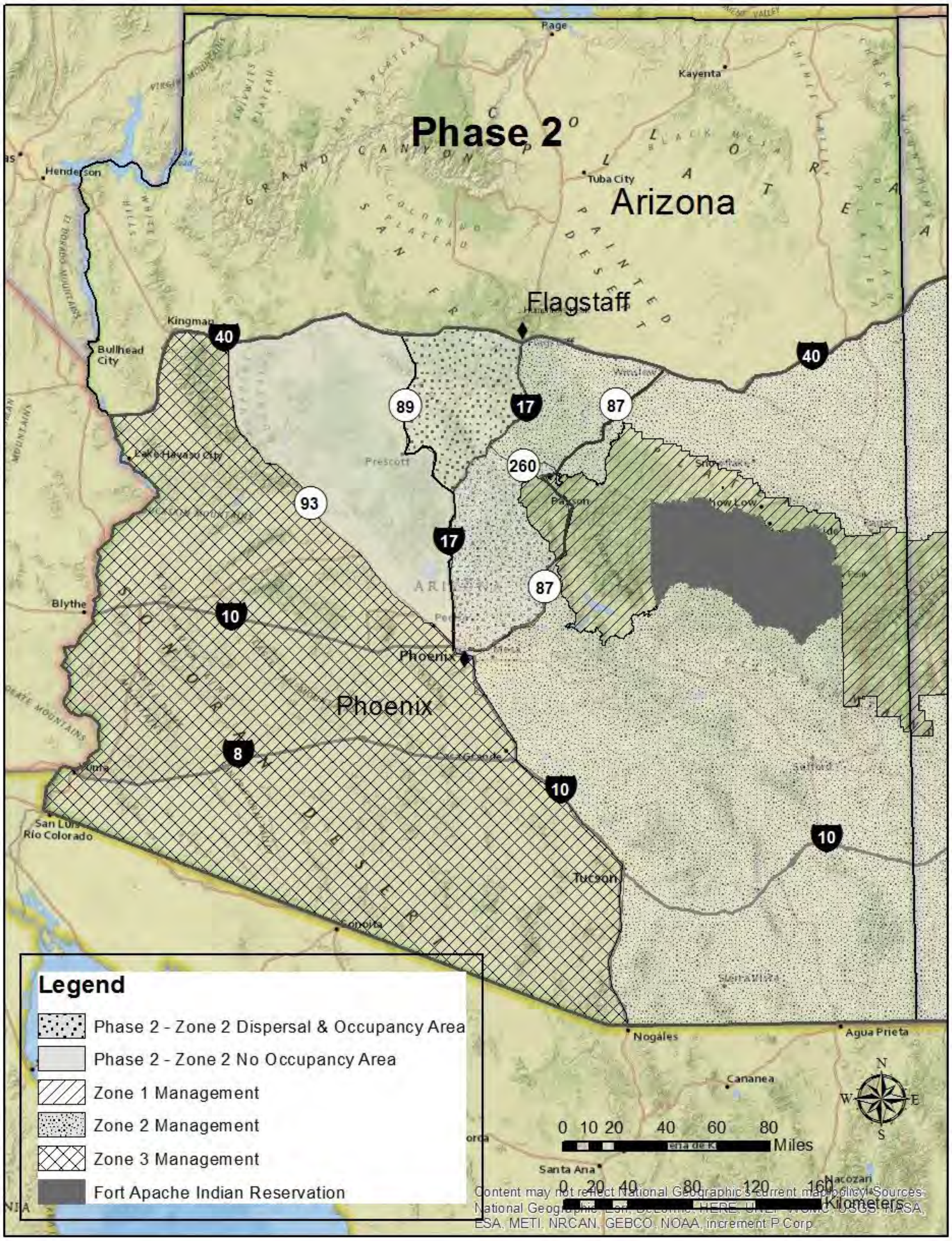


Figure 2-3. Alternative One: Phase 2

Figure 2-4. Alternative One: Phase 3

- Maintain an experimental Mexican wolf population of 300 to 325 wolves in the MWEPA.

- Subject to Service and state approved management agreements, the Service or a designated agency may develop and implement management actions on private land in management Zones 1 and 2 within the MWEPA in voluntary cooperation with private landowners, including but not limited to initial release and translocation of wolves onto private lands if requested by the landowner.
- Subject to agreements with tribal governments, the Service may develop and implement management actions on tribal trust land in management Zones 1 and 2 within the MWEPA in voluntary cooperation with tribal governments including but not limited to initial release, translocation onto Tribal trust lands, capture, and removal of Mexican wolves from Tribal trusts lands if requested by the tribal government.
- Revise and reissue the Mexican Wolf Recovery Program's section 10(a)(1)(A) research and recovery permit (TE-091551-8 dated 04/04/2013) so that it applies to both the MWEPA and areas outside of the MWEPA. Under this permit we would authorize removal of Mexican wolves that can be identified as coming from the experimental population that disperse to establish territories in areas outside of the MWEPA. Based in part on their genetic value relative to the Mexican wolf population, we may make a determination to maintain these wolves in captivity, translocate them to areas of suitable habitat within the MWEPA, or transfer them to Mexico.

2.3.2 Alternative Two

- MWEPA Expansion with Management Zones; and
- Modified Provisions for Take of Mexican Wolves.

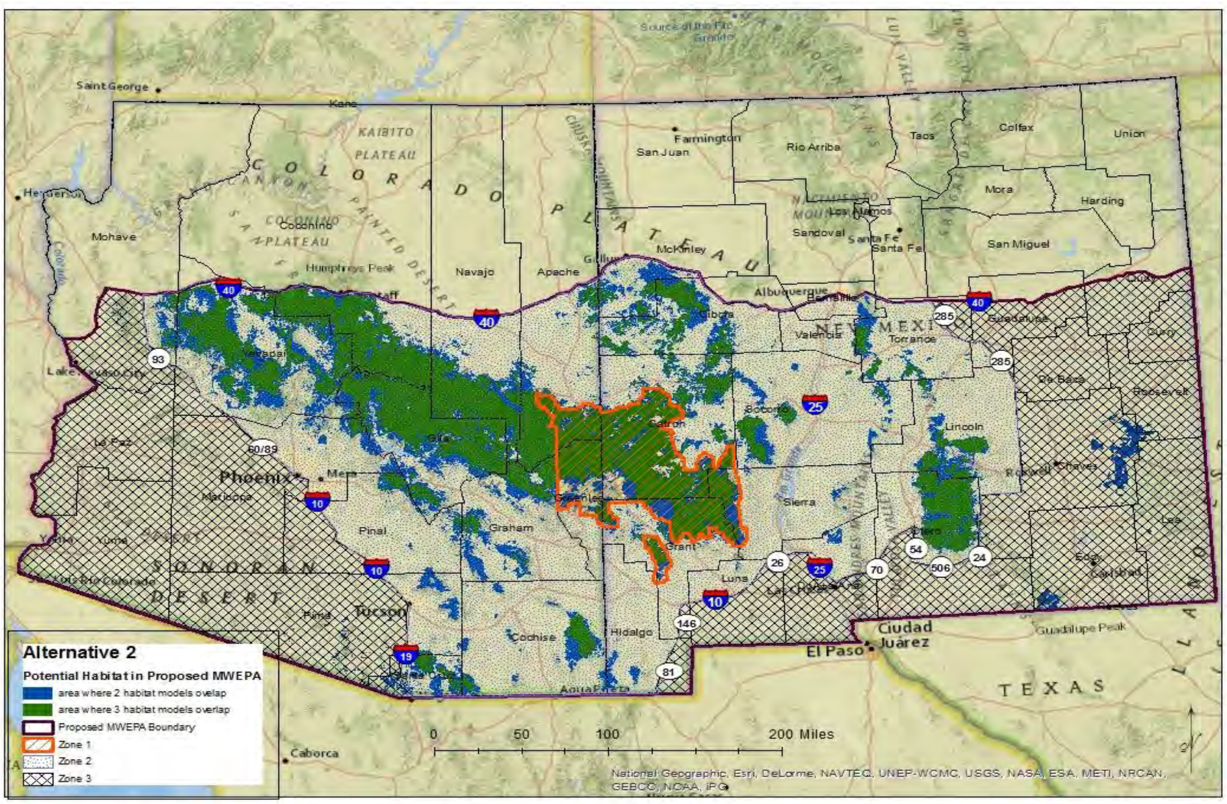


Figure 2-5. Alternative Two

Alternative Two would include all the initiatives proposed under Alternative One except under this alternative we would **not:** adopt a phased management approach or; establish a Mexican wolf experimental population objective of from 300 to 325 wolves within the entire MWEPA or; expand the geographic boundaries of the proposed management Zone 1 beyond the Apache and Gila National Forests (the existing BRWRA). Alternative Two would:

- Make geographic boundary changes that:
    - Remove the designation of the White Sands Wolf Recovery Area (WSWRA) as the back-up area for the initial release of Mexican wolves from captivity.
    - Remove from the MWEPA the small portion of Texas lying north of U.S. Highway 62/80 to the Texas-New Mexico boundary.
    - Move the southern boundary of the MWEPA in Arizona and New Mexico from Interstate-10 to the United States-Mexico international border.
    - Designate three wolf management zones within the expanded MWEPA and discontinue the designation of the BRWRA:
        - Zone 1 is an area of 7,197 mi^2 (18,639 km^2) within the MWEPA where Mexican wolves would be allowed to naturally disperse into and occupy and where Mexican wolves may be initially released from captivity or translocated. Approximately 87 percent of Zone 1(6,263 mi^2/16,221 km^2) has suitable habitat for wolves (Figure 2-5). Zone 1 would include all of the Apache and Gila National Forests (the existing BRWRA).
        - Zone 2 is an area of 84,069 mi^2 (217,737 km^2) within the MWEPA where Mexican wolves would 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 would be limited to pups less than five months old to allow for the cross-fostering of pups from the captive population into the wild, and to enable 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 could also be initially released under Service and state approved management agreements with private landowners or a Service approved management agreements with tribal governments. Approximately 30.0 percent (25,100 mi^2 /65,008 km^2) of Zone 2 has suitable habitat for wolves (Figure 2-5). The northern boundary of Zone 2 is Interstate Highway 40; the western boundary extends south from Interstate Highway 40 and follows Arizona State Highway 93, Arizona State Highway 89/60, Interstate Highway 10, and Interstate Highway 19 to the United States-Mexico international border; the southern boundary is the United States-Mexico international border heading east, then follows New Mexico State Highway 81/146 north to Interstate Highway 10, then along New Mexico State Highway 26 to Interstate Highway 25; the boundary continues along New Mexico State Highway 70/54/506/24; the eastern boundary follows the eastern edge of Otero County, New Mexico, to the north and then along the southern and then eastern edge of Lincoln County, New Mexico, until it intersects with New Mexico State Hwy 285 and follows New Mexico State Highway 285 north to the northern boundary of Interstate Highway 40. Zone 2 excludes the area in Zone 1.
        - Zone 3 is an area of 62,590 mi^2 (162,108 km^2) within the MWEPA where Mexican wolves would be allowed to disperse into and occupy but neither initial releases nor translocations would occur. Zone 3 is an area of less suitable Mexican wolf habitat where Mexican wolves would be more actively managed under the authorities of the proposed rule to reduce human conflict. Approximately 1 percent (882 mi^2/2,283 km^2) of Zone 3 has suitable habitat for

wolves (Figure 2-5). Zone 3 is two separate geographic areas on the eastern and western sides of the MWEPA. One area of Zone 3 is in western Arizona and the other in eastern New Mexico. In Arizona, the northern boundary of Zone 3 is Interstate Highway 40; the eastern boundary extends south from Interstate Highway 40 and follows State Highway 93, State Highway 89/60, Interstate Highway 10, and Interstate Highway 19 to the United States–Mexico international border; the southern boundary is the United States–Mexico international border; the western boundary is the Arizona–California State border. In New Mexico, the northern boundary of Zone 3 is Interstate Highway 40; the eastern boundary is the New Mexico–Texas State border; the southern boundary is the United States–Mexico international border heading west, then follows State Highway 81/146 north to Interstate Highway 10, then along State Highway 26 to Interstate Highway 25, the southern boundary continues along State Highway 70/54/506/24; the western boundary follows the eastern edge of Otero County to the north and then along the southern and then eastern edge of Lincoln County until it follows State Highway 285 north to the northern boundary of Interstate Highway 40

- Make management changes that:
  - Allow initial release of Mexican wolves throughout the entire Zone 1. Under this management change we would eliminate the designation of the BRWRA with a Primary Recovery Zone (PRZ) and Secondary Recovery Zone (SRZ).
  - Allow Mexican wolves to disperse naturally from Zone 1 into, and within the entire MWEPA (Zones 2 and 3) and occupy the entire MWEPA (Zones 1, 2 and 3). Under this management change we would:
    - Allow wolves to occupy federal and non-federal land in the MWEPA except in the case of depredation or other nuisance behavior that cannot be effectively managed through non-removal techniques.
    - Capture and remove wolves on tribal land if requested by the tribal government.
    - Translocate wolves at selected release sites on Federal land within Zones 1 and 2 of the MWEPA.
  - Revise the regulations for the take of Mexican wolves on Federal and non-Federal land within the entire MWEPA (Zones 1, 2 and 3):
    - Revise the conditions that determine when we would issue a permit to allow livestock owners or their agents to take (including intentional harassment or kill) any Mexican wolf that is in the act of biting or killing livestock (see definition of *livestock* in the List of Definitions) on Federal land;
    - Allow domestic animal owners or their agents to take (including kill or injure) any Mexican wolf that is in the act of biting or killing domestic animals (see definition of *domestic animal* in the List of Definitions) on non-federal land anywhere within the MWEPA;
    - Pursuant to a removal action authorized by the Service or a designated agency, the Service or designated agency may issue permits to allow domestic animal owners or their agents (e.g., employees, land manager, local officials) to take (including intentional harassment or kill) any Mexican wolf that is present on non-federal land where specified in the permit.
    - Revise the conditions under which take will be authorized in response to unacceptable impacts of Mexican wolf predation on wild native ungulate herds. An unacceptable impact would be determined by a State agency based upon ungulate management goals; or a 15 percent decline in an ungulate herd as documented by a State 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.

- Subject to Service and state approved management agreements, the Service or a designated agency may develop and implement management actions on private land in management Zones 1 and 2 within the MWEPA in voluntary cooperation with private landowners, including but not limited to initial release and translocation of wolves onto private lands if requested by the landowner.
- Subject to agreements with tribal governments, the Service may develop and implement management actions on tribal trust land in management Zones 1 and 2 within the MWEPA in voluntary cooperation with tribal governments including but not limited to initial release, translocation onto Tribal trust lands, capture, and removal of Mexican wolves from Tribal trusts lands if requested by the tribal government.
- Revise and reissue the Mexican Wolf Recovery Program's section 10(a)(1)(A) research and recovery permit (TE-091551-8 dated 04/04/2013) so that it applies to both the MWEPA and areas outside of the MWEPA. Under this permit we would authorize removal of Mexican wolves that can be identified as coming from the experimental population that disperse to establish territories in areas outside of the MWEPA. Based in part on their genetic value relative to the Mexican wolf population, we may make a determination to translocate them to areas of suitable habitat within the MWEPA, transfer them to the reintroduction project in Mexico, or maintain these wolves in captivity.

2.3.3 Alternative Three

- MWEPA Expansion with Management Zones; and
- Expanded Zone 1.

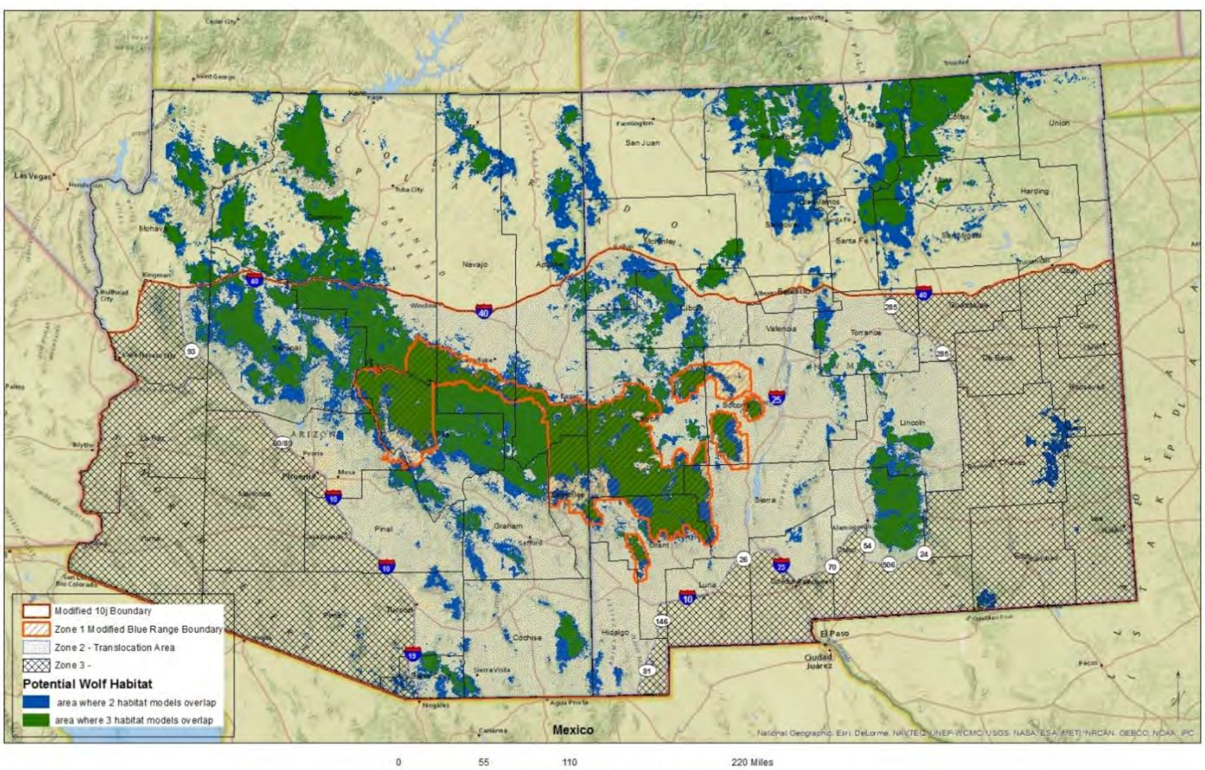


Figure 2-6. Alternative Three

Alternative Three would include all the initiatives proposed under Alternative One except under this alternative we would **not** adopt a phased management approach or; establish a Mexican wolf experimental population objective of from 300 to 325 wolves within the entire MWEPA; or include proposed management changes that would modify the regulations for take of Mexican wolves within the MWEPA. Alternative Three would:

- Make geographic boundary changes that:
  - Remove the designation of the White Sands Wolf Recovery Area (WSWRA) as the back-up area for the initial release of Mexican wolves from captivity.
  - Remove from the MWEPA the small portion of Texas lying north of U.S. Highway 62/80 to the Texas-New Mexico boundary.
  - Move the southern boundary of the MWEPA in Arizona and New Mexico from Interstate-10 to the United States-Mexico international border.
  - Designate three wolf management zones within the expanded MWEPA:
    - Zone 1 is an area of 12,507mi^2 (32,392 km^2) within the MWEPA where Mexican wolves would be allowed to naturally disperse into and occupy and where Mexican wolves may be initially released from captivity or translocated. Approximately 83 percent of Zone 1(10,359 mi^2/26,830 km^2) has suitable habitat for wolves (Figure 2-6). Zone 1 would include all of the Apache and Gila National Forests (the existing BRWRA); the Sitgreaves National Forest; 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 is an area of 78,756 mi^2 (203,978 km^2) within the MWEPA where Mexican wolves would 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 would be limited to pups less than five months old to allow for the cross-fostering of pups from the captive population into the wild, and to enable 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 could also be initially released under Service and state approved management agreements with private landowners or a Service approved management agreements with tribal governments. Approximately 27 percent (21,004 mi^2/54,399 km^2) of Zone 2 has suitable habitat for wolves (Figure 2-6). The northern boundary of Zone 2 is Interstate Highway 40; the western boundary extends south from Interstate Highway 40 and follows Arizona State Highway 93, Arizona State Highway 89/60, Interstate Highway 10, and Interstate Highway 19 to the United States-Mexico international border; the southern boundary is the United States-Mexico international border heading east, then follows New Mexico State Highway 81/146 north to Interstate Highway 10, then along New Mexico State Highway 26 to Interstate Highway 25; the boundary continues along New Mexico State Highway 70/54/506/24; the eastern boundary follows the eastern edge of Otero County, New Mexico, to the north and then along the southern and then eastern edge of Lincoln County, New Mexico, until it intersects with New Mexico State Hwy 285 and follows New Mexico State Highway 285 north to the northern boundary of Interstate Highway 40. Zone 2 excludes the area in Zone 1.
    - Zone 3 is an area of 62,590 mi^2 (162,108 km^2) within the MWEPA where Mexican wolves would be allowed to disperse into and occupy but neither initial releases nor translocations would occur. Zone 3 is an area of less suitable Mexican wolf habitat where Mexican wolves would be more actively managed under the authorities of the proposed rule to reduce human

conflict. Approximately 1 percent (882 mi^2/2,283 km^2) of Zone 3 has suitable habitat for wolves (Figure 2-6). Zone 3 is two separate geographic areas on the eastern and western sides of the MWEPA. One area of Zone 3 is in western Arizona and the other in eastern New Mexico. In Arizona, the northern boundary of Zone 3 is Interstate Highway 40; the eastern boundary extends south from Interstate Highway 40 and follows State Highway 93, State Highway 89/60, Interstate Highway 10, and Interstate Highway 19 to the United States–Mexico international border; the southern boundary is the United States–Mexico international border; the western boundary is the Arizona–California State border. In New Mexico, the northern boundary of Zone 3 is Interstate Highway 40; the eastern boundary is the New Mexico–Texas State border; the southern boundary is the United States–Mexico international border heading west, then follows State Highway 81/146 north to Interstate Highway 10, then along State Highway 26 to Interstate Highway 25, the southern boundary continues along State Highway 70/54/506/24; the western boundary follows the eastern edge of Otero County to the north and then along the southern and then eastern edge of Lincoln County until it follows State Highway 285 north to the northern boundary of Interstate Highway 40

- Make management changes that:
  - Allow initial release of Mexican wolves from captivity throughout the entire Zone 1. Under this management change we would eliminate the designation of the BRWRA with a Primary Recovery Zone (PRZ) and Secondary Recovery Zone (SRZ).
  - Allow Mexican wolves to disperse naturally from Zone 1 into, and within the MWEPA (Zones 2 and 3) and occupy the entire MWEPA (Zones 1, 2 and 3). Under this management change we would:
    - Allow wolves to occupy federal and non-federal land in the MWEPA except in the case of depredation or other nuisance behavior that cannot be effectively managed through non-removal techniques.
    - Capture and remove wolves on tribal trust land if requested by the tribal government.
    - Translocate wolves at selected release sites on federal land within Zones 1 and 2 of the MWEPA.
- Subject to Service and state approved management agreements, the Service or a designated agency may develop and implement management actions on private land in management Zones 1 and 2 within the MWEPA in voluntary cooperation with private landowners, including but not limited to initial release and translocation of wolves onto private lands if requested by the landowner.
- Subject to agreements with tribal governments, the Service may develop and implement management actions on tribal trust land in management Zones 1 and 2 within the MWEPA in voluntary cooperation with tribal governments including but not limited to initial release, translocation onto Tribal trust lands, capture, and removal of Mexican wolves from Tribal trusts lands if requested by the tribal government.
- Revise and reissue the Mexican Wolf Recovery Program's section 10(a)(1)(A) research and recovery permit (TE-091551-8 dated 04/04/2013) so that it applies to both the MWEPA and areas outside of the MWEPA. Under this permit we would authorize removal of Mexican wolves that can be identified as coming from the experimental population that disperse to establish territories in areas outside of the MWEPA. Based in part on their genetic value relative to the Mexican wolf population, we may make a determination to translocate them to areas of suitable habitat within the MWEPA, transfer them to the reintroduction project in Mexico, or maintain these wolves in captivity.

2.3.4 Alternative Four (No Action):

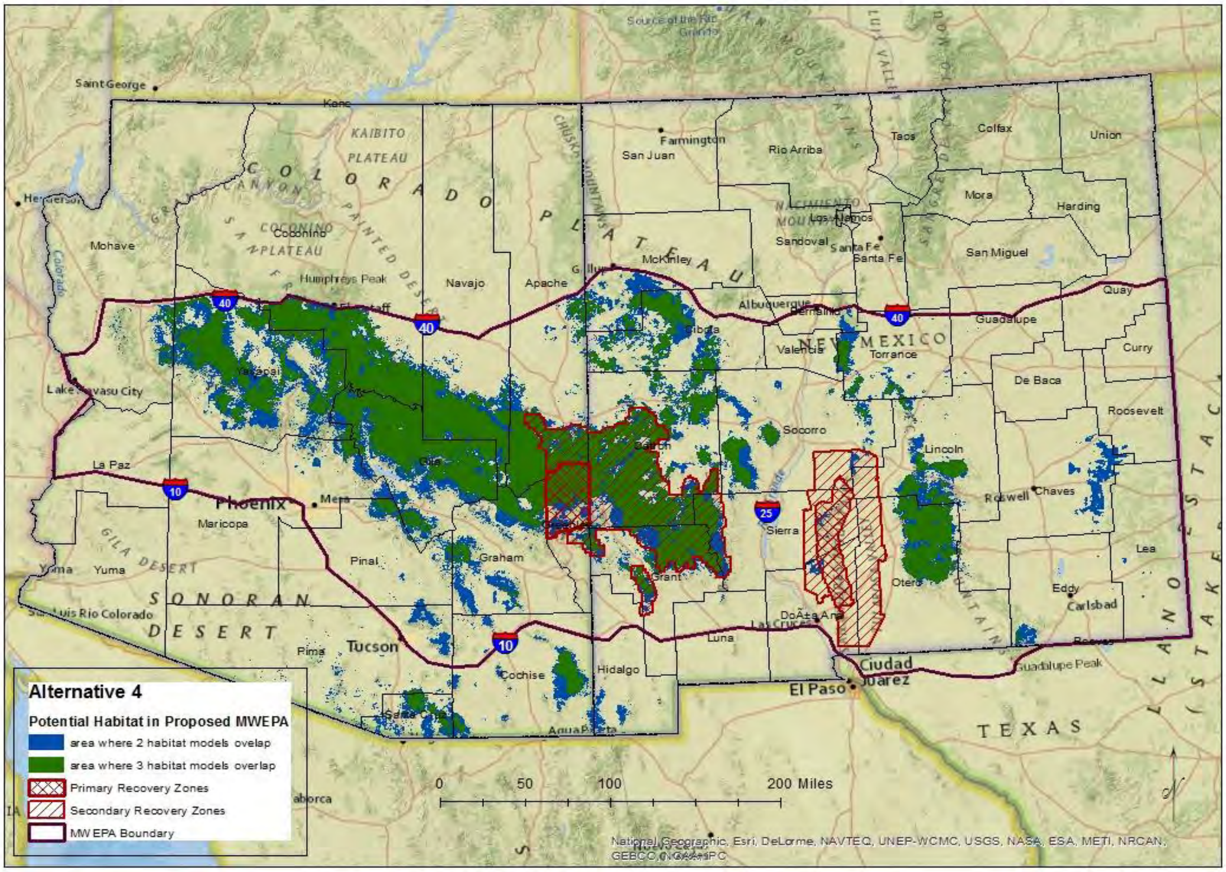


Figure 2-7. Alternative Four (No Action)

Under Alternative Four (Figure 2-7) no changes to the 1998 Final 10(j) Rule for the Mexican wolf or the Mexican Wolf Recovery Program's section 10(a)(1)(A) research and recovery permit (TE-091551-8 dated 04/04/2013) would be made. Alternative Four would:

- Retain the current boundaries of the Blue Range Wolf Recovery Area (BRWRA) and MWEPA and the designation of the White Sands Wolf Recovery Area (WSWRA), as set under the guidelines of the 1998 Final 10(j) Rule.
- Continue the designations of the Primary Recovery Zone (PRZ) and Secondary Recovery Zone (SRZ) within the established BRWRA. The Reintroduction Project would continue to operate under the current management regulations which restrict the initial release of Mexican wolves to the PRZ of the BRWRA.
- Make no change to the management policy that requires that Mexican wolves that naturally disperse and establish territories outside of the BRWRA be captured and returned to the BRWRA or placed in captivity.

- Make no change to the provisions of the 1998 Final Rule for the limited take of Mexican wolves. Under this alternative:
  - Landowners or their agents on non-federal land in the MWEPA would not have the authority to take a wolf actually engaged in the act of biting or killing domestic animals other than livestock (i.e., pet dogs).
  - We would not add provisions for the conditional issuance of permits on non-federal land anywhere within the MWEPA to allow livestock owners or their agents to take any wolf that is present on non-federal land.
  - The conditions that determine when we would issue a permit to livestock owners or their agents to allow take of Mexican wolves that are actually engaged in the act of killing, wounding or biting livestock on public lands anywhere in the MWEPA would not be changed.
  - We would not revise the conditions under which take will be authorized in response to unacceptable impacts of Mexican wolf predation on wild native ungulate herds.

2.3.5 Summary of Actions by Alternative

In this section we provide a tabular comparison of the actions in the Proposed Action and Alternatives.

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	Alternative			
	One (Proposed Action and Preferred Alternative)	**Two**	**Three**	**Four (No Action)**
Remove the designation of the White Sands Wolf Recovery Area (WSWRA) as the back-up area for the initial release of Mexican wolves from captivity.	X	X	X	
Remove from the MWEPA the small portion of Texas lying north of U.S. Highway 62/80 to the Texas-New Mexico boundary.	X	X	X	
Move the southern boundary of the MWEPA in Arizona and New Mexico from Interstate 10 to the United States-Mexico international border.	X	X	X	
Designate three wolf management zones with a larger Zone 1 within the expanded MWEPA and discontinue the designation of the BRWRA: Zone 1 is an area within the MWEPA where Mexican wolves would be allowed to naturally disperse into and occupy and where Mexican wolves may be initially released from captivity or translocated. Zone 1 would include all of the Apache and Gila National Forests (the existing BRWRA), the 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 is an area within the MWEPA where Mexican wolves would be allowed to naturally disperse and occupy and where Mexican wolves may be translocated. On federal land in Zone 2 initial releases of Mexican wolves would be limited to pups less than five months old to allow for the cross-fostering of pups from the captive population into the wild, and to enable 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, could also be initially released under Service and state approved management agreements with private landowners or Service-approved management agreements with tribal governments. Zone 2 would include the area of the MWEPA not included in Zone 1or 3 south of I-40 to the international border with Mexico	X		X	

	Alternative			
	One (Proposed Action and Preferred Alternative)	**Two**	**Three**	**Four (No Action)**
Zone 3 is an area within the MWEPA where Mexican wolves would be allowed to disperse into and occupy but neither initial releases nor translocations would occur. Zone 3 is an area of less suitable Mexican wolf habitat where Mexican wolves would be more actively managed under the authorities of the proposed rule to reduce human conflict. Zone 3 would include the area of the MWEPA not included in Zone1 or 2 south of I-40 to the international border with Mexico.				
Designate three wolf management zones within the expanded MWEPA and discontinue the designation of the BRWRA: Zone 1 is an area within the MWEPA where Mexican wolves would be allowed to occupy and where wolves may be initially released or translocated. Zone 1 would include all of the Apache and Gila National Forests (the existing BRWRA). Zone 2 is an area within the MWEPA where Mexican wolves would 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 would be limited to pups less than five months old to allow for the cross-fostering of pups from the captive population into the wild, and to enable 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 could also be initially released under Service and state approved management agreements with private landowners or a Service approved management agreements with tribal governments. Zone 2 would include the area of the MWEPA not included in Zone 1or 3 south of I-40 to the international border with Mexico Zone 3 is an area within the MWEPA where Mexican wolves would be allowed to disperse into and occupy but neither initial releases nor translocations would occur. Zone 3 is an area of less suitable Mexican wolf habitat where Mexican wolves would be more actively managed under the authorities of the proposed rule to reduce human conflict. Zone 3 would include the area of the MWEPA not included in Zone1 or 2 south of I-40 to the international border with Mexico.		X		

	Alternative			
	One (Proposed Action and Preferred Alternative)	**Two**	**Three**	**Four (No Action)**
Allow initial release of Mexican wolves throughout the entire Zone 1.		X	X	
Allow Mexican wolves to disperse naturally from Zone 1 into, and within the MWEPA (Zones 2 and 3) and occupy the MWEPA (Zones 1, 2 and 3).		X	X	
Allow the translocation of wolves at selected release sites on federal land within Zones 1 and 2 of the MWEPA.		X	X	
Allow wolves to occupy federal and non-federal land in the MWEPA except in the case of depredation or other nuisance behavior that cannot be effectively managed through non-removal techniques.	X	X	X	
Capture and remove wolves on tribal land if requested by the tribal government.	X	X	X	
Implement a phased management approach so that in: • Phase 1: Initial release 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 Zone 1 into, and within the MWEPA (Zones 2 and 3) 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. • Phase 2: If determined to be necessary by either the 5-Year or 8-Year evaluation: initial release 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 Zone 1 into, and within the MWEPA (Zones 2 and 3) and occupy the MWEPA (Zones 1, 2 and 3) **with the exception** of those areas in Zone 2 west of State	X			

	Alternative			
	One (Proposed Action and Preferred Alternative)	**Two**	**Three**	**Four (No Action)**
Highway 89 in Arizona. • Phase 3: If determined to be necessary by the 5-Year or 8- Year evaluation: Initial release of Mexican wolves can occur throughout the entire Zone 1 **including** the area west of State Highway 87 in Arizona; no translocations can be conducted west of State Highway 89 in Arizona; Mexican wolves can disperse naturally from Zone 1 into, and within the MWEPA (Zones 2 and 3) and occupy the MWEPA (Zones 1, 2 and 3). • Year 12 and beyond: Phased management approach ends: Initial release of Mexican wolves can occur throughout entire Zone 1; Translocations can be conducted at selected translocation sites on federal land and on non-federal private and tribal land with voluntary management agreements within Zones 1 and 2 of the MWEPA. Mexican wolves can disperse naturally from Zone 1 into, and within the MWEPA (Zones 2 and 3) and occupy the MWEPA (Zones 1, 2 and 3).				
Revise the regulations for the take of Mexican wolves on federal and non-federal land within the MWEPA (Zones 1, 2 and 3): - Revise the conditions that determine when we would issue a permit to allow livestock owners or their agents to take (including intentional harassment or kill) any Mexican wolf that is in the act of biting, wounding or killing livestock on federal land; - Allow domestic animal owners or their agents to take (including kill or injure) any Mexican wolf that is in the act of biting or killing domestic animals on non-Federal land anywhere in the MWEPA; - Pursuant to a removal action authorized by the Service or a designated agency, the Service or designated agency may issue permits to allow domestic animal owners or their agents (e.g., employees, land manager, local officials) to take (including intentional harassment or kill) any Mexican wolf that is present on non-federal land where specified in the permit; and - Revise the conditions under which take will be authorized in response to unacceptable	X	X		

	Alternative			
	One (Proposed Action and Preferred Alternative)	**Two**	**Three**	**Four (No Action)**
impacts of Mexican wolf predation on wild native ungulate herds. An unacceptable impact will be determined determined by a state agency based upon ungulate management goals,or; a 15 percent decline in an ungulate herd as documented by a State 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.				
Revise the regulations for the take of Mexican wolves on federal and non-federal land within the MWEPA (Zones 1, 2 and 3): - Maintain an experimental Mexican wolf population of 300 to 325 wolves in the MWEPA.	X			
Subject to Service and state approved management agreements develop and implement management actions on private land in management Zones 1 and 2 within the MWEPA by the Service or an authorized agency in voluntary cooperation with private landowners.	X	X	X	
Subject to agreements with tribal governments, the Service may develop and implement management actions on tribal trust land in management Zones 1 and 2 within the MWEPA in voluntary cooperation with tribal governments including but not limited to initial release, translocation onto Tribal trust lands, capture, and removal of Mexican wolves from Tribal trusts lands if requested by the tribal government.	X	X	X	
Revise and reissue the Mexican Wolf Recovery Program's section 10(a)(1)(A) research and recovery permit (TE-091551-8 dated 04/04/2013) so that it applies to both the MWEPA and areas outside of the MWEPA. Under this permit we would authorize removal of Mexican wolves that can be identified as coming from the experimental population that disperse to establish territories in areas outside of the MWEPA.	X	X	X	

Table 2-1. Tabular Comparison of the Actions of the Proposed Action and Alternatives

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2.3.6 Summary of the Environmental Consequences by Alternative

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

Resource Area	Alternative One (Proposed Action)	Alternative Two	Alternative Three	Alternative Four (No Action)
Land Use	No significant adverse direct or indirect impacts in Zones 1-3	No significant adverse direct or indirect impacts in Zones 1-3	No significant adverse direct or indirect impacts in Zones 1-3	No significant adverse direct or indirect impacts
Biological Resources (vegetation)	No significant direct or indirect adverse impact in Zones 1-3	No significant adverse direct or indirect impacts in Zones 1-3	No significant adverse direct or indirect impacts in Zones 1-3	No significant adverse direct or indirect impacts
Biological Resources (wild ungulate prey)	No significant direct adverse impact in Zones 1-3 with mitigation No significant direct adverse impact Zone 3.	No significant direct adverse impact in Zones 1-3 with mitigation No significant impact Zone 3	Less than significant direct adverse impact Zones 1 and 2. No significant direct adverse impact Zone 3.	Less than significant direct adverse impacts in the BRWRA.
Biological Resources (other predator, scavenger and non-ungulate wild prey species) including special status and listed T/E species)	No significant impacts to other predators on non-ungulate wild prey in Zones 1-3. Less than significant beneficial impact to scavengers in Zones 1 and 2.	No significant impacts to other predators on non-ungulate wild prey in Zones 1-3. Less than significant beneficial impact to scavengers in Zones 1 and 2.	No significant impacts to other predators on non-ungulate wild prey in Zones 1-3. Less than significant beneficial impact to scavengers in Zones 1 and 2.	Less than significant direct and indirect adverse impact in the BRWRA.
Biological Resources (special status and listed T/E species)	No significant impact in Zones 1-3	No significant impact in Zones 1-3	No significant impact in Zones 1-3	No significant impact
Biological Resources (listed T/E species: the Mexican wolf experimental population and subspecies)	Significant beneficial impact	Significant beneficial impact	Significant beneficial impact	Significant direct and indirect adverse impact in the BRWRA
Economic Activity (ranching /livestock	Less than significant direct adverse impact in Zones 1 and 2; no	Less than significant direct adverse impact in Zones 1 and 2; no	Less than significant direct adverse impact in Zones 1 and 2; no	Less than significant direct adverse impact in the BRWRA

Resource Area	Alternative One (Proposed Action)	Alternative Two	Alternative Three	Alternative Four (No Action)
production)	significant adverse direct or indirect impact in Zone 3	significant adverse direct or indirect impact in Zone 3	significant adverse direct or indirect impact in Zone 3	
Economic Activity (hunting)	No significant adverse direct or indirect impacts in Zones 1-3 with mitigation	No significant adverse direct or indirect impacts in Zones 1-3 with mitigation	Less than significant adverse indirect impacts in Zones 1-2; no significant adverse direct or indirect impact in Zone 3.	Less than significant adverse indirect impacts in the BRWRA
Economic Activity (tourism and outdoor recreation)	No significant beneficial impact	No significant beneficial impact	No significant beneficial impact	No significant beneficial impact
Human Health/Public Safety	No significant adverse direct or indirect impact in Zones 1-3	No significant adverse direct or indirect impact in Zones 1-3	No significant adverse direct or indirect impact in Zones 1-3	No significant adverse direct or indirect impact
Environmental Justice	Mitigated less than significant disproportionately high and adverse impacts to population groups of concern	Mitigated less than significant disproportionately high and adverse impacts to population groups of concern	Mitigated less than significant disproportionately high and adverse impacts to population groups of concern	Mitigated less than significant disproportionately high and adverse impacts to population groups of concern
Cumulative Impacts	No significant adverse cumulative impacts on wild prey (elk). No significant cumulative beneficial effects on other wildlife species (scavengers). No significant beneficial cumulative impact on the federally listed Mexican wolf or experimental population. Less than significant adverse cumulative impacts on ranching/livestock	No significant adverse cumulative impacts on wild prey (elk). No significant cumulative beneficial effects on other wildlife species (scavengers). No significant beneficial cumulative impact on the federally listed Mexican wolf or experimental population. Less than significant adverse	No significant adverse cumulative impacts on wild prey (elk). No significant cumulative beneficial effects on other wildlife species (scavengers). No significant beneficial cumulative impact on the federally listed Mexican wolf or experimental population. Less than significant adverse	N/A

Resource Area	Alternative One (Proposed Action)	Alternative Two	Alternative Three	Alternative Four (No Action)
	production.	cumulative impacts on ranching/livestock production.	cumulative impacts on hunting and ranching/livestock production.	
Relationship Between Short-Term Uses of Man's Environment and the Maintenance 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.	N/A
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.	N/A

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

2.3.7 Basis for Selection of Preferred Alternative

Under all three of the action alternatives we brought forward for further consideration we would: expand the area in which initial releases of Mexican wolves from captivity could occur; extend the southern boundary of the MWEPA in Arizona and New Mexico from I-10 to the United States-Mexico international border; expand the area within which Mexican wolves can disperse and occupy; expand the area within which we can translocate wolves; designate three wolf management zones; and conduct management actions within these zones intended to further the conservation of the Mexican wolf while being responsive to the needs of the local community in cases of depredation or nuisance behavior by Mexican wolves. We have selected Alternative One as our preferred alternative because it:

- Provides additional suitable, unoccupied habitat for the initial release of Mexican wolves from captivity to improve the genetic variation of the Mexican wolf and provide for population growth.
- Provides additional management flexibility to the Reintroduction Project to respond to depredation or nuisance behavior by a larger and more widely distributed experimental population of Mexican wolves.
- Responds to concerns expressed by the State of Arizona regarding potentially vulnerable elk herds in the central-western portion of the state by implementing a phased approach to wolf management west of Highway 87.
- Incorporates an experimental population objective of from 300 to 325 Mexican wolves in the MWEPA in Arizona and New Mexico.

These outcomes are expected to substantially contribute to our efforts to further the conservation of the Mexican wolf by improving the effectiveness of our Reintroduction Project in managing the experimental population to a greater degree collectively than the other alternatives. While Alternative Two would expand the area (Zone 1) for the initial release of Mexican wolves from captivity, it would only expand it to include the Gila and Apache National Forests which are currently designated as the BRWRA under the 1998 Final Rule. Compared to Alternative One, Alternative Two would not provide as much additional suitable unoccupied habitat within which the Reintroduction Project could select the best possible release site that would maximize the probability of a successful initial release of Mexican wolves. Alternative Three would not include the revised take provisions for Mexican wolves within the MWEPA. Under this alternative we would expect fewer wolves to be lethally taken in the case of depredation of livestock on Federal land or domestic animals on non-Federal land. However, when compared to Alternative One, Alternative Three would not provide the additional flexibility the Reintroduction Project needs to effectively manage a larger experimental population of Mexican wolves within an expanded MWEPA (that has a matrix of landownerships) in a manner that furthers the conservation of the Mexican wolf while being responsive to the needs of the local community in cases of depredation or nuisance behavior by wolves. Without these revised take provisions, there would be greater impacts on small businesses in the livestock production sector due to the inability of domestic animal and livestock owners to take the Mexican wolf under specific circumstances, and on small businesses involved in hunting and guiding due to designated agencies not being able to take a Mexican wolf in response to unacceptable impacts to wild ungulate herds.

Neither Alternative Two nor Alternative Three would adopt the phased management approach that is proposed in Alternative One nor would they establish a population objective. A population objective of from 300 to 325 Mexican wolves is large enough to meet our objective of improving the probability of persistence of the experimental population while minimizing the potential adverse impacts from predation and depredation. The phased management approach is intended to address concerns expressed by the State of Arizona regarding possible impacts from Mexican wolves on potentially vulnerable elk herds in the central-western portion of the state. For the first twelve years after implementation, this phased approach would limit the initial release and translocation of wolves and their natural dispersal and occupancy in portions of western Arizona in Zones 1 and 2 where potentially vulnerable elk herds occur. We expect that increasing the area of Zone 1 will also increase the number of suitable release sites, which would increase the likelihood that initial releases of Mexican wolves from captivity will be successful. More successful releases will provide the number of effective migrants per generation into the experimental population needed to improve the genetic variation within the population and assist with population growth, both of which will contribute to improving the probability of persistence of the experimental population of Mexican wolves.

Including a population objective of 300-325 Mexican wolves and a phased approach to management of Mexican wolves in Arizona would address the State of Arizona's concerns regarding possible impacts from Mexican wolves on potentially vulnerable elk herds, especially those west of Highway 87. Such coordination with the State of Arizona will improve the effectiveness of the management of the experimental population of Mexican wolves. We expect that modifying the take provisions for Mexican wolves would provide clarity and consistency in our take determinations and contribute to our efforts to find the appropriate balance between enabling wolf population growth and minimizing nuisance and depredation impacts on local communities. For these reasons we have selected Alternative One as our preferred alternative.

3 AFFECTED ENVIRONMENT

This chapter details the environment in those portions of Arizona and New Mexico which may be affected by implementation of the proposed action or alternatives we are considering in this EIS. Where appropriate the description of the affected environment provided in previously completed NEPA documents (see Section 1.1.1) is incorporated by reference (CEQ, Sec. 1502.21).

3.1 SPECIFIC RESOURCE AREAS TO BE EVALUATED

In accordance with NEPA and CEQ regulations, we focus the description of the affected environment only on those resource areas potentially subject to impacts. We do not evaluate the following resource areas in detail in this EIS because it is unlikely that impacts to them will occur:

- **Aesthetics/Visual Resources** – No construction or other changes to the human built or natural environment are proposed. The Proposed Action and alternatives would not directly or indirectly affect the aesthetic/visual resources of those portions of Arizona or New Mexico within the project study area.
- **Air Quality** – No stationary or permanent sources of air pollutant emissions would be introduced. An incremental increase in vehicle usage may occur but increases in direct and indirect emissions from the project/actions are below the de minimis levels and not subject to a conformity determination. No direct or indirect effects on regional air quality would occur as a result of the Proposed Action and alternatives.
- **Cultural/Historic Resources** – No ground disturbing activities are proposed and the nature of the proposed action and alternatives under consideration make it unlikely that adverse impacts to cultural/historic resources would occur. In compliance with the National Historic Preservation Act of 1966 (NHPA) Section 106 and implementing regulations, 36 CFR 800 coordination with the State Historic Preservation Officers (SHPO) of Arizona and New Mexico has been completed and concurrence in a determination that no historic properties will be adversely affected from the proposed action or any of the alternatives under consideration has been received from the New Mexico SHPO (NM State Historic Preservation Division, July 07, 2014) and Arizona SHPO (Arizona State Parks, July 17, 2014).
- **Climate Change** – No stationary or permanent sources of greenhouse gas emissions would be introduced. An incremental increase in vehicle usage may occur but increases in direct and indirect greenhouse gas emissions from the project/actions would be insignificant. No direct or indirect effects on climate change would occur as a result of the Proposed Action and alternatives.
- **Community Services** – The Proposed Action and alternatives would not directly or indirectly affect services such as police, fire and ambulance in those portions of Arizona or New Mexico within the project study area. See section 3.6 for a discussion of human health and safety issues.
- **Geology/Soils** – No construction or ground disturbing activities are proposed and the Proposed Action and alternatives would not directly or indirectly affect the Geology/Soils of those portions of Arizona or New Mexico within the project study area.
- **Noise** – No stationary or permanent sources of noise would be introduced and no changes in the ambient noise of the region would occur as a result of the Proposed Action and alternatives.
- **Resident Population** – No changes in the neighborhood makeup, or alteration of demographic characteristics of those portions of Arizona or New Mexico within the project study area would occur as a result of the Proposed Action and alternatives.

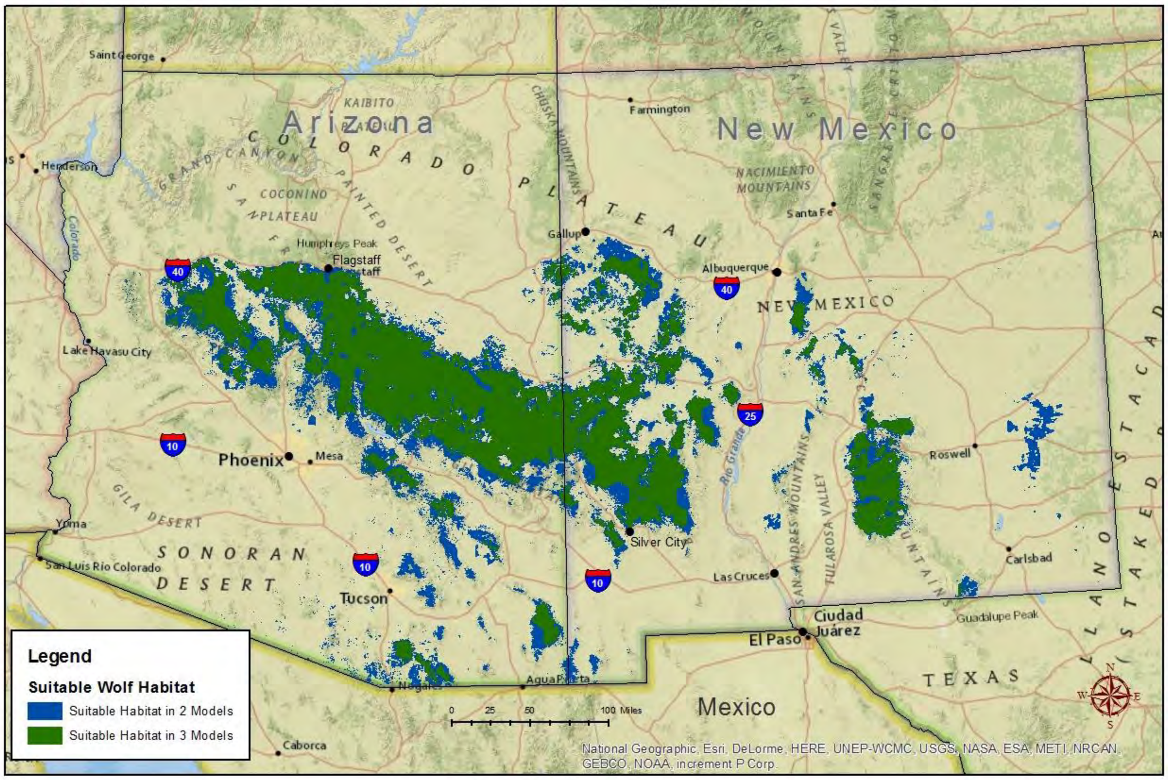
- **Solid/Hazardous Waste** – No permanent sources of solid/hazardous waste would be introduced as a result of the Proposed Action and alternatives. Temporary sources of solid waste generated by a field crew while conducting management activities would be insignificant.
- **Transportation/Parking** – No changes to regional transportation systems (roads, air, and rail) or parking areas in those portions of Arizona and New Mexico within the project study area would be required as result of the Proposed Action and alternatives.
- **Utilities** – No changes to the use of utilities (power/water/sewage/gas) in those portions of Arizona and New Mexico within the project study area would be required as result of the Proposed Action and alternatives.
- **Water Resources** – Water resources include those portions of the natural environment related to surface water and groundwater, water quality, floodplains and wetlands. No direct or indirect impacts to water resources in those portions of Arizona and New Mexico within the study area would occur from the Proposed Action and alternatives.

In the remainder of this chapter we describe Land Use, Biological Resources, Economic Activity, Human Health/Public Safety and Environmental Justice in the project study area.

3.2 THE PROJECT STUDY AREA

In accordance with NEPA and CEQ regulations, we define the project study area as the geographic area potentially subject to impacts from the Proposed Action and Alternatives. This geographic area incorporates all of Arizona and New Mexico between Interstate-40 in the north and Interstate-10 in the south as defined by the 1998 Final Rule boundaries of the MWEPA, as well as the area of Arizona and New Mexico south of Interstate-10 to the international border with Mexico, which we propose to include in an expanded MWEPA. To further refine our project study area we determined which areas in Arizona and New Mexico within the boundaries of the proposed expanded MWEPA have suitable habitat for wolves. The suitability of an area to sustain wolves is influenced by both biophysical (vegetation cover, water availability and prey abundance) and socioeconomic (human population density, road density and land status) factors (Sneed 2001). We generally consider the most important habitat attributes needed for wolves to persist and succeed in pack formation to be forest cover, public land, high native ungulate density, and low livestock density, while unsuitable habitat is characterized by low forest cover, and high human density and use (74 FR 15123, pp. 15157-15159, Oakleaf et al. 2006; see our 2009 NRM DPS delisting rule for more information on wolf habitat models (74 FR 15123, pp. 15157-15159). Suitable wolf habitat has minimal roads and human development, as human access to areas inhabited by wolves can result in increased wolf mortality. Specifically, roads can serve as a direct cause of wolf mortality due to vehicular collision and as an indirect factor because they support human access which can facilitate illegal killing of wolves. Public lands such as national forests are considered to have more appropriate conditions for wolf reintroduction and recovery efforts then other land ownership types because they typically have minimal human development and habitat degradation (Fritts and Carbyn 1995).

To estimate the amount and location of suitable habitat for Mexican wolves south of I-40 in Arizona and New Mexico, we combined the results from three methods that have been used to identify wolf habitat in the current scientific literature: (1) Carroll et al. 2006, areas with an occupancy level >25% under current landscape conditions; (2) Carroll et al. 2014, areas with a habitat score greater than 700; and (3) Oakleaf et al. 2006, areas that were primarily forested. We generated a grid that indicated where all three models agreed, where two out of three models agreed, and where only one out of three models suggested that the area was wolf habitat. We consider the areas where at least two models spatially concur with each other as suitable wolf habitat (i.e., areas colored green or blue in Figure 3-1). In general these areas are forested, montane terrain containing wild ungulate populations (elk, white-tailed deer, and mule deer) adequate to support wolves. This map (Figure 3-1) serves as our estimate of where wolves can potentially be supported on the landscape, which we refer to as “suitable habitat”. We recognize that ground-truthing may further refine these results over time. For example, although several small areas of suitable habitat are identified by the models in Chaves and Eddy Counties, New Mexico, they are disjunct (i.e. geographically isolated) from other larger, contiguous areas of suitable habitat and fragmented by oil and gas production infrastructure. Therefore, we consider these locations as unlikely to support wolf occupancy or to be useful as dispersal corridors.



Credit: U.S. Fish and Wildlife Service.

Figure 3-1. Suitable habitat for the Mexican wolf in Arizona and New Mexico within project study area.

3.2.1 Counties in Arizona and New Mexico without Suitable Habitat for Mexican wolves and Unlikely to be Affected by the Proposed Action and Alternatives

South of I-40 in Arizona and New Mexico there are several counties which do not contain any suitable habitat for wolves:

- Arizona: La Paz, Yuma
- New Mexico: Curry, De Baca, Guadalupe, Lea, Roosevelt, Quay, Santa Fe

These counties are unlikely to be affected by our proposed action or alternatives, including the no action alternative. We therefore do not describe them in this chapter nor do we provide an analysis of environmental consequences for them in Chapter 4.

3.2.2 Counties in Arizona and New Mexico with Suitable Habitat for Mexican Wolves

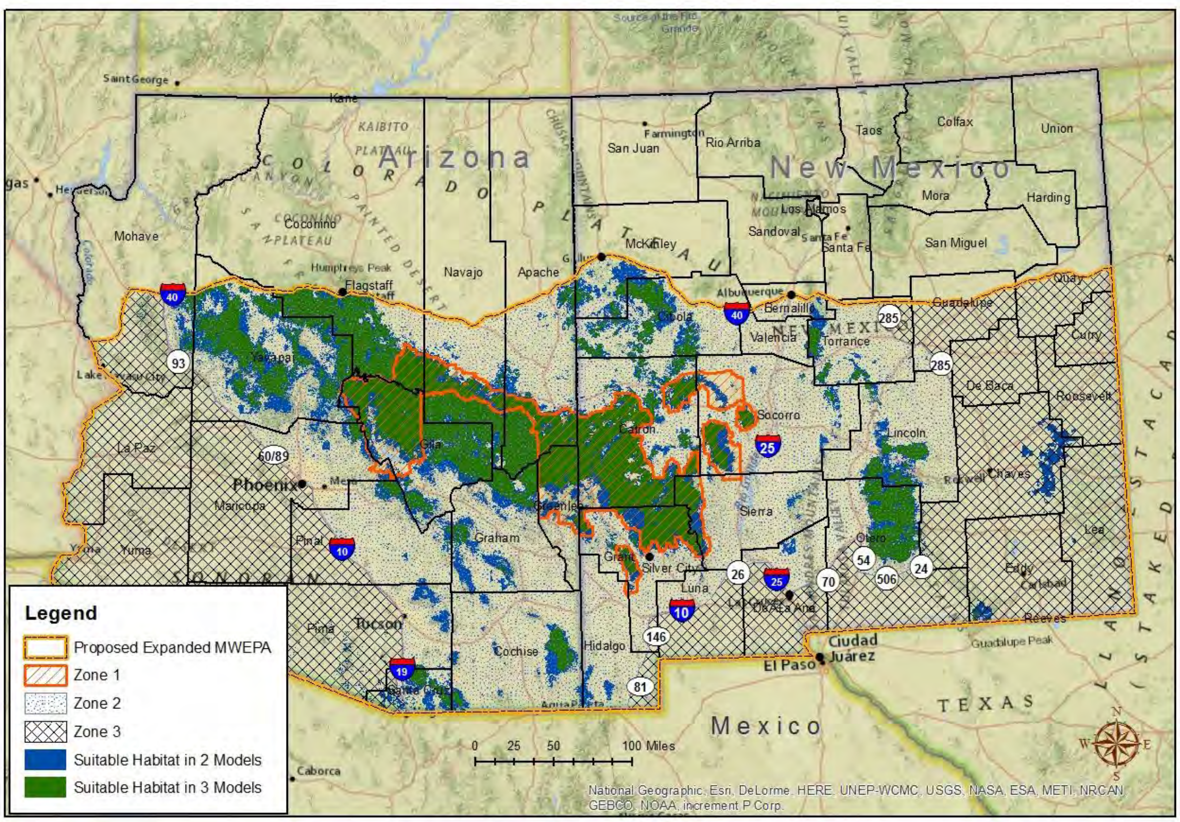
The counties in Arizona and New Mexico that have suitable habitat for wolves are primarily within the proposed Management Zones 1 and 2.

3.2.2.1 Counties with Suitable Habitat for Mexican Wolves within Zone 1

The counties of Apache, Gila, Greenlee, and Navajo in Arizona and the counties of Catron, Grant, Hidalgo and Sierra in New Mexico have some portion of their land within the area currently designated as the BRWRA. The counties of Coconino, Maricopa and Yavapai in Arizona and Socorro in New Mexico have some portion of their land included within the additional areas that we are proposing to add to the BRWRA (all of the Sitgreaves and the Payson, Pleasant Valley, and Tonto Basin Ranger Districts of the Tonto National Forests in Arizona and the Magdalena Ranger District of the Cibola National Forest in New Mexico). The area of the proposed expanded BRWRA is area that we propose to designate as Zone 1(Figure 3-2).

3.2.2.2 Counties with Suitable Habitat for Mexican Wolves within Zone 2

The counties of Apache, Navajo, Coconino, Mohave, Yavapai, Maricopa, Pinal, Pima, Gila, Graham, Greenlee, Santa Cruz and Cochise in Arizona and the counties of McKinley, Cibola, Bernalillo, Valencia, Torrance, Lincoln, Otero, Sierra, Socorro, Dona Ana, Luna, Grant, Hidalgo and Catron in New Mexico have all, or some portion of their land within the area that we propose to designate as Zone 2 (Figure 3-2).



(Credit: U.S. Fish and Wildlife Service.)

Figure 3-2. Suitable Mexican wolf habitat in Arizona and New Mexico Counties by Zone (Proposed Action/Alternative One).

3.2.2.3 Counties with Suitable Habitat for Mexican Wolves within Zone 3

The counties of Mohave, La Paz, Yuma, Maricopa, Yavapai, Pinal, Pima, and Santa Cruz in Arizona, and Hidalgo, Luna, Dona Ana, Otero, Chaves, Eddy, Lea, Roosevelt, De Baca, Lincoln, Curry, Guadalupe, Quay, Santa Fe and Torrance in New Mexico have all, or some portion of their land within the area proposed as Zone 3. The counties of Chaves and Eddy in eastern New Mexico have several small areas identified on our suitable habitat map, although we recognize these areas to be of likely low suitability, as they are primarily agricultural or used for oil/gas development. These counties are within the existing MWEPA in the area that we propose to designate as Zone 3 (Figure 3-2).

3.2.3 Tribal Trust Lands in Arizona and New Mexico unlikely to be affected by the proposed action and alternatives

Tribal trust lands in proposed Zones 2 and 3 in Arizona and New Mexico which do not contain any suitable habitat for wolves are:

- 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

Tribal trust lands in proposed Zones 2 and 3 in Arizona and New Mexico which contain minimal suitable habitat for wolves which is not contiguous or adjacent to larger blocks of contiguous habitat on Federal or non- Federal land are:

- Tohono O'odham Indian Reservation in Arizona. Approximately 56 mi^2 (145 km^2).
- San Xavier Indian Reservation in Arizona. Approximately 3 mi^2 (7.7 km^2).
- Yavapai Prescott Indian Reservation in Arizona. Approximately 2 mi^2 (5.1 km^2).
- Yavapai Apache Indian Reservation in Arizona. Approximately 1 mi^2 (2.6 km^2).

Because of the absence of, or minimal amount of, suitable wolf habitat on these reservations (less than 4 mi^2 /910 km^2) and/or because the small area of suitable habitat that is present is not contiguous to other larger blocks of habitat (greater than 400 mi^2 /1000 km^2) we do not expect that these tribes are likely to be affected by our proposed action or alternatives, including the no action alternative. We therefore do not describe them in this chapter or Appendix B, nor do we provide an analysis of potential environmental consequences for them in Chapter 4.

3.2.4 Tribal Trust Lands in Arizona and New Mexico with Suitable Habitat for Mexican Wolves

Within Zone 2 the tribal trust lands in Arizona and New Mexico that have suitable habitat for wolves are:

- White Mountain Apache Tribe, Fort Apache Indian Reservation. Approximately 2,561 mi^2 (6,632 km^2).
- San Carlos Apache Tribe, San Carlos Apache Reservation. Approximately 1,480 mi^2 (3,834 km^2).
- Navajo Nation. Navajo Indian Reservation Approximately 234 mi^2 (606 km^2).
- Navajo Nation. Navajo Reservation Trust. Approximately 43 mi^2 (112 km^2).
- Navajo Nation. Ramah Navajo Indian Reservation. Approximately 159 mi^2 (413 km^2).
- Navajo Nation. Alamo Band Navajo Indian Reservation. Approximately 1 mi^2 (2.6 km^2).
- Mescalero Apache Tribe. Mescalero Apache Indian Reservation. Approximately 654 mi^2 (1,694 km^2).
- Pueblo of Zuni. Zuni Indian Reservation. Approximately 223 mi^2 (578 km^2).
- Pueblo of Acoma. Acoma Indian Reservation. Approximately 170 mi^2 (441 km^2).
- Pueblo of Isleta. Isleta Indian Reservation. Approximately 35 mi^2 (91 km^2).
- Pueblo of Laguna. Laguna Indian Reservation. No suitable habitat in project study area.

Because of the presence of a substantial amount of suitable habitat on these reservations and/or because they are adjacent to larger contiguous blocks of habitat we consider that these tribes may be affected by our proposed action or alternatives, including the no action alternative. We therefore describe them in this chapter and Appendix B and provide an analysis of environmental consequences for them in Chapter 4.

3.3 LAND USE

Land use refers to the management and use of land by people. The attributes of land use include general land use patterns, land ownership, land management plans, and special use areas. A geographic area may support multiple types of land use activities, or may be designated for a specific activity. Land uses are directly related to the lands' resources (topography, vegetation, access) and land ownership. General land use patterns characterize the types of uses within a particular area and include both developed and undeveloped land. Undeveloped land is commonly classified as open space while developed land uses range from residential and commercial to recreational and agricultural. Open space reflects primarily undeveloped land that provides scenic, ecological, or recreational values. In many instances open space is set aside for resource protection or conservation; it may be managed as forest, rangeland, or agricultural land. Land use is regulated by plans and policies that identify the type and extent of uses allowed by the governing authorities in specific areas. Within county boundaries land ownership is generally a mix of Federal and non-Federal land. Many counties have comprehensive plans or land use plans to provide an official long-range vision and framework for land use and development policies within the county. Arizona Revised Statutes specifically requires counties to adopt and maintain comprehensive plans for the purpose of "guiding and accomplishing a coordinated, adjusted, and harmonious development of the area of jurisdiction" (Cochise County 2014) In New Mexico the Planning District Act provides state grants-in-aid for financial assistance to designated development districts (4-58-1 to 6 NMSA). This emphasis on county planning ensures the comprehensive plan and its accompanying land use map provide policies for the use of land, and guide the type and scope of development that should occur in the county. Zoning regulations, subdivision regulations and county codes and ordinances are the tools for implementation of those policies. County plans directly affect the management of private lands within the county, but have limited, if any, authority over Federal land management. Federal land managers work closely with counties to maximize consistency between county and Federal plans and to promote cooperation. Management plans, policies, ordinances, and regulations developed by the land management entities for specific areas determine the types of uses that are allowed, or the types of uses that protect specially designated or environmentally sensitive areas.

3.3.1 Overview of Arizona and New Mexico

The states of Arizona and New Mexico have a diverse land base at both the state and county level that reflects a mixture of Federal government lands, state lands, county lands, Tribal trust lands, and private property (Table 3-1). Over 30 percent of the land base in New Mexico and over 40 percent of the land base in Arizona is federally owned. Tribal lands also comprise a large portion of both states. Approximately 70 percent of the state of Arizona is Federal or tribal land.

Table 3-1. Table of land ownership: Arizona and New Mexico.

State	Landownership	Area ~ miles squared	Area ~ kilometers squared	Acres (for reference)	% of state
Arizona	*BLM*	*19,258*	*49,878*	*12,325,029*	16.9
Arizona	Forest Service	*17,050*	*44,158*	*10,911,724*	15.0
Arizona	Other Federal	*11,262*	*29,169*	*7,207,778*	9.9
Arizona	Tribal	30,927	80,100	19,793,135	27.1
Arizona	State	14,320	37,088	9,164,681	12.6
Arizona	Private	19,873	5,1471	12,718,674	17.4
Arizona	Other	1,247	3,229	797,981	1.1
Arizona	Total Federal	47,569	123,205	30,444,531	41.8
Arizona	**Total Land Area**	**113935**	**295,093**	**72,919,001**	
New Mexico	BLM	20,961	54,289	13,415,171	17.2
New Mexico	Forest Service	14,574	37,747	9,327,433	12.0
New Mexico	Other Federal	5,478	14,187	3,505,699	4.5
New Mexico	Tribal	12,610	32,659	8,070,277	10.3
New Mexico	State	14,253	36,917	9,122,273	11.7
New Mexico	Private	51,444	133,240	32,924,400	42.2
New Mexico	Other	2,523	6,534	1,614,682	2.1
New Mexico	Total Federal	41,013	106,223	26,248,304	33.7
New Mexico	**Total Land Area**	**121,843**	**315,574**	**77,979,936**	

Credit: U.S. Fish and Wildlife Service

3.3.1.1 Federal Land

The Federal government is the largest landowner in many Arizona and New Mexico counties. In some counties over 50 percent of the land base is controlled by various federal agencies. In Arizona and New Mexico the majority of Federal land is managed by two agencies; the Bureau of Land Management (BLM) and the U.S. Forest Service (USFS). Other Federal agencies which control large land areas include the National Park Service (NPS), the Department of Energy (DOE), the Department of Defense (DOD), and the U.S. Fish and Wildlife Service (USFWS). For those Arizona and New Mexico counties in the project study area Table 3-2 provides the percent of land owned by the Federal government.

Table 3-2. Percentage of Federal land in counties within project study area. Credit: USGS 2012.

County	Percent Federal Land Ownership	County	Percent Federal Land Ownership
Arizona		**New Mexico**	
Apache	10.6	Bernalillo	15.1
Cochise	25.9	**Catron**	**62.7**
Coconino	39.9	Chaves	31.7
Gila[1]	**57.2**	Cibola	29.0
Graham	37.5	**Dona Ana**	**74.6**
Greenlee	**77.2**	**Eddy**	**58.5**
Maricopa	**52.9**	Grant	47.4
Mojave	**71**	Hidalgo	41.6
Navajo	9.5	Lincoln	35.4
Pima	30.9	Luna	40.1
Pinal	19.5	McKinley	13.2
Santa Cruz	**55.9**	**Otero**	**70.0**
Yavapai	46.0	**Sierra**	**63.2**
		Socorro	**53.5**
		Torrance	7.9
		Valencia	6.5

Note 1: Bolded text indicates counties with greater than 50 percent of land base owned by the Federal government.

Federal land supports a variety of land uses and is managed specific to agency requirements and mission. Public lands managed by the Forest Service and BLM are generally managed under the principals of multiple-use and sustained yield, providing for a variety of activities to occur on the land. As discussed in the next section, the USFS planning guidance comes from the National Forest Management Act of 1976 (NFMA) and BLM planning direction comes from the Federal Land Policy and Management Act of 1976. Other Federal lands are managed specific to the mission of the managing agency. All Federal land managers are required to prepare land management plans in accordance with specific agency laws and regulations. These plans are developed in open public processes. The types of land use, and the extent of use, are considered within the capability of the natural resources to sustain the use, legislative requirements relative to a particular use, and public input obtained during the planning process.

USFS

Land use on all National Forests is governed by Forest Plans prepared in accordance with the NFMA (36CFR219.1). Additional planning direction comes from Congressional Acts, such as the Sustained Yield Act of 1960 (US Code 528), and agency direction and guidance. The NFMA requires every national forest to develop a Forest Plan which must be consistent with environmental laws and regulations. Each forest plan provides broad direction for the management of natural resources and guides project and activity decision making. Forest Plans generally provide for the multiple use and sustained yield of goods and services from the national forest in a way that maximizes long-term net public benefits in an environmentally sound manner (USFS 2010b). The mix of uses within a forest may include recreation, grazing, timber harvest, mineral extraction, watershed protection, wildlife and fishery management, and plant and animal conservation for the protection of biological diversity. Forest plans divide the Forest into management areas for which the plan designates the type and relative priority of use (or uses) authorized. For example, the authorized use in a management area that is designated as wilderness will not include mechanized recreation, timber harvest, or mineral extraction. Management areas with labels such as forest land, general forest, or Ponderosa pine are generally suiTable Dor timber harvest, livestock grazing, recreation, mineral extraction and other uses. The management emphasis on national forests has shifted over time from timber harvest to restoration of fire adapted ecosystems, with activities such as tree planting and thinning for sustainment of forest health, management for threatened and endangered species habitats, providing for other wildlife habitat needs, sustaining biological diversity and rural community stability and social values. Another area of emphasis for the USFS in recent years has been reducing the hazard of damage to structures for wildfires in the wildland-urban interface (WUI).

BLM

The BLM's mission is to "manage and conserve the public lands… under a mandate of multiple use and sustained yield" as directed by the FLPMA. BLM land is managed through comprehensive land use planning requirements set forth in FLPMA and further defined in agency regulations (43 CFR 1610) and instruction memorandums, policy, and handbooks. The BLM prepares comprehensive land use plans, called Resource Management Plans (RMPs) which provide guidance for management decisions on allowable land uses actions while protecting natural and cultural resources. RMPs usually address an array of management programs occurring on BLM managed lands including, but not limited to; lands and realty; transportation and off-highway vehicle use; fire management; visual resource management; cultural resource management; recreational activities; wildlife resource management; rangeland resource management; and the management of energy resources and mineral resources. RMPs also provide direction for the management of areas requiring special protection through designations such as Areas of Critical Environmental Concern, Wilderness Study Areas, or designated Wilderness.

Other Federal

Other lands under Federal management tend to operate under more narrow mandates. For example, NPS lands are managed for resource preservation with emphasis on visitor management while DOD lands are managed with an emphasis on supporting military mission requirements while preserving natural and cultural resources. The National Park Service develops General Management Plans (GMP) in accordance with agency requirements. The GMP defines agency wide considerations followed by Park or Monument specific resources and values including opportunities for public enjoyment (Program Standards Park Planning, Facilities and lands, September 9, 2004). This insures standards while allowing for opportunities to highlight specific features of individual parks and monuments with emphasis on resource protection and visitor use management.

Department of Defense lands are generally closed to public access and the military mission is considered the highest priority for land use. Natural resources are managed under the direction of the specific facilities' Integrated Natural Resource Management Plan (INRMP). The INRMP for a military installation is prepared in cooperation with the USFWS (and local wildlife agencies) in accordance with the Sikes Act Improvement Act and Amendments (Title 16).

USFWS national wildlife refuges constitute a national network of lands and waters for the conservation, management, and where appropriate, the restoration of wildlife and plant resources and habitats (USFWS 2014a). Each refuge is managed under a Comprehensive Conservation Plan (CCP). Developing these long-term plans relies on public participation and input. CCPs ensure that each refuge unit is managed to fulfill the purpose(s) for which it was established. Completed CCPs allow refuge managers to take actions that support State Wildlife Action Plans, improve the condition of habitats and benefit wildlife. The current generation of CCPs will focus on individual refuge actions that contribute to larger, landscape-level goals identified through the Landscape Conservation Design process (USFWS 2014b).

3.3.1.2 Non-Federal Land

Non-Federal land includes land owned and managed by state governments, Tribal trust land, and land owned by private individuals, corporations or organizations. Individual counties may own land, but these lands are mostly small parcels and are used for specific county activities such as local government buildings/facilities and county parks and recreation facilities.

State Owned

The majority of state owned lands were acquired from the Federal government when individual sections of land were provided to the states for revenue production; most commonly the revenue was to be used for education. Over time land exchanges or other lands actions have consolidated state land in some locations. Arizona and New Mexico state lands offer both commercial and recreational opportunities, such as tourism, ranching, hunting/trapping, mining, energy production, and the harvest of forest products.

In Arizona, the Arizona State Land Department is responsible for the management of state-owned land. The Arizona State Land Department manages over nine million acres of State Trust lands within Arizona. These lands were granted to the State under the provisions of the federal Enabling Act that provided for Arizona's statehood in 1912. State lands are held in trust and managed for the sole purpose of generating revenues for the 13 State Trust land beneficiaries, the largest of which is Arizona's K-12 education (AZ SLD 2014). These lands are managed to enhance value and optimize economic return for the trust beneficiaries, consistent with sound stewardship, and business management principles supporting socioeconomic goals. With the exception of lands within the Phoenix and Tucson metropolitan areas the primary use of Arizona state lands is for livestock grazing,

In New Mexico, state lands are managed by the New Mexico State Land Office. The Enabling Act of 1910 and the Ferguson Act granted certain lands held by the federal government to the territory of New Mexico. Under the terms of these land grants, it was stipulated that such lands, were to be held in trust for the benefit of the public schools, universities, and other specific beneficiary institutions. The State Land Office is responsible for administering 9 million acres of surface and 13 million acres of subsurface estate for the beneficiaries of the state land trust, which includes schools, universities, hospitals and other important public institutions (NM SLO 2014). New Mexico state lands are managed to optimize economic returns and provide stewardship for future generations. The State Land Office generates revenues by leasing lands for grazing, agriculture, commercial use, renewable energy, oil and gas drilling, mining, and other surface and subsurface activities (NM SLO 2014). State land use plans are prepared in accordance with state and local laws and tend to address local land use objectives and concerns.

Tribal

Tribal lands can be "fee simple" or held in trust by the federal government. Tribal trust lands are titled to the federal government but held in "trust by the federal government specifically for the benefit of the tribe who holds the right to occupy these lands. Tribes are considered sovereign nations with governments that are federally recognized. Tribes have the right to self-determination over their lands, resources, and people, and exercise comprehensive regulatory, adjudicatory, and territorial jurisdiction over activities and persons on their land. Tribes interact with Federal agencies on a government-to-government basis; Federal agencies share a trust responsibility and obligation for consultation on all activities that may have impact on lands of sovereign Indian nations. Neither type of tribal land is considered public land and tribal land is not subject to public land laws such as the NFMA or the FLPMA. Federal actions on tribal lands do require compliance with NEPA.

Tribal land use plans are tribe specific and provide direction for managing natural resources consistent with tribal environmental laws and regulations. Most tribal governments require permits for activities such as camping, hunting, or fishing on their lands; therefore land use opportunities are, for the most part, limited to tribal members or permit holders. Many tribes provide recreation opportunities to the general public through a permit process.

Land use on tribal lands follows the same patterns as elsewhere in the region, including uses such as livestock grazing, forest management, agriculture, oil and gas development, coal production and permitted recreation opportunities. In addition, some tribal lands are known for their quality big game hunting. Tribal lands are also used for individual and group spiritual and ceremonial purposes. Tribal lands include scattered homesteads and sites for commercial and industrial use. The tribes manage the use of their lands. Land use on Indian allotments is managed by the allottees with approval of the Bureau of Indian Affairs (BIA).

Private

Private land is generally owned by individuals, corporations, or groups of individuals and in population centers often consists of a complex pattern of ownership. In rural areas private land can be blocked or consist of isolated parcels surrounded by federal land. Private land use planning is generally structured through state and county planning and zoning. State, county, and city land use is regulated by plans and policies that identify the type and extent of uses allowed by the governing authorities in specific areas.

3.3.2 The MWEPA Including the BRWRA and the Proposed Expansion South of Interstate-10

In the MWEPA, including the BRWRA and the proposed expansion south of I-10, there are 32,265 mi^2 (83.566 km^2) of suitable wolf habitat. This is approximately 21 percent of the total land area of the proposed expanded MWEPA (proposed management Zones 1,2 and 3) Sixty three percent of this habitat occurs on land owned by the Federal government. Of this federally managed suitable wolf habitat, 91 percent occurs on Forest Service land and 7 percent on BLM land. The final 2 percent occurs on other Federal land owned by the Department of Defense (DOD), the National Park Service (NPS) and the USFWS (Figure 3-3).

Approximately 37 percent of suitable wolf habitat south of I-40 occurs on state, tribal, and private land. Specifically, 6 percent of suitable habitat occurs on state land; 17.5 percent occurs on tribal land, and 13 percent occurs on private land. Other ownership such as private conservation lands, land owned by non-government agencies and land of unknown ownership make up the remaining 0.5 percent.

Livestock grazing and agriculture are important cultural and economic land uses throughout Arizona and New Mexico. Many communities in the project study area began as ranching/agricultural communities. These activities, as well as hunting/trapping, and tourism play a significant role within many of the areas that have suitable wolf habitat. Much of the suitable Mexican wolf habitat is prime hunting area, particularly for big game such as elk and deer. Opportunity for outdoor recreation and tourism activities is provided by the national forests, national wildlife refuges, national monuments, national and state parks and other public lands within the project study area. Some tribal reservations also provide outdoor recreation opportunity to the public such as skiing, hiking and big game guided hunts. Within the project study area Arizona and New Mexico also provide a quality environment for ecotourism. Ecotourism promotes an area's natural beauty, opportunities for outdoor adventure, cultural heritage, and access to wild places.

The following sections discuss each type of land owner, the associated land use and management, and the amount of suitable wolf habitat associated with each type of land owner.

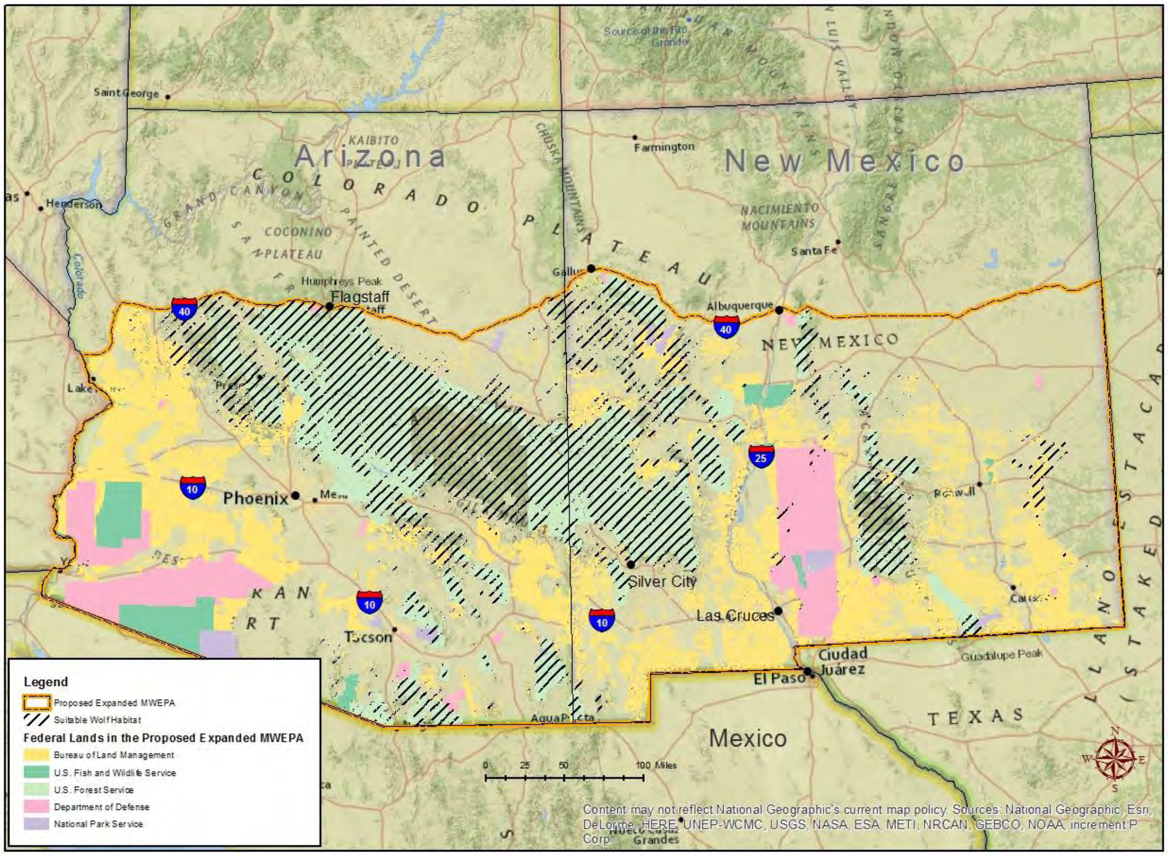


Figure 3-3. Federal land with suitable wolf habitat in proposed expanded MWEPA.

3.3.2.1 Federal Land

U.S. Forest Service

There are nine national forests in the project study area that contain suitable habitat for the Mexican wolf (Figure 3-4). The land use in these forests is consistent with national forest policy and planning requirements. Forest Service land is primarily managed for multiple-use with emphasis on ecosystem management. Traditional land uses include grazing, wilderness, recreation, motorized recreation, and fire and timber management dominate forest activity. The following is a summary description of the land use and management for each national forest within the project study area:

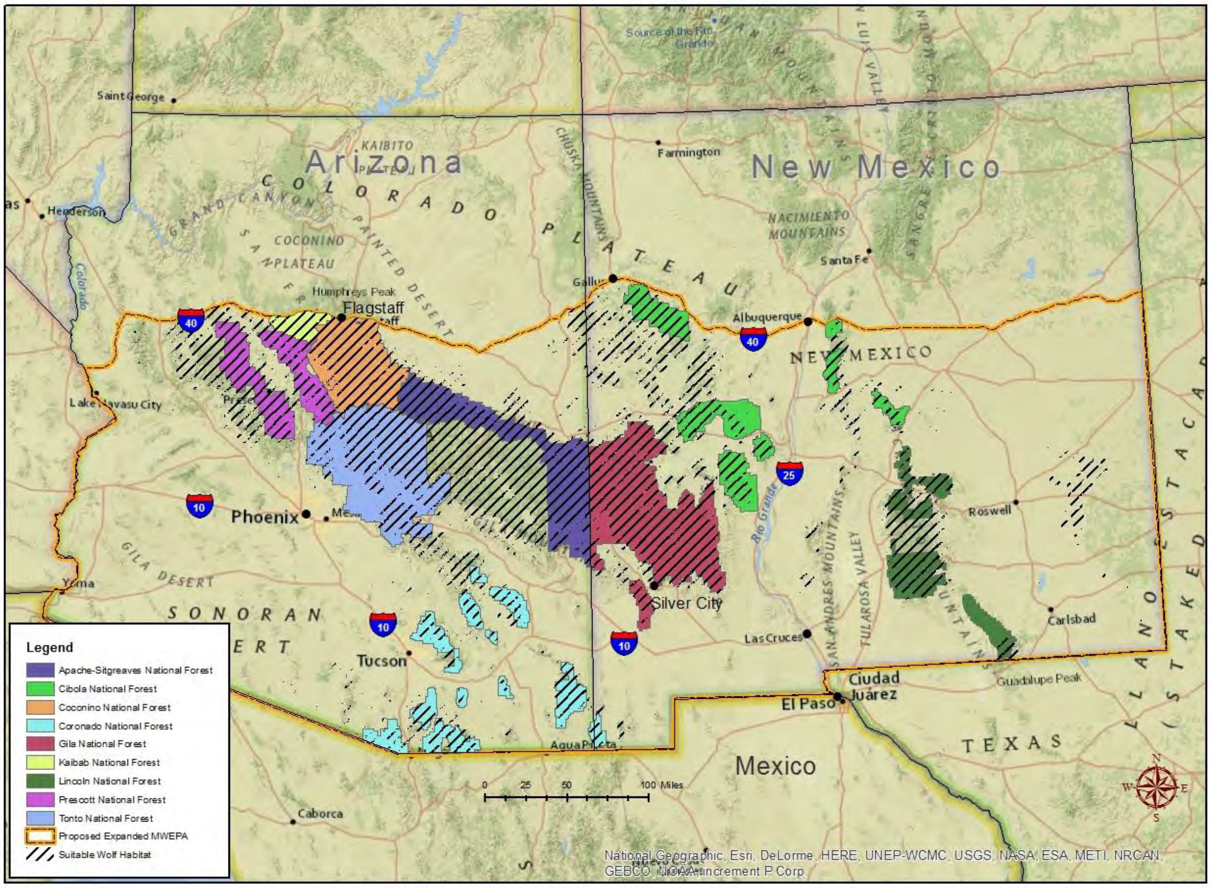


Figure 3-4. National Forests with suitable habitat in proposed expanded MWEPA.

Apache-Sitgreaves National Forest (Arizona)

The Apache-Sitgreaves National Forests are administered as one national forest which encompasses approximately 2.1 million acres of land that runs along the Mogollon Rim and the White Mountains in east-central Arizona. The Apache National Forest is part of the existing BRWRA. The Forest Supervisors Office is located in Springerville, Arizona. The five ranger districts are the Alpine, Black Mesa, Clifton, Lakeside, and Springerville. All of the approximately 3,147 mi^2 (8150 km^2 Forest is within the study area. Approximately 85 percent (2687 mi^2/6959 km^2) of this area is considered suitable Mexican wolf habitat. The forest is considered ecologically diverse and ranges in elevation from 3,500 feet above sea level to nearly 11,500 feet on Mount Baldy.

Current Forest Plan

Currently the Apache-Sitgreaves National Forest is operating under the same Forest Management Plan that was in effect when the 1996 Mexican Wolf FEIS was prepared. This plan was completed in 1987, but is currently being revised. Expected implementation of the revised forest plan is January 2015. The LMP provides forest-level direction to meet the USFS' mission during management of activities on the ASNFs. The LMP does not specifically authorize any projects or activities. Site-specific actions will be subject to future consultations, as required. The plan 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. The plan honors the continuing validity of private, statutory, or pre-existing rights.

Grazing Management

Livestock grazing is an active program on the forest consisting of 96 allotments and 2 sheep driveways with approximately 130,000 AUMs of livestock, of which 8,912 are sheep.

Wilderness Areas

The forest contains three wilderness areas and one designated primitive area. The wilderness areas are the Mount Baldy (6,842 acres), Bear Wallow (11,234 acres), and Escudilla (5,157 acres). The Blue Range Primitive Area (179,153 acres) also occurs on the ASNFs. An additional 714,938 acres in 38 areas were identified to have wilderness potential in the plan revision DEIS.

Inventoried Roadless Areas

There are 17 IRAs on the Apache-Sitgreaves NFs. These areas total approximately 322,000 acres. In general, these lands include rough, broken terrain with steep-sided canyons and are located in low population areas. The forests' IRAs are the result of Forest Service rulemaking and environmental analysis that was conducted in the late 1990s and early 2000s. IRAs are not a management area, but overlay a variety of management areas. There is considerable overlap between IRAs and areas with wilderness potential.

Recreation

The ASNFs offer a wide array of dispersed, developed, motorized, and non-motorized recreation opportunities. Visitors come to the forests to engage in a variety of activities. The primary recreation activities are "relaxing and escaping the heat," fishing, hiking, OHV use, viewing natural features and wildlife, camping, driving for pleasure, and picnicking and large group gatherings. A majority of these activities occurs in the ponderosa pine, wet mixed conifer, and dry mixed conifer forests, which make up approximately 46 percent of the Apache-Sitgreaves NFs. Visitors use the forests as a place to stay overnight more than any other forest in the National Forest System (NFS). Outfitters and guides, under permit by the Forest Service, operate on the forests and provide services to the recreating public.

Tribal Interests

The lands of the ASNFs contain a long and diverse cultural record that begins approximately 12,000 years ago. Remnants of past and current human activities and events can be found throughout the ASNFs that reflect continuous use by Native peoples and the exploration, settlement, and management by Euro-American cultures. Based on current inventory surveys it is estimated that over 100,000 cultural resource sites are located on the forests. At present, over 6,900 archaeological sites are recorded (ASNFs inventory and site files). Many of these sites are eligible for listing on the National Register of Historic Places. The Heritage Program of the ASNFs is responsible for the management of cultural resources for the benefit of the public through preservation, pubic use, and research.

Fire and Timber Management

At the time of Euro-American settlement, the Apache-Sitgreaves NFs, as well as other forests in northern Arizona, generally consisted of open stands of uneven-aged ponderosa pine with an extensive grass-forb understory. Frequent (every 2 to 17 years) low intensity fires burning through small pine regeneration and other ground fuels, prevented forests from becoming the dense stands so frequently found in northern Arizona today.

Fire scar samples taken in ponderosa pine vegetation within the White Mountains show an average return interval of 3 years with widespread fires occurring every 10 years. Grasslands on southern aspects had the greatest frequency, fires were fast moving and killed conifer seedlings encroaching from adjacent forested areas.

Fire frequency has been altered from historic condition in most vegetation types. Historically, fires could burn until they were extinguished by precipitation, ran out of fuel, or reached a previously burned area. Fires could burn for months and cover thousands of acres.

Years of land management practices in the early 1900s (e.g., fire suppression, livestock grazing) have impacted the ability of fire to play its natural role in maintaining ecosystem health. Consequently there are higher levels of woody vegetation (fuel loads) and less herbaceous cover than existed historically. Altered fire regimes are now the norm in fire-adapted ecosystems in the Southwest and have resulted in increasingly larger and more severe wildfires. This has resulted in increased attention to the way land is managed in the Southwest (Swetnam and Betancourt, 1998).

On the Apache-Sitgreaves NFs, fire season is generally April 1 through October 15. Strong southwest winds and low humidity are prevalent from mid-April to mid-June, resulting in mainly wind driven fire behavior. Hot, dry and unstable conditions usually occur from mid-June to early July. The potential for dry lightning is most likely during this time period. The monsoon season, accompanied by higher humidity and rainfall potential, decreased wind, and subdued fire behavior, generally begins during the first or second week in July and it ends in the second or third week in September when dry and mild conditions return leading to a period of increased fire behavior potential before the onset of winter conditions.

From 1997 to 2011 the majority of fires on the Apache-Sitgreaves NFs were caused by lightning, with an average of 155 fire starts per year. The remaining fires were human-caused, averaging 64 fire starts per year. Both human and lighting fires contribute to the total number of acres burned on the forests. Fires occurred every month of the year with the greatest amount occurring from May to August, usually lasting less than 2 days.

Over a million acres have burned on the Apache-Sitgreaves NFs between 1997 and 2011. About 80 percent were unplanned ignitions, while approximately 20 percent were planned ignitions. Approximately 40 percent of the acreage burned occurred in the ponderosa pine vegetation type. Fire sizes have been generally small with over 65 percent of the fires less than one quarter of an acre and 94 percent of them being less than 10 acres. The 2002 Rodeo-Chediski Fire burned 173,000 acres on the forests, and the 2011 Wallow Fire burned 538,000 acres. Both of these fires were human-caused.

Ponderosa pine forest: The ponderosa pine forest is widespread and at roughly 602,206 acres of NFS lands, or approximately 30 percent of the forests, represents the largest PNVT on the A-SNFs. This PNVT generally occurs at elevations ranging from 6,000 to 9,000 feet on soils derived from igneous, metamorphic, and sedimentary parent material with good aeration and drainage. Ponderosa pine forest is typically bounded at the upper elevation by mixed conifer forest, and at the lower elevation by grassland, piñon-juniper forest, or chaparral, although extensive intergrading of species may occur at ecotone boundaries along gradients of slope, elevation, aspect, and moisture. Generally, annual precipitation ranges from 17.3 to 27.6 inches, with 45 to 55 percent coming between October 1st and March 31st.

Wet mixed conifer forest: The wet mixed conifer forest is found primarily on the Alpine, Black Mesa, and Springerville RDs and at roughly 177,995 acres of NFS lands, or approximately 9 percent of the forests, represents the fifth largest PNVT on the A-SNFs. This PNVT is also known as *Cool/Moist Mixed Conifer* and *Mixed Conifer with Aspen*. Wet mixed conifer forests range in elevation from approximately 9,000 to 11,500 feet along a variety of gradients including gentle to very steep mountain slopes. Generally, annual precipitation ranges from 22.8 to 31.9 inches, with 50 percent coming between October 1st and March 31st.

Dry mixed conifer forest: The dry mixed conifer forest is widespread and at roughly 147,885 acres of NFS lands, or approximately 7 percent of the forests, represents the sixth largest PNVT on the A-SNFs. This PNVT is also known as *Warm/Dry Mixed Conifer* and *Mixed Conifer with Frequent Fire.* This PNVT contains a mix of dominant and co-dominant species in both dry and moister environments in the Rocky Mountain (petran), Madrean montane and subalpine coniferous forest biotic communities at elevations between 7,500 and 10,000 feet. Dominant and co-dominant vegetation varies in relation to elevation and moisture availability. Generally, annual precipitation ranges from 15.7 to 31.9 inches, with 45-55 percent coming between October 1st and March 31st.

Spruce-fir forest: The spruce-fir forest is found on the Alpine and Springerville RDs and at roughly 17,667 acres of NFS lands, or approximately 1 percent of the forests, is the smallest of the forest types, and represents the eleventh largest PNVT on the A-SNFs. Also known as subalpine conifer forests, spruce-fir with wet mixed conifer forests range in elevation from approximately 9,000 to 11,300 feet along a variety of gradients including gentle to very steep mountain slopes. Generally, annual precipitation ranges from 26.8 to 36.2 inches, with 50 percent coming between October 1st and March 31st.

Inholdings and Wildland Urban Interface (WUI)

The Apache-Sitgreaves NFs are literally the backyard for many residents of the White Mountains region of Arizona. Many communities adjoin the Apache-Sitgreaves NFs, while others are completely surrounded by the forests. Because of this close proximity, many communities and private landowners are directly affected by forest management decisions. These entities, in turn, affect forest management. There continues to be a significant growth in the communities surrounded by the Apache-Sitgreaves NFs both in population and construction of summer homes. Growth in all the communities has been steady. There are 12 communities within or adjacent to the forests which have been identified as "Urban Wildland Interface Communities within the Vicinity of Federal Lands That Are at High Risk from Wildfire". They include: Alpine, Eagar, Forest Lakes, Greer, Heber-Overgaard, Hideaways, Linden, McNary, Nutrioso, Pinedale, Pinetop-Lakeside, and Show Low. These are communities around which hazardous fuel reduction treatments on adjacent Federal lands are ongoing.

Coconino National Forest (Arizona)

The Coconino National Forest consists of three Ranger Districts and contains1.86 million acres of land in central Arizona. The Forest Supervisor's office is located in Flagstaff, Arizona. The Flagstaff, Red Rock and Mogollon Rim Ranger Districts are either wholly or have portions of their land within the project study area. The Forest is considered one of the most ecological diverse forests within the national forest system with elevations ranging from 2,600 feet to over 12,600 feet. This elevation and topographical variation provides for a wide range of diverse vegetation ranging from desert to subalpine. Much of the Forest is plateau supporting Ponderosa pine forests. The forest surrounds two National Monuments, one north and one south of Interstate 40. Approximately 2,192 mi^2 (5677 km$^{2)}$ of the forest is within the project study area. Of this approximately 91 percent (1986 mi^2/5143 km^2) is considered suitable Mexican wolf habitat.

Current Forest Plan

The Forest Plan was completed in 1987 and has been amended 24 times. The Plan is currently undergoing revision.

Forest-wide Goals and Objectives

Forest-wide goals and objectives are to cooperate with the Arizona Game and fish Department on proposals to reintroduce species, to improve habitat for federally-listed and Forest Service sensitive species (TES), and to protect areas that contain TES species.

Wildlife Management

A forest-wide standard provides a hierarchy for management of habitat for federally-listed species, with endangered species taking precedence over threatened species, and threatened species taking precedence over Forest Service sensitive species. Direction is provided to follow and reintroduce species according to approved recovery plans.

Specifically for game species, forest-wide standards and guidelines provide for big game winter range management, management of forage for wildlife, and for improvements such as water developments.

Grazing Management

Livestock grazing is an active program on the forest. A management standard in the Forest Plan requires that forage use by grazing ungulates will be maintained at or above a condition which assures recovery and continued existence of threatened and endangered species.

Wilderness Areas

There are ten designated wilderness areas within the Forest; Munds Mountain, Red Rock/Secret Mountain, Sycamore, West Clear Creek, Wet Beaver, Fossil Springs, Kachina Peaks, Kendrick Mountain, Mazatzal, and Strawberry Crater.

Recreation

Recreation activity within the forest includes hiking, horseback riding, camping, and hunting and fishing. Forest Plan direction defines habitat for threatened, endangered, and sensitive species as a criteria for evaluating the need for future closures or restrictions:

Fire and Timber Management

The 1987 Plan has standards and guidelines 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. Prescribed fire is another way to meet resource objectives and to improve wildlife habitat.

Coronado National Forest (Arizona and New Mexico)

The Coronado National Forest consists of five ranger districts and contains 2,664 mi^2 (6899 km^2) of land in southeastern Arizona and southwestern New Mexico. The Forest Supervisor's office is located in Tucson, Arizona. All five ranger districts are within the project study area with the Safford and Santa Catalina districts to the north of I-10 and the Douglas, Sierra Vista and Nogales districts to the south of Interstate-10. Forest lands are not contiguous and consist of multiple "sky island" mountain ranges. These "sky islands" provide varied and complex ecosystems. Approximately 60 percent (1,594 mi^2 /4,128 km$^{2)}$ of the Forest is considered suitable Mexican wolf habitat.

Current Forest Plan

One LRMP covers all National Forest Service lands within the boundary of the Coronado National Forest. The plan was prepared in 1986 and has been amended several times. The plan is currently undergoing revision with a proposal to add wilderness areas. The Forest is divided into twelve ecosystem management areas that have specific management direction in addition to the Forest wide management direction.

Grazing Management

Livestock grazing is an active program on the forest consisting of approximately 187 active allotments.

Wilderness Areas

There are eight designated wilderness areas, four of which are south of Interstate 10. The wilderness areas are Galiuro, Miller Peak, Pusch Ridge, Rincon Mountain, Santa Teresa, Chiricahua, Pajarita, and Mount Wrightson. These wilderness areas cover 338,294 acres of the Coronado National Forest. .

Inventoried Roadless Areas

The Forest contains 421,000 acres of Inventoried Roadless Areas.

Recreation

Recreation uses within the forest include hiking, horseback riding, camping, hunting, and fishing. The Coronado provides the full spectrum of Recreation Opportunity Spectrum settings including primitive, semi-primitive non-motorized, semi-primitive motorized, roaded natural, roaded modified, rural, and urban (<0.1%).

Tribal Interests

There are twelve Native American Tribes that have cultural ties to lands within the Coronado National Forest. They include the Ak-Chin Indian, Community, Fort Sill Apache Tribe, Gila River Indian Community, Hopi Tribe, Mescalero Apache Tribe, Pascua Yaqui, Pueblo of Zuni, Salt River Pima-Maricopa Indian Community, San Carlos Apache Tribe, Tohono O'odham Nationa, White Mountain Apache Tribe, and Yavapai-Apache Nation.

Fire and Timber Management

The ecosystems within the Coronado National Forest are primarily fire dependent, and management goals are to return fire to its natural role as a non-catastrophic disturbance. There are no lands suiTable Dor timber production within the Coronado National Forest.

Inholdings and Wildland Urban Interface (WUI)

In Cochise and Santa Cruz counties the Forest is surrounded by State of Arizona, BLM and private lands, including approximately 75,000 acres of private inholdings (USFWS 1996).

Kaibab National Forest (Arizona)

The Kaibab National Forest is comprised of three separate land areas located principally in Coconino County, Arizona. The forest consists of three ranger districts and is 1.6 million acres in size, including private land within the forest boundary. The only ranger district within the project study area is the Williams Ranger District. Approximately 414 mi^2 (1070 km^2) of the forest is within the project study area. Approximately 84 percent (347 mi^2/898 km^2) of this area is considered suitable Mexican wolf habitat. The Kaibab National Forest is diverse ranging in elevation from 3,000 feet above sea level to over 10,000 feet. Habitats transition from grassland and sagebrush to ponderosa pine forest with fir and aspen.

Current Forest Plan

The Land and Resource Management Plan (LRMP) for the Kaibab National Forest was revised in 2014. LRMP guidelines relative to management of habitat for threatened, endangered and sensitive species include the following direction:

- Threatened, endangered and sensitive species have quality habitat, stable or increasing populations, and are at low risk for extirpation.
- Project activities and special uses within federally listed species habitat should integrate habitat management objectives and species protection measures from approved recovery plans. Project

activities and special uses should be designed and implemented to maintain refugia and critical life cycle needs of Forest Service Sensitive Species.

The Kaibab NF maintains strong partnerships between the State, other federal agencies, academia, and nongovernment organizations to provide for TES species. Emphasis is placed on the protection and replacement of key habitats that contain threatened, endangered, and/or sensitive species of plants and animals. The Kaibab NF works with the USFWS and other partners to develop conservation measures (e.g. public education to reduce human impacts) to prevent listing and to aid to in the recovery and delisting of federally listed species.

Grazing Management

Livestock grazing is an active program with in the project study area, consisting of 9 allotments/permittees and 9560 head of livestock. The project study area is permitted for 12,733 Animal Unit Month's. The AUM's are broken down in the following way: 5,803 AUM's are considered to be cow/calf, 20 AUM's are considered to be yearlings, 378 AUM's are considered to be horse, 6,186 AUM's are considered to be sheep, and 310 AUM's are considered to be ram permitted. Due to drought in 2013 the total AUM's validated was 59,243, with many of those reducing numbers throughout the year. Twenty-six (26) of the allotments have a yearlong season of use, of which 5 of those allotments have either an on-off, permit, or add or subtract head during a specific season of use. All of the allotments are seasonal use; however the season of use ranges throughout the year, the majority of them are on an allotment from the summer through fall.

Wilderness Areas

Only one designated wildness area, Sycamore Canyon, is within the project study area. The 21-mile-long scenic canyon reaches a maximum width of about 7 miles. Sycamore Canyon Wilderness is 58,408 acres and is a designated Class I Airshed. The Sycamore Canyon Wilderness is located on the Coconino, Kaibab, and Prescott National Forests, but the management direction for Sycamore Canyon Wilderness is contained in the Coconino National Forest LRMP. There is a potential wilderness area (PWA) on the south portion of the Williams District. The PWA is adjacent to Sycamore Canyon Wilderness, at the head of Jacks Canyon (about 160 acres).

Inventoried Roadless Areas

There are no inventoried roadless areas (IRA) located within the project study area.

Recreation

Recreation activities in the project study area include: hunting/trapping, fishing, camping, hiking, mountain biking, horseback riding, winter sports activities and off-highway vehicle use on designated open roads. All hunting and trapping activity is managed by the Arizona Department of Game and Fish. The District falls with Game Management Units (GMU) 8 and 19B, the key hunting species for Unit 8 include elk, mule deer, pronghorn antelope, black bear, Merriam's Turkey, mountain lion and javelina. Key hunting species in Unit 19B (western most portion of the Williams District) are antelope, elk, mule deer, mountain lion, javelina, dove and quail.

The project study area currently has 20 authorized special use permits for outfitter guides. The hunting season starts around Mid-August for pronghorn and ends around Mid-January for mule deer. Turkey can be hunted in the spring and fall. Javelina season starts in January extends to the end of March. The project study area contains 2 developed campgrounds, 9 developed trailheads, and 5 undeveloped trailheads as well as numerous opportunities for dispersed recreation. The District manages 105 miles of forest system trails, which are mainly utilized for hiking, horseback riding, and mountain biking within the project study area. The District completed and is implementing the Travel Management Rule. There are currently 500 miles of National Forest System Roads within the proposed study area which are open to general motorized use.

Inholdings and Wildland Urban Interface (WUI)

There are WUIs that are within or near the project study area. The Greater Williams Area Community Wildfire Protection Plan is 326,000 acres in size. The City of Williams (Population in 2012: 3,020 (85% urban, 15% rural) and the community of Ashfork (Population 2,373) is in close proximity to the project study area. The city of Parks (Population 1,188) does not border the project study area but the citizen's use the Williams Ranger District. These communities also use lands currently managed by the Forest Service, including the Williams Ranger District for various uses including recreation (camping, hiking, biking, rock climbing, skiing, dispersed activities), fuelwood gathering, grazing of livestock (cattle and sheep), resource harvesting, water sources and hunting. Many of the residents of these communities and residents of inholdings within the Forest Boundary have horses, cattle, sheep, goats and domestic pets on their property.

Tribal Interests

The lands managed by the Williams Ranger District are culturally significant for the area tribes, including the Hopi, Navajo Nation, Havasupai, Hualapai, Yavapai-Prescott and Zuni of New Mexico. The lands have been used and continue to be used for a variety of traditional cultural and religious activities. Some of the tribes have acknowledged and identified places and properties of cultural and religious significance.

Fire and Timber Management

The Williams Ranger District fire program plans to burn around 5,000 acres each year for the next five years in the project study area. The growing timber program (4FRI) provides saw timber to a local mill. The forests annual harvest is be 7-10 million board feet board feet.

Prescott National Forest (Arizona)

The Prescott National Forest consists of three ranger districts encompassing approximately 1.25 million acres. The Forest Supervisor's office is located in Prescott, Arizona. The Bradshaw, Chino Valley and Verde Ranger Districts are within the project study area. The Prescott National Forest borders three other National Forests in Arizona: Kaibab, Coconino, and Tonto. Roughly half of the forest lies west of the city of Prescott, Arizona, in the Juniper, Santa Maria, Sierra Prieta, and Bradshaw Mountains. The other half of the Forest lies east of Prescott and takes in the Black Hills, Mingus Mountain, Black Mesa, and the headwaters of the Verde River (USFS 2014). The Forest is closely associated with "urban" activity, including recreational residences and subdivisions within the forest. The forest contains varied vegetation type and ecosystems based upon elevation. Lower elevation vegetation types consist of Sonoran Desert habitats and as the elevation increases, vegetation types move through chaparral and pinion juniper until reaching Ponderosa Pine forests at higher elevations. Approximately 84 percent (1,650 mi^2 /4,274 $km^{2)}$ of the Forest is considered suitable Mexican wolf habitat.

Current Forest Plan

The Prescott National Forest LRMP was completed in 1987 and has undergone numerous amendments.

Grazing Management

In 2011, 49 permittees were issued permits to graze cattle on the Prescott NF, covering 62 of the 68 allotments across the forest; 4 allotments are closed to grazing and 2 allotments are vacant without an active grazing permit. The active grazing is permitted on 5 seasonal allotments encompassing spring or summer use periods, 14 fall and/or winter seasonal, and 43 yearlong allotments. Fall and/or winter seasonal allotments may contain riparian areas with streamside vegetation that is grazed during the dormant season. Permitted grazing areas generally are contiguous with privately-owned ranchland, and ranch owners or managers depend on the Prescott NF for grazing to provide ranch income (Forest Service, 2009c).

The permitted and actual grazing levels are expressed in head months (HMs). Head months are a month's use and occupancy of rangeland by a single animal or equivalent. They are not synonymous with an animal unit month and do not distinguish between the class of cattle; in other words, yearlings, bulls, and cows with calves are all counted as "one head." In 2010, the most recent year available, 135,767 HMs were permitted for cattle and 1,237 HMs for horses. Of those, only 90,928 HMs were actually grazed for cattle and 876 HMs for horses. No head months were either permitted or grazed for sheep or goats.

Wilderness and other special Areas

The Prescott National Forest contains eight designated wilderness areas, totaling over 100,000 acres, and a portion of the Verde Wild and Scenic River. The largest wilderness area on the Forest is Sycamore Canyon Wilderness, which encompasses parts of three national forests: the Prescott, the Coconino and the Kaibab. Management of the area is shared among the three units following direction contained in the Coconino National Forest Land and Resource Management Plan. Pine Mountain Wilderness is also managed cooperatively, as it sits atop the boundary between the Prescott and the Tonto National Forests. Direction for the management of the Pine Mountain Wilderness is contained in this Prescott National Forest Land and Resource Management Plan. Of the remaining six wilderness areas managed by the Prescott National Forest, Granite Mountain Wilderness receives the highest level of visitation due to its proximity to the Prescott Basin.

Extending upstream from Clarkdale to the Forest boundary, approximately 38 miles of the upper Verde River have been determined to be eligible for wild and scenic river designation (Forest Service, 2010b). This is in addition to the 41 miles of existing designated wild and scenic river south of Camp Verde (Forest Service, 2004).

The Forest also contains 11 inventoried roadless areas (IRAs) identified in the 2001 Roadless Area Conservation Rule (RACR). The RACR prohibited road construction and reconstruction in most inventoried roadless areas and outlined procedures to evaluate the quality and importance of roadless characteristics. IRAs are characterized as having an undeveloped character and are valued for many resource benefits including wildlife habitat, biological diversity, and dispersed recreation opportunities.

Special areas, such as research natural areas, botanical areas, and geological areas, are designated to ensure protection of specific biological and geological communities. By definition, they must have unique or special characteristics for which specific management is required. Grapevine Botanical Area, a special area located in the Bradshaw Mountains south of Prescott, was designated to protect the 12 perennial springs and associated Arizona alder-Arizona walnut vegetation community found in the area.

Inventoried Roadless Areas

- Arnold Mesa Inventoried Roadless Area
- Blind Indian Creek Inventoried Roadless Area
- Grief Hill Inventoried Roadless Area (west portion)
- Pine Mountain Wilderness Contiguous Inventoried Roadless Area
- Ash Creek Inventoried Roadless Area
- Connell Mountains Inventoried Roadless Area
- Fritsche Inventoried Roadless Area

- Muldoon Inventoried Roadless Area
- Sheridan Mountain Inventoried Roadless Area
- Black Canyon Inventoried Roadless Area
- Grief Hill Inventoried Roadless Area (east portion)
- Hackberry Inventoried Roadless Area

Recreation

A variety of year-round recreation opportunities including hunting, fishing, camping, hiking and off-highway vehicle use exist on the Prescott NF. Visitors and local citizens alike enjoy having such opportunities nearby, and during the summer, recreate in the Prescott NF where temperatures are moderate. In the winter, people visit the Verde Valley and other snow-free areas to recreate where temperatures are mild. Increases in population have continuing increases in temperatures; it is likely that there will also be increases in recreation visitors from hotter areas such as Phoenix. In addition to a host of trails and campgrounds, the Prescott NF has several unique recreation opportunities, including: a hang-glider site atop Mingus Mountain; Alto Pit and Hayfield Draw Off-highway Vehicle (OHV) recreation sites; Granite Mountain National Recreation Trail; General Crook National Historic Study Trail, a portion of the Great Western Trail, which traverses the western U.S. from Mexico to Canada; gold panning on Lynx Creek; and three historic Forest Service buildings which are a part of the “Rooms with a View” cabin rental program. The Prescott NF contains several heritage sites which are protected for their unique cultural values; a couple of popular sites for visitors include the Lynx Creek Ruin and Charcoal Walker Kilns.

Minerals

The Prescott National Forest is generally a mineral rich region as demonstrated by the large number of existing and historic mineral patents. The mix of patented (mining claims) lands and NFS lands creates a patchwork of private and Federal ownership within the boundaries of the Forest. While mining gold and copper were important historically, current mining activities on the Forest include five mineral material contracts for removal of flagstone, one contract for schist removal, and one contract for removal of decomposed granite. One large, locatable limestone operation exists. Today, there is interest in both commercial gold mining and recreational gold panning/sluicing on the forest. Placer gold operations involve extracting gold from alluvial deposits such as panning or using a sluicebox. Lode operations, also known as hard rock mining, consist of mining a vein bearing gold or a rock in-place valuable mineral deposit. Most placer mining is recreation use or small commercial operators.

Vegetation

The potential natural vegetation types in the Prescott National Forest include Semi-Desert Grassland (10%), Great Basin Grassland (3%), Juniper Grassland (11%), Piñon-Juniper Evergreen Shrub (37%), Interior Chaparral (25%), Ponderosa Pine-Evergreen Oak (5%), Ponderosa Pine-Gambel Oak (4%), Piñon-Juniper Woodland (3%), Desert Communities (< 1%), Riparian Gallery Forest (1%).

Forest Products

Forest products sold on the Prescott National Forest include both sawtimber and firewood. Since approximately the mid-1990s, demand for sawtimber on the Forest has shifted from a commodity driven need to an ecological need. In other words, the harvest of sawtimber on the Prescott National Forest has been the result and a byproduct of thinning forested areas with the primary objective of improving forest health, resiliency to disturbance, and wildlife habitat or to reduce hazardous fuels in the wildland-urban interface, not to produce sawtimber. The demand for wood products other than sawtimber has been driven by local and regional need for firewood. Under management of the 1987 plan, over a 10-year span sawtimber sales averaged 2,340 hundred cubic feet (ccf) annually and firewood sales averaged 2,040 ccf of firewood annually.

Juniper Grassland and Piñon-Juniper Evergreen Shrub PNVTs are the two vegetation types on which firewood is currently harvested and are generally characterized by moderate to low similarity to desired ecological conditions in terms of vegetation structure. As noted in the "Vegetation and Fire" section in "Need for Change 1," fire exclusion over the past century has created increases in canopy cover and tree density and a related decrease in growth and germination of grasses and shrubs in the understory. On erosive soil types within these communities, shrub, tree, and herbaceous ground cover help to lessen raindrop intensity and soil movement.

Sawtimber is harvested from both the Ponderosa Pine-Evergreen Oak and Ponderosa Pine-Gambel Oak PNVTs. These vegetation types can be described as having a low similarity to desired ecological conditions. The current fire regime is one of low frequency and high-intensity as opposed to the desired regime in which fire would occur at high frequency with low intensity. Results of this change in the fire regime are: there are too many young and mid-aged trees and too few mature trees which create high canopy cover and stands that have a single overstory canopy layer; both fine and coarse fuels have accumulated on the forest floor; and there has been a decrease in the growth and germination of grasses and forbs in the understory. Healthy pine forests provide important habitat for a variety of wildlife species and are essential to maintaining bird populations such as the northern goshawk and Mexican spotted owl. A considerable amount of these two PNVTs include areas that are deemed wildland-urban interface.

Fuels management

Prescribed burning and vegetation thinning are often used to restore the fire regimes to a more natural frequency. They can also reduce the likelihood of high severity wildfires and contribute to a long-term reduction in smoke emissions. These activities alter stand structure so that wildfires burn as surface fires in the accumulated litter and duff on the forest floor by reducing the overall amount of available fuel, removing mid-story vegetation that can act as a path for fire to reach the overstory, and opening up the canopy to inhibit the spread of fire among tree crowns. Surface fires typically produce less smoke because they consume less live biomass than crown fires, resulting in less overall impact to air quality. Removal or thinning of shrubs and trees could occur on about 1,000 acres per year. About 7,835 acres per year would be treated using managed fire across all vegetation types.

Inholdings and Wildland Urban Interface (WUI)

Wildland-urban interface includes those areas of resident populations at imminent risk from wildfire and human developments having special significance. These areas may include: critical communications sites, municipal watersheds, high voltage transmission lines, church camps, scout camps, research facilities, and other structures that, if destroyed by fire, would result in hardship to communities. These areas encompass not only the sites themselves, but also the continuous slopes and fuels that lead directly to the sites, regardless of the distance involved.

Tonto National Forest (Arizona)

The Tonto National Forest consists of six ranger districts which encompass approximately 2.87 million acres in central and eastern Arizona. The Forest Supervisor's office is located in Phoenix, Arizona. The Cave Creek, Globe, Mesa, Payson, Pleasant Valley and Tonto Basin Ranger Districts are within the project study area. The Tonto National Forest is the largest of the six national forests in Arizona and is the fifth largest National Forest in the United States. It is bounded by the Phoenix metropolitan area to the south, the Mogollon Rim to the north and the San Carlos and Fort Apache Indian reservations to the east. The forest is comprised of varied Sonoran desert habitats as well as Ponderosa pine forest at higher elevations (above 5,000 feet.). Approximately 67 percent (3,007 mi^2 /7,789 $km^{2)}$ of the Forest is considered suitable Mexican wolf habitat. The majority of suitable wolf habitat is within the Payson, Pleasant Valley and Tonto Ranger Districts which are the higher elevation northern and eastern parts of the Forest. The Cave Creek, Globe and Mesa Ranger Districts are the lower elevation western and southern parts of the forest where Sonoran desert, chaparral, and piñon pine-juniper vegetation types are predominant. The Tonto National Forest is closely associated with "urban" activity, including recreational residences and subdivisions within the forest. It is considered one of the most visited (approximately 5.8 million visitors annually) "urban" forests in the United States because of its proximity to the Phoenix metropolitan area. Recreation activities include hunting, camping hiking and motorized vehicle use.

Current Forest Plan

The Forest Plan was completed in 1985 and has been amended 26 times. The Plan is currently undergoing revision. Forest-wide goals and objectives are to achieve a management situation that can respond to national demands for wood products, livestock production, water yield, and a wide mix of recreation opportunities

Wildlife Management

Wildlife and fish habitat elements will be recognized in all resource planning and management activities to assure coordination that provides for species diversity and greater wildlife and fish populations through improvement of habitat. Cooperate with appropriate State Fish and Wildlife agencies.

Grazing Management

Livestock grazing is an active program on the forest consisting of 90 allotments. A standard in the Plan requires range administration will bring the range resources under proper management and improve range forage conditions. The recognizable benefit of this emphasis will be improved watershed condition and wildlife habitat.

Wilderness Areas

There are seven wilderness areas within the Forest; Four Peaks, Hells Gate, Mazatzal, Salome, Salt River Canyon, Sierra Ancka, and Superstition. A portion of the Verde Wild and Scenic River lies within the forest as well as a portion of the Salt River.

Fire and Timber Management

Design of timber management activities integrate considerations of wildlife habitat and forest health

Cibola National Forest (New Mexico)

The Cibola National Forest and Grasslands encompasses approximately 1.63 million acres. The Forest Supervisor's office is located in Albuquerque, New Mexico. There are four Ranger Districts (RDs) in New Mexico: Sandia, Mountainair, Magdalena, and Mt. Taylor. The districts are widely dispersed but all have some portion of land within the project study area. The forest is ecologically diverse with elevations ranging from 5,570 feet to 10,873 feet above sea level. Vegetation is varied across the districts with grassland and pinion-juniper at lower elevations, Ponderosa pine with Gambel's oak in the mid elevations, and mixed conifer at the higher elevations. Approximately 2130 mi^2 (5517 km^2) of the forest is within the project study area. Of this approximately 71 percent (1505 mi^2 /3898 km^2) is considered suitable Mexican wolf habitat.

Current Forest Plan

The Cibola National Forest Land and Resource Management Plan (LRMP) was completed in 1985. The LRMP has been amended several times. Six Management Areas (MA) are on the Magdalena Ranger District and include MA 3 (Wilderness), MA 7 (Langmuir Research Site), and MA 11, 12, 13, and 16.

Forest Plan Standards and Guidelines relative to management of habitat for threatened and endangered species include the following direction:

- Manage for a diverse, well-distributed pattern of habitats for viable populations of wildlife and fish species in cooperation with states and other agencies. Apply technology and manage habitat to help recover threatened and endangered species and increase the productivity for existing native and desired non-native vertebrate species consistent with other resource considerations. Resist introduction of exotics.
- Grazing Management Standards: Forage use by grazing ungulates will be maintained at or above a condition which assures recovery and continued management of threatened and endangered species.
- Manage threatened and endangered species habitat to achieve delisting consistent with recovery plans and goals established by the US Fish and Wildlife Service. Manage sensitive species habitat to maintain population viability within the National Forest. Habitat management for federally listed species will take precedence over unlisted species. Habitat management for endangered species will take precedence over threatened species. Habitat management for sensitive species will take precedence over non sensitive species.
- All vegetation manipulations will be coordinated with threatened and endangered species requirements.
- Consult and cooperate with all Federal and State Natural Heritage Programs and Native American programs, such as the Navajo Heritage Program, to achieve management objectives identified in these programs.
- Studies by appropriate, qualified personnel will be conducted to ascertain suitability of reintroduction of endangered, threatened, proposed, and state listed native species to suitable habitat where not presently occupied.
- When activities conducted in conformance with Mexican spotted owl standards and guidelines may adversely affect other threatened, endangered, or sensitive species or may conflict with other established recovery plans or conservation agreements; consult with US Fish and Wildlife Service to resolve the conflict.
- Habitat requirements for threatened, endangered, and sensitive species will take precedence over insect and disease control. Where there are no conflicts with TES species habitat requirements, all silvicultural examinations will integrate insect and disease considerations in the final stand prescriptions to maintain stand vigor and composition in resistant conditions. Special attention will be given to removal of mistletoe infected trees during intermediate and regeneration harvests.

Grazing Management

The Magdalena Ranger District has 44 grazing allotments, three of the allotments are closed to grazing, and one is reserved as a grass bank allotment. Of the 40 active allotments on the District, there are 34 permittees, of which 10 permittees (portions of 12 Allotments) take in wilderness. The Magdalena Ranger District is permitted for 83,756 Animal Unit Month's, or 64,117 Head Months. 9,642 AUM's are considered to be Cow/Calf, 3,795 AUM's are considered to be yearlings, and 173 AUM's are considered to be Horse or Mule permitted. Due to drought in 2013 the total AUM's validated was 59,243, with many of those reducing numbers throughout the year. Twenty-six (26) of the allotments have a yearlong season of use, of which 5 of those allotments have either an On-Off, permit, or add or subtract head during a specific season of use. Sixteen (16) of the allotments are seasonal use; however the season of use ranges throughout the year, the majority of them are on an allotment from the fall through the spring.

The Mt. Taylor RD has 28 livestock grazing allotments in the Zuni Mountains with 25 permittees. The Zuni Mountain portion of the Mt. Taylor Ranger District is permitted for 23,223 Animal Unit Month's, or

17,941 Head Months. All of the AUM's are considered to be Cow/Calf. Four of the allotments have a yearlong season of use, and 24 of the allotments are seasonal use; however the season of use ranges throughout the year, the majority of them are on an allotment from the May through October.

The Mountainair RD has 18 livestock grazing allotments in the Manzano and Gallinas Mountains. One is closed to grazing, and none are reserved as grass bank allotments. Of the active allotments on the District, there are 22 permittees of which 2 have permits in the Manzano Mountain Wilderness. The Mountainair Ranger District is permitted for 18,420 Animal Unit Month's. All are considered to be Cow/Calf, or bull AUMs. Due to severe and exceptional drought from 2010 to 2013, the total AUMs validated was voluntarily reduced by permittees to less than half. All allotments were destocked, either voluntarily or through amended Annual Operating Instructions in 2013 due to lack of forage. Restocking in 2014 has been to less than 50% of allowable numbers during mid-drought recovery. There is no grazing authorized on the Manzanita Mountain portion of the Sandia Ranger District.

Wilderness Areas

Two wilderness areas are located in the San Mateo Mountains. There are 44,530 acres within the Apache Kid Wilderness and 19,075 acres within the Withington Wilderness. The 36,875 acre Manzano Mountain Wilderness is located on the Mountainair Ranger District. The Minimum Requirement Decision Guide (MRDG) is designed for wilderness administrators to effectively analyze proposed actions to minimize negative impacts to wilderness character and values. It assumes a basic knowledge of the Wilderness Act of 1964, agency policies, and specific provisions of the wilderness designation legislation for each unit. This guide is suggested for wilderness administrators for the four federal land management agencies, the Bureau of Land Management, the National Park Service, the U.S. Fish & Wildlife Service and the U.S. Forest Service.

Inventoried Roadless Areas

There are eight (8) Inventoried Roadless Areas (IRA) located on the Magdalena Ranger District totaling 205,972 acres. The eight (8) IRAs are identified as follows: Goat Spring IRA and the Scott Mesa IRA are located in the Bear Gallinas Mountains; the Datil IRA and the Madre Mountain~ IRA are located in the Datil Mountains; the Ryan Hill IRA is located in the Magdalena Mountains; and the Apache Kid Contiguous IRA, the San Jose IRA, and the White Cap IRA are located in the San Mateo Mountains. The Langmuir Research site is located in the Magdalena Mountains and covers over 30,000 acres. There are no IRAs on the Zuni Mountain portion of the Mt. Taylor Rd or on the Mountainair or Sandia RDs.

Recreation

Hunting is a popular recreation activity throughout the Ranger Districts. All hunting and trapping activity is managed by the New Mexico Department of Game and Fish. The Magdalena Ranger District falls with Game Management Units (GMU) 13 and 17. Mt. Taylor Ranger District (Zuni Mountain portion) includes GMU 10. The Mountainair RD and Sandia RD south of I-40 are in GMU 14 and the Gallinas Mountains on the Mountainair RD are in GMU 38. A large number local residents and out of town visitors come to the Cibola National Forest to hunt elk, mule deer, pronghorn, black bear, and Merriam's turkey. The Magdalena Ranger District currently has 37 authorized special use permits for outfitter guides. There are ten outfitter/guides on the Mt. Taylor RD but none on the Mountainair RD or Sandia RD (Manzanita Unit). In general, the hunting season starts around Mid-August for pronghorn and ends around Mid-January for mule deer. Turkey can be hunted in the spring and fall depending on the GMU. Javelina season starts in January extends to the end of March.

The Magdalena District contains six developed campgrounds, one developed trailhead, and 34 undeveloped trailheads as well as numerous opportunities for dispersed recreation. The District manages 193 miles of forest system trails, which are mainly utilized for hiking, horseback riding, and mountain biking. The Zuni Mountain unit of the Mt. Taylor RD has three developed campgrounds, one developed trailhead, a picnic site at McGaffey Lake and 26 miles of developed mountain bike trails. The Mountainair Ranger District has 6 campgrounds with a total of 82 sites, 4 picnic areas with 17 sites, 11 developed trailheads and approximately 85 miles of recreational trails. The Sandia RD (Manzanita Mountains) has one developed campground, two developed picnic areas, and nine developed trailheads. There are 80 miles of developed trails. The majority of use on the Manzanita trail system is motorcycle and mountain bike with moderate hiker and equestrian use.

Currently the Mountainair RD has 234 miles of roads and trails designated for motorized use with 23 miles of routes designated as dispersed camping corridors. Sandia RD (Manzanita Unit) has 88 miles of motorized routes. Mt. Taylor RD has 587 miles of roads and trails designated for motorized use in the Zuni Mountains. The Magdalena RD is analyzing alternatives for the designation of motorized use including motorized dispersed camping and motorized big-game retrieval to implement the Travel Management Rule. There are currently 1,318 miles of National Forest System Roads on the District which are open to general motorized use. The entire District (except Wilderness areas) is open to motorized cross-country travel resulting in a proliferation of unauthorized roads. Implementation of the Travel Management Rule will determine what roads and motorized dispersed uses will be authorized. The Decision for the Magdalena Travel Management Plan is expected in 2015.

Tribal Interests

The lands managed by the Cibola National Forest are culturally significant for the area tribes, including the Pueblos of Acoma, Zuni, Laguna, Isleta, Sandia, Santo Domingo, Santa Ana, San Felipe, San Ildefonso, Cochiti, Zia, and Jemez, the Navajo Nation, the Hopi Tribe, the Jicarilla Apache Nation, the Mescalero Apache Tribe, and the Ft. Sill Apache Tribe. The lands have been used and continue to be used for a variety of traditional cultural and religious activities. Some of the tribes have acknowledged and identified places and properties of cultural and religious significance. The entire Alamo Band Navajo Indian Reservation is located within the administrative boundary of the Magdalena Ranger District. These tribes recognize the lands managed by the Cibola National Forest as part of their aboriginal or traditional use areas, and acknowledge contemporary use of these lands for traditional cultural and religious activities. The Cibola NF maintains a governmental relationship with these federally recognized tribes, and routinely consults with these tribes on policy /development, and proposed plans, projects, programs, and Forest activities that have a potential to affect tribal interests or natural or cultural resources of importance to the tribes.

Fire and Timber Management

The Magdalena fire program plans to burn around 2,500 acres each year for the next five years. Mountainair RD estimates a burning program of about 500acres per year and Sandia Rd (Manzanita unit) also estimates about 500 acres per year for the same five year time period. Mt. Taylor RD (Zuni Mountain unit) estimates it will burn about 2,200 acres per year in the next five years.

The forest's annual harvest in the Zuni Mountains is 3 to 5 million board feet of ponderosa pine, using ground based mechanical methods. This growing timber program provides saw timber to a local mill in Milan, NM, but some of this volume is sold as firewood. Harvest methods are in conformance with guidelines to enhance and protect habitat for the Mexican spotted owl and Northern goshawk. Currently the other RDs sell piñon, juniper and pine for firewood. Mountainair RD sells about 1.5 million board feet of firewood within designated areas. Magdalena RD sells about 1.1 million board feet throughout the District.

Inholdings and Wildland Urban Interface (WUI)

There are 16 WUIs that are within or near the Cibola within the area covered by the proposed 10(j) rule. The communities of Alamo Band Navajo Indian Reservation (Population 1,085), Magdalena (Population 938), Datil (Population 54), Dusty, and Monticello are in close proximity to the Magdalena Ranger

District. The city of Socorro (Population 8,906) does not border the Magdalena District but the citizen's use the Cibola. These communities also use lands currently managed by the Forest Service, including the Magdalena Ranger District for various uses including recreation, fuelwood gathering, grazing of livestock, resource harvesting, water sources and hunting. Many of the residents of these communities and residents of inholdings within the Forest Boundary have horses, cattle, sheep, goats and domestic pets on their property.

Within the Zuni Mountains of the Mt Taylor Ranger District there is heavy interspersion of private land inholdings and there are numerous towns and unincorporated areas. Subdivisions or towns that surround the Zuni Mountains include Bread Springs, Pine Haven, Timber Lake Estates, Jamestown, Bluewater Estates, Ramah, Pine Hill, El Morro Ranches, and La Jara.

Ownership outside the proclamation boundary is diverse. The Zuni Indian Reservation and Fort Wingate Army Depot are located west and north of the Zuni Mountains, and the Ramah Navajo Reservation is to the south. The Navajo (Dine) Indian Reservation is to the north, and to the south are three National Park Service lands: El Malpais National Monument, El Malpais National Conservation Area, and El Morro National Monument. The northeast side of the unit is primarily checkerboard ownership comprised of state, BLM, tribal, and lands in private ownership.

On the Mountainair RD, the Manzano Mountains share a border on the north with Isleta Indian Reservation and land grants on the east and west. The land grant communities of Chilili, Tajique, Torreon, and Manzano are small predominantly Hispanic and agriculturally based with close ties to the land. Quarai and Abo, two units of the Salinas Pueblo Missions National Monument, are near the district on the east side, as is Manzano State Park. The west side is adjacent to the Tome, Casa Colorado, and Belen Land Grants. These land grants are vast tracts, and lightly populated. There is checkerboard ownership to the northwest comprised of BLM, state, and private lands. The Gallinas Mountains are located south of the Manzanos. Ownership within the proclamation boundary is primarily NFS lands, but there is also a substantial amount of land in private ownership. There is one developed campground accessible from the south, up Red Cloud Canyon. Land outside the proclamation boundary is primarily in private ownership with some sections of State land. Corona is the closest town, at the intersection of State Highway 42 and US Highway 54, about one mile east of the District boundary.

The Sandia RD manages Forest system lands in the Manzanita Mountains located south of Interstate 40. The village of Tijeras is located nearby, and a Department of Defense and Department of Energy (Military) withdrawal parcel is on NFS lands. The withdrawal land is closed to public entry, and is used by Kirtland Air Force Base and the Sandia National Labs. The withdrawal area is approximately 19,749 acres (USDA Cibola NF 2013). The withdrawal area is administered by the Forest Service, but is withdrawn from typical Forest Service multiple uses such as mineral entry, cattle grazing, and recreation uses.

Gila National Forest (New Mexico)

The Gila National Forest encompasses approximately 5,101 mi^2 (13,212 km^2) in western New Mexico. It is the sixth largest National Forest in the continental United States. The forest headquarters office is located in Silver City, New Mexico and there are six Ranger Districts; Silver City, Black Range, Glenwood, Reserve, and Wilderness. The Forest's most significant feature is wilderness and the beauty and ecological diversity associated with the wilderness areas. Approximately 89 percent (4,563mi^2 /11,819 $km^{2)}$ of the Forest is considered suitable Mexican wolf habitat. The Gila Forest Management Plan was completed in 1986, but management has evolved over time. In the 1990's the Forest began implementing ecosystem management – a means to determine desired forest conditions and to work towards achieving those desired conditions based upon ecosystem sustainability. More recently, management has placed emphasis on restoring the forest's natural disturbance regimes, particularly as related to fire adapted ecosystems. The Gila National Forest contains parts of three wilderness areas; Aldo

Leopold, Blue Range, and Gila. Recreation activities includes hunting/trapping, fishing, camping, hiking and off-highway vehicle use.

Lincoln National Forest (New Mexico)

The Lincoln National Forest consists of three ranger districts which encompass approximately 1,712 mi^2 (4435 km^2) in south-central New Mexico. The Forest Supervisor's office is located in Alamogordo, New Mexico. The Smokey Bear, Sacramento and Guadalupe Ranger Districts are within the project study area. The Forest varies in elevations from 4,000 to 11,500 ft. and contains a diverse natural landscape that passes through five different life zones ranging from Chihuahuan desert to sub-alpine vegetation above the tree line. Approximately 69 percent (1,181mi^2 /3,058 $km^{2)}$ of the Forest is considered suitable Mexican wolf habitat. The Lincoln National Forest LRMP was completed in 1986 and has been amended several times. The LRMP covers most all USFS service programs and provides guidance for management and monitoring. There are two designated wilderness areas within the Forest; White Mountain and Captain Mountain. Recreation activities include hunting/trapping, fishing, camping, hiking and off-highway vehicle use.

Other Federal

BLM

The majority of the land managed by the BLM is managed as open space and is open to public access. Under the multiple use mandate the majority of BLM land in the project study area is managed for livestock grazing, mineral exploration and development, energy production, wildlife habitat improvement, and outdoor recreation, including hunting/trapping and fishing and off highway vehicle use. Approximately seven percent (1,441 mi^2/ 3732 km^2) of the suitable wolf habitat in the project study area is on BLM owned land. With the exception of a negligible amount in proposed management Zone 1, all of the suitable habitat on BLM land is within proposed management Zones 2 and 3. The majority of this suitable habitat is adjacent to large blocks of contiguous habitat within the national forests.

Grazing Management

The BLM administers permits and leases held by ranchers who graze their livestock, mostly cattle and sheep, at least part of the year on allotments under BLM management. Permits and leases generally cover a 10-year period and are renewable if the BLM determines that the terms and conditions of the expiring permit or lease are being met. The amount of grazing that takes place each year on BLM-managed lands can be affected by such factors as drought, wildfire, and market conditions. BLM activities for Arizona and New Mexico's grazing and rangeland program include resource monitoring, conducting land health assessments and evaluations, use authorizations, allotment planning and administration, developing vegetation objectives, integrating weed management and activity plan development in connection with land use planning.

Recreation

The BLM manages a number of National Conservation Lands in Arizona and New Mexico that are part of the National Landscape Conservation System. National Conservation Lands include National Monuments, National Conservation Areas, Wilderness Areas, Wilderness Study Areas, Wild and Scenic Rivers, and National Scenic and Historic Trails. The National Conservation Lands have four goals:

- Protecting and restoring unique resources
- Preserving culture and heritage
- Maintaining quality of life for a growing generation
- Protecting critical habitat

BLM Arizona manages five national monuments, three national conservation areas, two national historic trails, a portion of one national scenic trail, 47 wilderness areas and two wilderness study areas. BLM New Mexico manages four national monuments, two national conservation areas, three national historic and scenic trails, two wild and scenic rivers, five wilderness areas and 56 wilderness study areas.

Wildlife habitat improvement

BLM also manages wilderness and wilderness study areas and the newly created Oregon Mountains Desert Peak National Monument. These areas would provide the greatest potential for wolves to be found on BLM lands.

NPS

Within the project study area the NPS manages the Coronado National Memorial and the Chiricahua National Monument, both in Cochise County, Arizona as well as the Casa Grande Ruins, Organ Pipe Cactus National Monument, Petrified Forest National Park and Saguaro National Park in Arizona. In New Mexico, the NPS manages the White Sands National Monument, El Malpais National Monument, El Morro National Monument, Salinas Pueblo Missions National Monument, and Gila Cliff Dwellings National Monument. Only the El Malpais National Monument in New Mexico and the Chiricahua National Monument contain more than a negligible amount of suitable wolf habitat.

Chiricahua National Monument and Coronado National Memorial

Both the Monument and the Memorial are managed in accordance with GMPs which define the direction and philosophy for resource preservation and visitor use in accordance with NPS management policies. The 12,900 acre Chiricahua National Monument was established to protect unique natural formations called "the Pinnacles" and contains 11,120 acres of designated wilderness. The 4,800 acre Coronado National Memorial was established to commemorate Francisco Vasquez de Coronado's 16th century expedition into what is now the United States. Approximately five percent (.4 mi^2/1 km^2) of the Coronado National Memorial and 94 percent (17 mi^2/45 km^2) of the Chiricahua National Monument contain suitable Mexican wolf habitat. Both the Monument and the Memorial are adjacent to contiguous suitable habitat within the Coronado National Forest.

Montezuma Castle National Monument

Approximately 67 percent of the .2 mi^2 (2 km^2) Montezuma Castle National Monument in the Verde Valley has suitable wolf habitat. It is adjacent to suitable habitat within the Coconino National Forest.

White Sands National Monument

The 143,733 acre White Sands National Monument is located in the Tularosa Basin and consists of the largest gypsum and dune area in the world. The White Sands National Monument lies within the currently designated White Sands Wolf Recovery Area but does not contain suitable wolf habitat.

El Malpais and El Morro National Monument

The El Malpais National Monument consists of lava flows and other volcanic features as well as short-grass prairies along the margins of lava flows. Lower elevations of the Monument feature native bunchgrass, shrub, and wildflower communities. Piñon-juniper forest dominates hillslopes, and ponderosa pine, Douglas fir, and other conifer species appear at higher elevations. El Morro National Monument was created in 1906 to protect ancient ruins and a large sandstone promontory also known as "Inscription Rock" due to the petroglyphs and pictures, names, dates and messages left by Spanish and Anglo-American explorers. Approximately 53 percent (.8 mi^2/2 km^2)of the El Morro National Monument and 38 percent (66 mi^2/171 km^2) of the El Malpais Monument has suitable wolf habitat. This habitat is adjacent to the 114,276 acre BLM managed El Malpais Natural Conservation Area and larger blocks of contiguous habitat in the Cibola National Forests.

Gila Cliff Dwellings National Monument

The Gila Cliff Dwellings Monument was created in 1907 to protect cave dwellings built in five cliff alcoves by the Mogollon peoples. The Monument is located in the Gila Wilderness within the Gila National Forest. The entire Monument (.8 mi^2/2 km^2) is considered suitable wolf habitat.

USFWS

Within the project study area the USFWS manages the Sevilleta, Bosque del Apache, San Andres, bitter Lake and Grulla National Wildlife Refuges in New Mexico and the Buenos Aires, Leslie Canyon, San Bernardino, Cabeza Prieta, Kofa, Imperial and Cibola National Wildlife Refuges (NWRs) in Arizona. **Refuge conservation plans are called "comprehensive conservation plans" (CCPs).** The purpose of a CCP is to specify a management direction for the Refuge for the next 15 years. Only the Sevilleta, San Andres and Buenos Aires NWRs contain more than negligible amounts of suitable wolf habitat.

Sevilleta NWR

The Sevilleta refuge contains approximately 230,000 acres of diverse habitat including Chihuahuan desert, great-plains short grass prairie, and pinion juniper woodland. The refuge is bisected by the Rio Grande River adding riparian habitat. The refuge is unique in that it was set aside "to preserve and enhance the integrity and the natural character of the ecosystems of the property by creating a wildlife refuge managed as nearly as possible in its natural state." Approximately 2 percent (8mi^2/ 22 km^2) of the refuge has suitable habitat for Mexican wolves. Located within the Refuge is the pre-release facility for Mexican wolves raised in captivity.

San Andres NWR

Established in 1941 for the conservation and development of natural wildlife resources, the San Andres National Wildlife Refuge contains approximately 57,215 acres within the boundaries of the 2.2 million-acre White Sands Missile Range. Closed to the general public, San Andres National Wildlife Refuge serves as a natural laboratory that supports important research on southwestern flora and fauna, Chihuahuan desert ecosystems, hydrological status, effects of prescribed burning and wildfires, and protects historical and cultural sites. The refuge includes ideal habitat for New Mexico's desert bighorn sheep. Approximately 2 percent (2mi^2/4 km^2) of the refuge has suitable habitat for Mexican wolves.

Buenos Aires NWR

The Buenos Aires National Wildlife Refuge was established in 1985 for the reintroduction of masked bobwhite quail and to restore the natural landscapes and native wildlife that depend upon it. The Refuge is divided into three management units. The main portion of the refuge encompasses approximately 110,000 of the 117,464 acre refuge. This tract is made up Sonoran semi-desert grassland. The other two units are the Brown Canyon Unit and the Arivaca Unit, which includes Arivaca Creek and the adjacent Arivaca Cienega. An important objective of the refuge is to protect and restore these three habitat types. Management strategies focus on improving habitat for a variety of species with an emphasis on the masked bobwhite quail. Approximately six percent (11 mi^2/29 km^2) of the Refuge's land area provides suitable habitat for wolves.

DOD

Department of Defense facilities within the project study area include the U.S. Army's Yuma Proving Ground and Fort Huachuca in Arizona and the White Sands Missile Range (WSMR), and Fort Bliss in New Mexico. The U.S. Air Force maintains Kirtland and Holloman Air Force Bases (AFB) in New Mexico and Davis-Monthan and Luke AFB in Arizona as well as the Barry M. Goldwater Range (BMGR-East) in Arizona. Marine Corps Air Station, Yuma manages the BMGR-West. The Arizona

Army National Guard's Camp Navajo facility is west of Flagstaff, Arizona. The WSMR and Kirtland AFB in New Mexico, Fort Huachuca in southern Arizona and Camp Mohave have suitable wolf habitat.

White Sands Missile Range (WSMR), NM

The WSMR is the largest military facility within the United States, encompassing approximately 3,107 mi^2 (8047 km^2) of land. Approximately three percent (107 mi^2/278 km^2) of the WSMR land area provides suitable habitat for wolves. The major mission of the WSMR is to provide test and evaluation, research and development, and training support to the U.S. Army. However, WSMR provides test and training support to all the military services. Holloman AFB and the U.S. Army's Fort Bliss are adjacent to the WSMR.

Within the WSMR boundary is the 51,500 acre White Sands National Monument and the 57,215 acre San Andres Wildlife Refuge. The WSMR is closed to livestock grazing and the vast size of the facility provides considerable biodiversity and varied habitats for a variety of wildlife species. Hunting for large and small game is allowed on WSMR in accordance with New Mexico state laws and WSMR policies, when not in conflict with mission activities. The White Sands Wolf Recovery Area was designated for initial release of Mexican wolves in the 1998 Final Rule but has not been utilized.

Kirtland AFB, NM

Kirtland AFB extends east into the Sandia Mountains and is adjacent to the Cibola National Forest which could produce conditions for transient wolves to enter Kirkland. Approximately 16 percent (12 mi^2/32 km^2) of the Kirtland AFB land area provides suitable habitat for wolves.

Fort Huachuca, AZ

The U.S. Army's Fort Huachuca covers 73,124 acres with an additional 29,987 acres of leased/withdrawn land to support the military mission. The current mission is focused on airlift training, technology testing and providing support to the Army Intelligence Center. Approximately 25 percent (31 mi^2/79 km^2) of the Fort Huachuca land area provides suitable habitat for wolves.

Fort Huachuca is located in the in the San Pedro River Valley and is adjacent to the BLM San Pedro Riparian Nation Conservation Area to the east and the Coronado National Forest to the south and west. Elevations on the facility range from 3,925 feet above sea level to 9,500 feet in the mountain adjacent to the Coronado Nation Forest. Vegetation varies from desert habitats at lower elevation to ponderosa pine forest at the higher elevations. The geology of the area is complex and volcanic in nature, but much of the volcanic origin is obscured by weathering.

Land use at the Fort is guided by the Installation Master Plan and the Integrated Natural Resource Management Plan (INRMP) which provides the basis and criteria for protecting and enhancing natural resources using watershed, landscape, and ecosystem perspectives consistent with the military mission. The Fort only supports one grazing lease and does not have an agriculture program. Recreation opportunities considered compatible with the military mission are available for uniformed and civilian personnel (DOD) working on the facility. In addition, Fort Huachuca allows access to the general public to some areas. Recreation activity is managed by Moral Welfare and Recreation, and includes hunting, fishing, camping, hiking (backcountry and interpretive trails), horseback riding, ATV trails, and wildlife and scenic river use.

Camp Navajo, AZ

The US Army National Guard Camp Navajo facility consists of 28,000 acres and supports training use by all services. Approximately 87 percent (39 mi^2/102 km^2) of the land area provides suitable habitat for wolves. Originally the facility was the Navajo Army Depot. In the 1985 Base Realignment and Closure Act the Depot was renamed Camp Navajo and placed under the jurisdiction of the Arizona Army National

Guard. The facility contains battalion sized maneuver areas and a wide assortment of firing ranges along with the necessary infrastructure to support the training facilities.

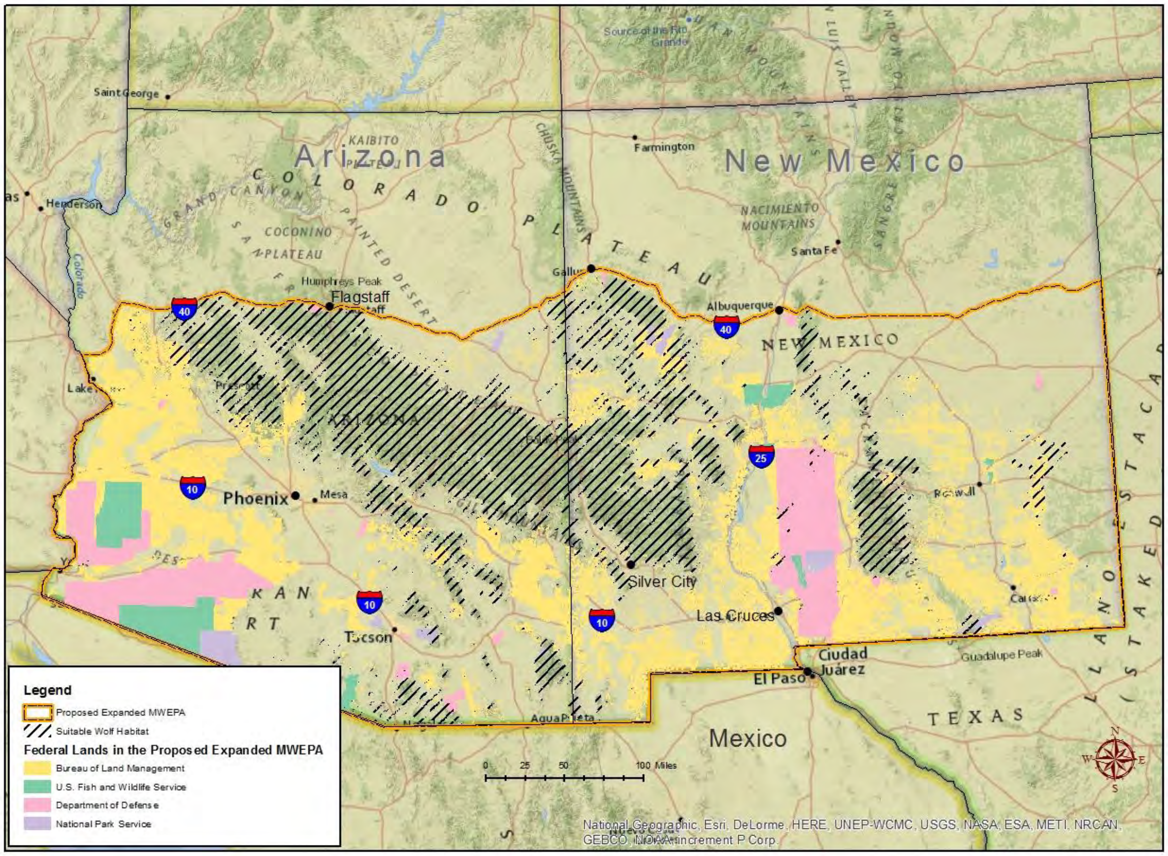


Figure 3-5. Other Federal land with suitable wolf habitat in proposed expanded MWEPA.

3.3.2.2 Non-federal Land

Tribal

Tribal reservations south of I-40 containing suitable wolf habitat (Zone 2) include the Navajo Nation (including the Ramah Navajo and the Alamo Navajo), Fort Apache Indian Reservation, San Carlos Apache Reservation in Arizona, and the Pueblo of Zuni, Pueblo of Laguna, Pueblo Isleta, Pueblo of Acoma, and Mescalero Apache Reservation in New Mexico (Figure 3-5). The White Mountain Apache Tribe's Fort Apache Indian Reservation is the only tribal land currently managed for Mexican wolves.

Land use on tribal lands in the area is similar to uses across the region but is focused on individual tribal management. Livestock grazing, forest management, mining agricultural, energy production and recreation in areas that provide permits to the general public are common land uses. Hunting and fishing are predominant uses for many tribes. For example, tribal big game hunting on the Fort Apache Indian Reservation is a significant revenue source; tribal guided hunts are known for their quality and success. In addition, the White Mountain Apache Tribe provided ecotourism opportunities.

The following provides, by tribe, a general summary of tribal land uses within the project study area:

White Mountain Apache Tribe: Fort Apache Indian Reservation

The Fort Apache Indian Reservation is approximately 2,630 mi^2 (6,812 km^2) in size and ranges from 2,600 feet above sea level to 11,400 feet. Approximately 97 percent (2,561 mi^2/6,632 km^2) of the reservation is considered suitable Mexican wolf habitat. The reservation is known for trophy elk hunting, excellent trout fishing and other forms of recreation. The Sunrise Peak Mountain resort and Hawley Lake Recreation Area provide additional recreation opportunities. Recreation activity requires a permit from the tribe. Other land uses include livestock grazing and forest management by the Fort Apache Timber Company.

San Carlos Apache Tribe: San Carlos Apache Reservation

The San Carlos Apache Reservation is approximately 2,875 mi^2 (7,445 km^2) in size and ranges in elevation from low desert to ponderosa pine forests. Approximately 51 percent (1,480 mi^2/3,834 km^2) of the reservation is considered suitable Mexican Wolf habitat. Livestock grazing, primarily cattle, is a primary land use on the Reservation. The Reservation is known for quality trophy elk hunting and fishing. San Carlos Lake, as well as other lakes, provides varied and quality fishing opportunities. In addition to campgrounds a recreational vehicle park and a golf course complement recreational experiences. Recreation activity requires a permit from the tribe.

Mescalero Apache Tribe: Mescalero Apache Indian Reservation

The Mescalero Indian Reservation is approximately 719 mi^2 (1,863 km^2) in size and consists of forested foot hills to high mountain forests. The peak of Sierra Blanca is 12,003 feet in elevation and is considered sacred by the tribe. Approximately 91 percent (654 mi^2/1,694 km^2) of the reservation is considered suitable Mexican wolf habitat. The reservation is known for scenic beauty and recreation opportunities. Reservation lands provide for excellent hunting and fishing as well winter skiing at the Ski Apache facility. In addition the Mountain Gods Resort Casino and Travel Center provides for golf and horseback riding. Livestock grazing and tourism are major tribal land use as is forest management.

Navajo Nation: Navajo Indian Reservation, Ramah Navajo and Alamo Band of Navajo Indians. The Navajo Indian Reservation is the largest reservation within the United States. The majority of the Reservation is extends across northeastern Arizona and northwestern New Mexico and is outside of the project study area. Approximately 896 mi^2/2319 km^2 of the Navajo Reservation and Reservation Trust land extends south of I-40 in the project study area. Approximately 30 percent (234 mi^2/606 km^2) of the Reservation and 37 percent (43 mi^2/112 km^2) of the Reservation Trust land has suitable habitat for wolves. The Ramah Navajo Indian Reservation in New Mexico is wholly within the project study area. Approximately 46 percent (159 mi^2/413 km^2) of the Ramah Navajo Reservation land has suitable habitat for wolves. The Alamo Band Navajo Indian Reservation in New Mexico is wholly within the project study area. A large portion of the reservation is within the boundaries of the Magdalena Ranger District of the Cibolla National Forest. Approximately one percent (1 mi^2/2.6 km^2) of the Alamo Band Navajo Indian Reservation land has suitable habitat for wolves. Land use on the reservation includes all uses common to Indian lands in Arizona and New Mexico. Livestock grazing is a common and significant use of reservation lands as in outdoor recreation activities such as camping, hunting, and fishing. Permits are required for the general public to recreate on Navajo lands. Livestock grazing is an important land use for both the Ramah and Alamo reservations.

Pueblo of Zuni: Zuni Indian Reservation

The Zuni Indian reservation is approximately 529mi^2 (1370 km^2) in size and consists of a variety of habitat and natural resources. Elevations range between 6,000 and 8,000 feet above sea level supporting piñon-juniper and ponderosa pine forests. Approximately 42 percent (223 mi^2/578 km^2) of the reservation is considered suitable Mexican wolf habitat. The reservation contains the Pueblo of Zuni. Land uses including livestock grazing, hunting and fishing, and camping by permit. The six reservoirs on the reservation provide excellent fishing opportunities. Hunting permits are generally for tribal members only.

Pueblo of Acoma: Acoma Indian Reservation

The Acoma Indian reservation is approximately 584 mi^2 (1512 km^2) in size and consists of a mosaic of mesa, canyons, and meadow country. Elevations average between 7,000 to 8,500 feet above sea level and support pinion juniper and ponderosa pine forests. Approximately 29 percent (170 mi^2/441 km^2) of the reservation is considered suitable Mexican wolf habitat. The reservation contains the Pueblo of Acoma. Land uses on the reservation mainly include livestock grazing and Hunting. In 1995 a big game hunting program was initiated and resulted in trophy elk, as well as pronghorn, bear, and mountain lion hunting successes.

Pueblo of Isleta: Isleta Indian reservation

The Isleta Indian reservation is approximately 329 mi^2 (853 km^2) in size and is centered in the Rio Grande Valley. Approximately 11 percent (35 mi^2/91 km^2) of the reservation is considered suitable Mexican wolf habitat. The reservation contains the Pueblo of Isleta. Land uses on the reservation consist of livestock grazing, farming, camping and fishing, including the Sunrise Lake Recreational Vehicle Park and Casino and golf course.

Pueblo of Laguna: Laguna Indian Reservation.

The Laguna Indian reservation extends both north and south of I-40 in New Mexico. Approximately 330 mi^2 (854 km^2) of the Reservation is in the project study area. The topography of the Reservation ranges from approximately 5,110 feet above sea level to over 10,000 feet in elevation. Vegetation varies from that associated with the Rio San Jose River to mesa and mountain top ponderosa pine and aspen forests. Volcanic features are common to the area. There is no suitable Mexican wolf habitat on the area of the Reservation within the project study area. The Reservation contains the Pueblo of Laguna. Land uses on the reservation have evolved from agriculture, to uranium mining, to the on-going activities of livestock grazing, hunting and fishing, and outdoor recreation.

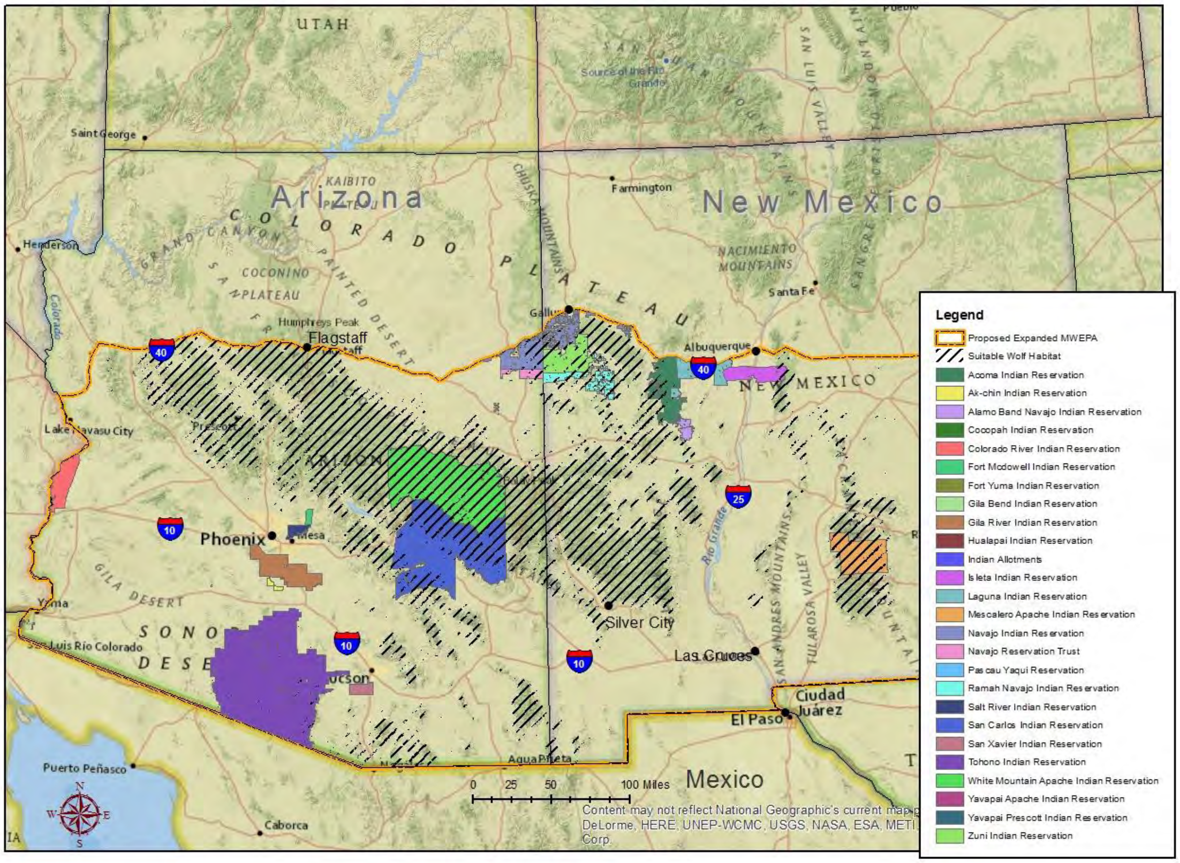


Figure 3-6. Tribal trust land with suitable wolf habitat within proposed expanded MWEPA.

State

Generally, state land consists of isolated parcels that are 640 acres sections. In some areas the state lands have been consolidated to form wildlife management areas and state parks or to allow for development. There is a negligible amount (4 mi^2/11 km^2) of state land with suitable wolf habitat within proposed management Zone 1. Approximately seven to nine percent (1,811 mi2/4,690 km^2) of the suitable wolf habitat in proposed management Zone 2 and 14 percent (123 mi2/319 km^2) of the suitable wolf habitat in proposed management Zone 3 is on state land. State lands generate revenues from a variety of land uses which include grazing, agriculture, commercial use, renewable energy, oil and gas drilling, and mining. The dominant land use of Arizona and New Mexico state land is livestock grazing and most often the grazing is part of a larger BLM or US Forest Service grazing allotment. In some instances, state land can supplement large private land holdings. Grazed state lands remain open to public access for general public recreation. State Parks provide excellent recreation opportunities for the general public, as do wildlife areas.

Private

Private land holdings predominate in urban areas but large private ranches or small isolated parcels surrounded by federal land are found in rural areas of both Arizona and New Mexico. Suitable wolf habitat is primarily found on large private holdings such as ranches or inholdings within national forest boundaries. Generally, private inholdings within national forests are scattered and of limited size but may be adjacent to or surrounded by large blocks of contiguous habitat in the national forest. Although limited in total acreage, inholdings can provide important connectivity within habitat or represent significant habitat areas. In addition to inholdings, there are some large private parcels of land located adjacent to Mexican wolf habitat on national forests or other public lands. These large parcels are generally ranches dedicated to livestock grazing and/or outfitting for other recreation activities, most commonly hunting and fishing. There is a negligible amount (1 mi^2/2.5 km^2) of private land with suitable wolf habitat within proposed management Zone 1. Approximately 15 to 17 percent (3,524 mi2/9,128 km^2) of the suitable wolf habitat in proposed management Zone 2 and 22 percent (198 mi2/513 km^2) of the suitable wolf habitat in proposed management Zone 3 is on private land.

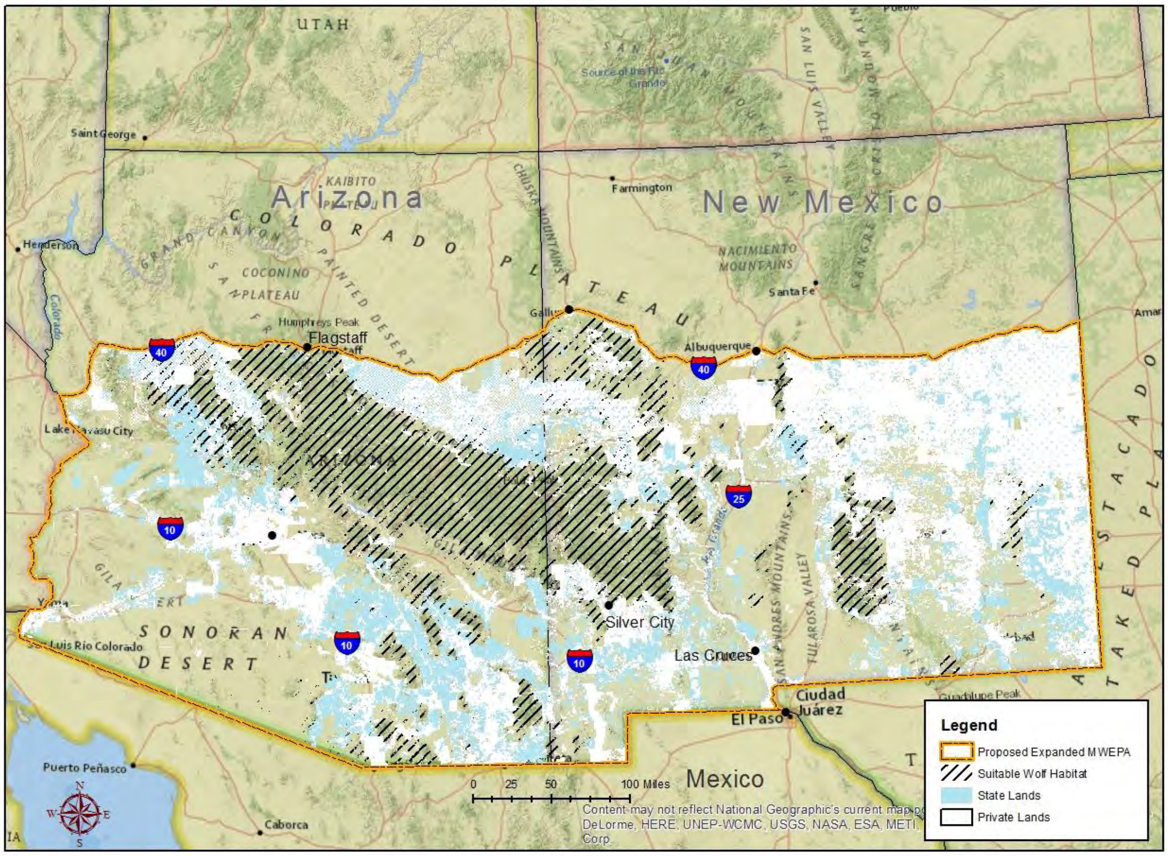


Figure 3-7. State and private land with suitable wolf habitat within proposed expanded MWEPA.

3.4 BIOLOGICAL RESOURCES

We address in this section the flora (vegetation) and fauna (wildlife), including protected or special status species, which may occupy the project area. Wolves interact directly with, or indirectly affect, a number of different species of wildlife. Primary direct interactions include wild ungulate prey species (primarily elk, mule deer, white-tailed deer); and to a lesser degree non-ungulate prey species (e.g., wild turkey, rabbits, rodents, beaver, porcupine and skunks) as well as other predators or mesocarnivores (e.g., mountain lions, bears, coyotes, bobcats, foxes) that may compete with the Mexican wolf for food. Scavenger species (e.g., ravens, eagles, coyotes, bears) that consume carrion are indirectly affected by wolf-killed carcasses resulting from predation by wolves (Smith et al. 2003).

Historically, Mexican wolves were believed to have preyed primarily upon white-tailed deer (*Odocoileus virginianus*) and mule deer (*Odocoileus hemionus*), and possibly also collared peccaries (javelina)

(*Tayassu tajacu*), pronghorn (*Antilocapra americana*), bighorn sheep (*Ovis canadensis*), jackrabbits (*Lepus spp*.), cottontails (*Sylvilagus spp.*), and small rodents (Parsons and Nicholoupolos 1995, Brown 1983, Bednarz 1988, Bailey 1931, Leopold 1959). Today, elk constitute the majority of the diet of Mexican gray wolves in the BRWRA (Paquet et al. 2001, AMOC and IFT 2005, Reed et al. 2006, Merkle et al. 2009). Two studies that analyzed wolf scat (feces) collected in the BRWRA indicate that elk is the primary food species of the wild Mexican wolf population. These studies found that on average elk comprises approximately 77 percent (Reed et al. 2006) to 80 percent (Merkle et al. 2009) by mass of the diet of Mexican wolves. Mule and white-tailed deer comprised from <1 percent (Merkle et al. 2009) to approximately 5 percent (Reed et al. 2006) by mass. Domestic livestock comprised from 8 percent (Reed et al. 2006) to 16.8 percent (Merkle et al. 2009) by mass of the diet of Mexican wolves. Other non-ungulate prey species (rabbits, rodents, birds, and insects) comprised a very small portion of the Mexican wolves' diet, typically less than 2 percent frequency of occurrence in scat (Reed et al. 2006), less than 3% of biomass (Merkle et al. 2009). Wolf scats collected on the eastern portion of the Fort Apache Indian Reservation in 2008 and 2009 indicated that 89 percent, 8 percent, and 3 percent of biomass was elk, mule deer, and coyote, respectively (Rinkevich 2012). It is unlikely that Mexican wolves will prey on wild horses, mules, or burros. There has been on average approximately one horse injury or depredation documented per year in the BRWRA (USFWS files) and similarly limited occurrences are reported in the Northern Rocky Mountains (M. Jimenez, USFWS, pers.comm. 2014). There is no detection of these species in the Mexican wolf diet studies conducted in the BRWRA where free ranging horses, burros, and mules occur (Reed et al. 2006, Merkle et al. 2009, Rinkevich 2012).

Some of the species which wolves may directly or indirectly affect are identified as "special status species". As used here, the term "special-status" refers to species listed under the Federal Endangered Species Act; state listed species or species of concern identified by the Arizona Game and Fish Department or the New Mexico Department of Game and Fish; or species identified as sensitive or special status by the Forest Service (including Management Indicator Species). Many special status species have a range, life history, or habitat requirements such that they are unlikely to interact with, or be affected by, Mexican wolves (e.g., birds, fishes, crustaceans, reptiles, amphibians, invertebrates or arthropods). Special status species that we believe could be affected directly or indirectly by the Mexican wolf in any of the alternatives are listed in Appendix A.

3.4.1 Existing Setting: Overview of Arizona and New Mexico

The landscape of Arizona and New Mexico is diverse, including deserts, grasslands, riparian corridors/floodplains and high plains, tablelands, plateaus, and high elevation forested mountains ("sky islands"). In this section we describe Arizona and New Mexico's topography and climate for a general overview of the landscape. We also identify and briefly describe species with which wolves may regularly interact or directly or indirectly affect. Suitable habitat for the Mexican wolf occurs throughout large portions of both states (Figure 1-21). Although the Mexican wolf has the ability to disperse over long distances and through a variety of environmental conditions, we focus on describing the biophysical details (vegetation cover, wild ungulate prey and other wildlife species) of those areas that we have estimated are suitable to support wolves from I-40 in Arizona and New Mexico south to the international border with Mexico.

3.4.1.1 Arizona

Arizona is a large state (113,909 mi^2 (295.022 km^2) with varying topography and dry, sunny climate. The highest point in the state is Humphreys Peak, located northwest of Flagstaff, with an elevation of 12,611 ft (3,843 m); the lowest elevations, as low as 100 ft (30 m) above sea level occur in the state's southwestern desert valleys (Western Regional Climate Center 2014). Temperature and precipitation can vary greatly from location to location depending on elevation and season. Average daily temperatures in the southwestern desert range from 43° to 67°F (6° to 19°C) in January, and from 81° to 106°F (27° to

41°C) in July. In the central uplands, average daily January temperatures range from 14° to 41°F (–10° to 5°C), and average daily July temperatures range from 50° to 81°F (10° to 27°C). The highest elevations of the state, running diagonally from the southeast to the northwest, receive between 25 and 30 in (63 to 76 cm) of precipitation a year, and the rest, for the most part, between 7 and 20 in (18 to 51 cm). The driest area is the extreme southwest, which receives less than 3 in (8 cm) a year. Snow, sometimes as much as 100 in (254 cm), falls on the highest peaks each winter but is rare in the southern and western lowlands.

Arizona has three physiographic provinces that form wide horizontal zones across the state (Figure 3-8). The Colorado Plateau extends across the northern third of Arizona and western New Mexico. It is characterized by rugged tableland topography with canyons, mesas, plateaus and mountains, averaging between 5,000 and 7,000 ft (1,524 and 2,133 m) in elevation. It includes the Grand Canyon region, which extends from southernmost Utah through northern Arizona, centering on Grand Canyon National Park and adjacent Kaibab and Coconino National Forest lands.

(Credit: Arizona Department of Water Resources, www.Azwater.gov)

Figure 3-8. Physiographic Provinces of Arizona.

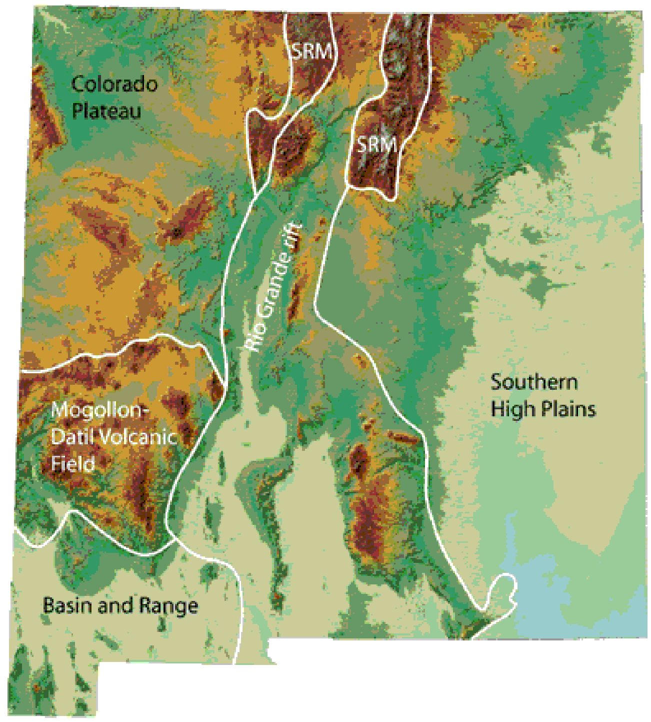
The Central Highlands Transition Zone in Arizona lies between the Colorado Plateau and the Basin and Range provinces. It is a mountainous region oriented southeast to northwest with maximum elevations between 9,000 and 12,000 ft (2743 and 3657 m) to mean sea level. The Transition Zone is characterized by rugged mountains and extensive forests of Ponderosa pine and mixed conifers. Several large mountain ranges lie within this area, including the Mazatzal, Santa Maria, Sierra Ancha, and White mountains, along with the Salt River Canyon. The Mogollon Rim, a 200 mi (321 km) long escarpment that defines the southern boundary of the Colorado Plateau runs from Yavapai County east toward the border of New Mexico. Much of the Rim is 4,000-5,000 ft (1219 – 1524 m) elevation, rising up to around 8,000 ft (2438 m) in some places.

The Basin and Range province, in the southwestern portion of the state (also extending into southwestern New Mexico), has highly variable terrain, from narrow northwest-southeast trending mountain ranges to broad desert valleys. In the southern portions of this province, isolated mountain ranges (known as "sky islands") rise above desert valleys at elevations from 4,000 ft (1219 m) in the interspersed desert valleys, to more than 9,000 ft (2743 m) at the crests of the Santa Rita, and Huachuca mountain ranges. The southwestern sky island complex extends from subtropical to temperate latitudes.

3.4.1.2 New Mexico

New Mexico is the 5th largest state with a total area of 121,412 mi^2 (2,904,443 km^2). The State's topography consists mainly of high plateaus or mesas, with numerous mountain ranges, canyons, valleys, and normally dry arroyos. Average elevation is about 4,700 ft (1432 m) above sea level. The lowest point is just above the Red Bluff Reservoir at 2,817 ft (858 m) where the Pecos River flows into Texas. The highest point is Wheeler Peak at 13,161 ft (4011 m). New Mexico has a mild, arid or semiarid, climate characterized by light precipitation totals, abundant sunshine, low relative humidity, and a relatively large annual and daily temperature range. Average annual precipitation ranges from less than 10 in (25 cm) over much of the southern desert and the Rio Grande and San Juan Valleys to more than 20 in (50 cm) at higher elevations in the State. As in Arizona, southern portions of the state tend to be drier and warmer, with more moderate summers and greater winter precipitation in the mountainous areas of the north. The highest mountains have climate characteristics common to the Rocky Mountains. Mean annual temperatures range from 64°F (17°C) in the extreme southeast to 40°F (4°C) or lower in high mountains and valleys of the north; elevation is a greater factor in determining the temperature of any specific locality than its latitude. During the summer months, individual daytime temperatures often exceed 100°F (38°C) at elevations below 5,000 feet; but the average monthly maximum temperatures during July, the warmest month, range from slightly above 90°F (32°C) at lower elevations to the upper 70°Fs at high elevations. In January, the coldest month, average daytime temperatures range from the middle 50°Fs in the southern and central valleys to the middle 30°Fs in the higher elevations of the north. Minimum temperatures below freezing are common in all sections of the State during the winter, but subzero temperatures are rare except in the mountains (NMSU New Mexico Climate Center: http://nmcc.nmsu.edu/en/climate-new-mexico).

New Mexico has six physiographic provinces, with widely varying terrain: The Colorado Plateau (see description of this province in Section 3.4.1.1, above), the Southern Rocky Mountains, the Rio Grande Rift, the Southern High Plains, the Mogollon-Datil Volcanic Field, and the Basin and Range (see description of this province in Section 3.4.1.1 above) (see Figure 3-9). The Southern Rocky Mountains province of New Mexico extends south from Colorado into north-central New Mexico to the west and east of the Rio Grande River valley. This area is characterized by high elevation and steep, rugged mountains, including Wheeler Peek, as well as irregular terrain of hills and ridges, with elevations of 6000 to 8500 ft. The Southern High Plains province in eastern New Mexico is characterized by a plateau region of mesas and tablelands in the north cut by several deep canyons and rivers continuing as flat terrain toward the south and east to the state's borders. Elevation is relatively consistent, typically above 3,000 ft (Netstate 2014). The Rio Grande Rift province is a north-south area of low elevation surrounding the Rio Grande River that starts in Colorado and runs the length of New Mexico to the Gulf of Mexico. This province contains a series of mid-elevation sediment-filled basins (including three large basins, the San Luis, Espanola, and Albuquerque) cut by canyons along the Rio Grande River. The Mogollon-Datil Volcanic Field province is a large volcanic field in western New Mexico that includes volcanoes, calderas, mountains, valleys, and rivers. This region is a section (a smaller division than province) of the Colorado Plateau sometimes referred to as the Datil-Mogollon section. Similar to the Transition Zone in Arizona, the region is a transition zone in New Mexico between the Colorado Plateau and the Basin and Range provinces, and contains some characteristics of both.



(Credit: Physiographic map of New Mexico, modified from Wilks 2005).

Figure 3-9. Physiographic provinces of New Mexico.

3.4.2 The MWEPA including the BRWRA and the proposed expansion south of Interstate 10

3.4.2.1 Vegetation

BRWRA

The BRWRA includes all of the Apache and Gila National Forests (NF) in east-central Arizona and west-central New Mexico, encompassing 17,740 km² (6,849.5 mi²). Elevations range from <1,220 m (4,000 ft) in the semi-desert lowlands along the San Francisco River to 3,353 m (11,000 ft) on Mount Baldy, Escudilla Mountain, and the Mogollon Mountains (USFWS 1996). The Apache-Sitgreaves National Forest has 325,880 acres of mixed conifer; 602,206 acres of Ponderosa pine, 617,093 acres of woodland, 17,667 acres of spruce-fir, 185,523 acres of great basin grasslands, 51,559 acres of montane/subalpine grassland; 106,952 acres of semi-desert grassland; 55,981 acres of chaparral, and 48,241 acres of riparian (USFS 2014). The Gila National Forest has 277,436 acres of mixed conifer; 1,119,773 acres of Ponderosa pine; 1,591,082 acres of woodland, 120,334 acres of mountain grassland; 163,787 acres of plains grassland; 43,454 acres of desert shrub; and 26,741 acres of riparian (USFS 1986). Terrain ranges from rugged mountains and deep canyons to semi-desert. Vegetation at higher elevation is characterized by mixed conifer forests, transitioning to Ponderosa pine (*Pinus ponderosa*) forests in mid-elevation, and then to semi-desert grasslands (USFWS 1996). Aspen, a preferred browse species for elk and deer, is common within mixed- conifer stands (Beschta and Ripple 2010). There is some indication that aspen recruitment in recent decades has been in general decline or absent across significant portions of the Springerville and Alpine districts (Beschta and Ripple 2010). Bartos (2001) reports that while pre-settlement aspen forests occupied nearly 3.9 million hectares in eight western states (Arizona, Colorado, Idaho, Montana, Nevada, New Mexico, Utah, and Wyoming) they had declined 60% by the end of the 20th century. Beschta and Ripple (2010) reported that aspen recruitment in the last two decades has been low or absent across significant portions of the Springerville and Alpine districts and coincided with the period when elk populations had been relatively high. There appears to be a general decline of aspen in the Northwestern United States. This trend has been noted for the past 50 years, but aspen mortality has become more pronounced since 2002 (USFS 2014). Climate change, fire suppression, conifer competition, ungulate browsing, drought, insects, and pathogens (UFRWG 2010; Crawford 2011) have all been hypothesized as causal factors in the decline of aspen. As a consequence of the 2011 Wallow Fire, the acreage dominated by aspen is expected to increase on the Apache-Sitgreaves National Forests, but given the landscape level decline mentioned previously, the longevity of this increase in aspen is unknown (USFS 2014).

MWEPA

Central Arizona and New Mexico are generally characterized by coniferous spruce-fir and mixed conifer forests at the higher elevations to desert scrub and desert grasslands at the lower elevations. An unbroken stand of Ponderosa pine montane conifer forest spans central Arizona from the White Mountains across the Mogollon Rim to the San Francisco Peaks. Piñon-juniper woodlands occur extensively in the mid-elevation range (4,000-7,000 ft) (1219 m- 2133m) (Gottfried et al. 1995; Loftin et al. 1995), giving way to chaparral vegetation south of the Mogollon Rim. One of the most extensive and continuous riparian forests (bosque) in the southwestern United States occurs in the valleys along the Rio Grande in New Mexico (Crawford et al. 1993). This riparian forest has trees, shrubs, and other streamside vegetation (Hink and Ohmart 1984, Keller and Cather 1994). Eastern New Mexico contains prairie, shrub-steppe, piñon-juniper, and desert grassland vegetation.

The 1.8 million-acre San Carlos Apache Reservation forms the southwestern boundary of the BRWRA (Figure 3-6). The southern portion is mostly high desert, with the exception of Mount Turnbull. To the north, high ridges and plateaus occur with several large prairies interspersed. The northeastern section consists of densely forested terrain with vegetation typical of the region. The reservation is bordered to the east and west by National Forests, to the south by state, private, and BLM land, and to the north by the Fort Apache Indian Reservation. On the San Carlos Apache Reservation, vegetation types include: piñon-juniper (470,580 acres), Ponderosa pine (175,000 acres), oak (103,380 acres), mesquite (84,260 acres), and riparian (7,350 acres). The condition of the woodlands has never been classified.

The 1.63 million acre Fort Apache Indian Reservation is located in Arizona immediately west of the BRWRA in the transition between the Colorado Plateau and the Basin and Range physiographic provinces (Figure 3-6). The Mogollon Rim runs through the Reservation. Elevations range from 2,600 ft on the extreme western end to the 11,403 ft crest of Mount Baldy in the east. The reservation is bordered on the east and north by the Apache-Sitgreaves NF, on the west by the Tonto NF, and on the south by the San Carlos Apache Reservation. Over 721,000 acres, or 44 percent of the reservation is forested, mostly Ponderosa pine. Vegetation zones include spruce-alpine fir forest (about 27,000 acres in the northeast), montane conifer forest featuring Ponderosa pine, with aspen stands intermixed (about 694,000 acres), riparian deciduous forest, woodland (about 640,000 acres), oak-pine woodland, interior chaparral (about 24,000 acres), plains and desert grassland (about 50,000 acres), Sonoran desert scrub (about 7,000 acres), and mountain meadow grassland (about 7,000 acres).

In the southern portion of the MWEPA, the native vegetation in the Basin and Range physiographic province is mostly grama-tobosa shrubsteppe in the basins and oak-juniper woodlands on the ranges, except at higher elevations where Ponderosa pine is predominant. The Lower Madrean Woodlands vegetation community occurs at intermediate elevations, generally above 5000 ft, with mixed conifer forest occurring above 7000 ft. The Madrean encinal, or evergreen oak woodlands, have a mosaic of savannas, denser woodlands, and grassy areas. Emory, silverleaf, Tourney, and Arizona white oaks occur, along with scattered piñon, juniper, mesquite, and chaparral species. Desert and grassland vegetation extend up into southeastern Arizona from Mexico, with Chihuahuan vegetation (or transition vegetation) found in the southeastern portions of Arizona into New Mexico, and Sonoran desert vegetation occurring in southwestern portions of Arizona. The Atascosa and Patagonia Mountains contain the greatest percentage of oak vegetation and Madrean evergreen woodlands. The Dragoon and Whetstone Mountains contain few forested areas (USFWS 1996). Riparian vegetation intergrades from mesquite, willow, and hackberry within the desert grasslands to cottonwood, sycamore, ash, and willow in the woodlands to willow and alder at the upper elevations (USFWS 1996).

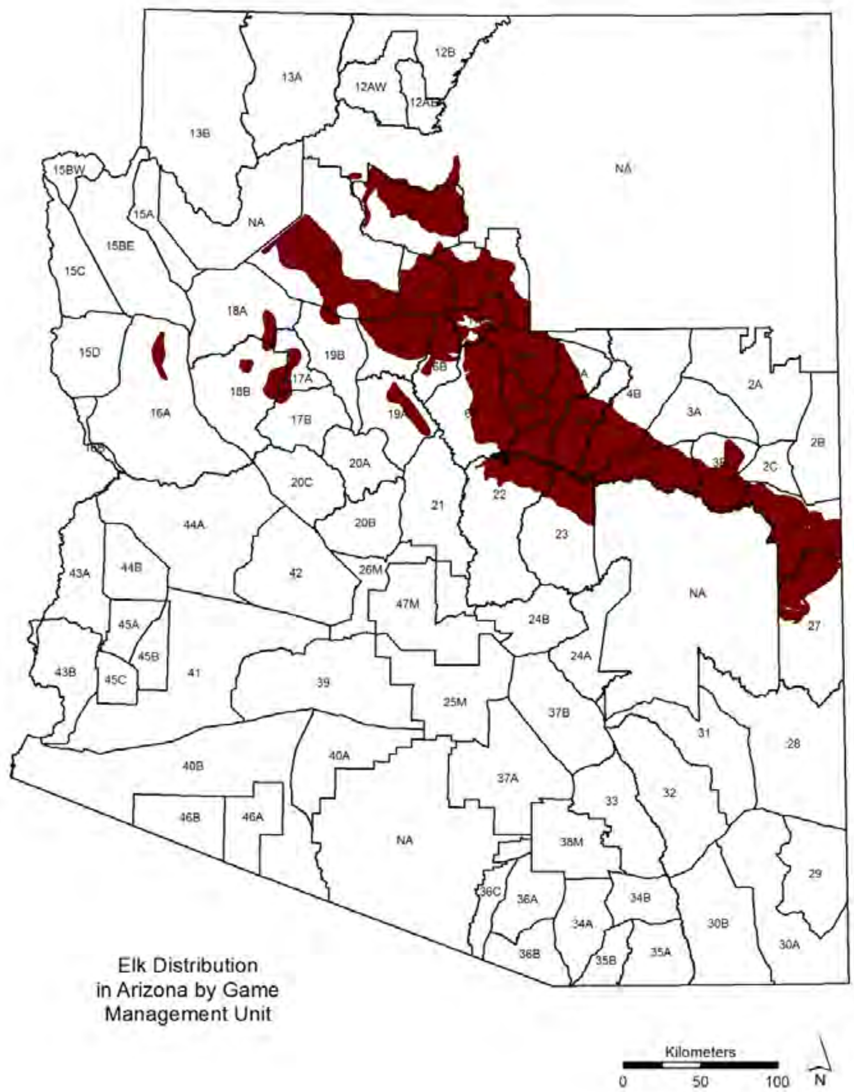
3.4.2.2 Wild Ungulate Prey Species

Elk

Elk favor mixed habitat types including mountain meadows, Ponderosa pine woodlands, spruce-fir forests, and other high elevation habitats between 7,000 and 10,500 feet elevation. Elk forage on grasses, sedges, aster, goosefoot, bear grass, erigonums, lupines, and other montane plants (Boyce et al. 2003). Elk typically use different habitats in the summer and winter, a pattern which is driven by seasonal factors. Elk summer range includes mountain meadows, Ponderosa pine woodlands, spruce-fir forests, and other high-elevation habitats, typically within a half a mile of water (Edge et al. 1987, Collins and Urness 1983). Elk tend to stay on their summer range as long as possible, until forced to lower elevation by deep snow. Their winter range, generally piñon-juniper, is more limited in extent and may only comprise 10% of their total habitat use. Most elk remain in the lower elevation grasslands and piñon-juniper and sagebrush communities until snowmelt allows them to migrate upward. Some elk are non-migratory, and continue to occupy lower elevations throughout the year. Mountain lion, black bear, wolves, and coyote are the principal predators of elk.

Elk were at one time the most widely distributed member of the deer family in North America, with a population estimated to total 10 million before European settlement. In Arizona, elk were distributed from the White and Blue mountains westward along the Mogollon Rim to near the San Francisco Peaks. Elk did not historically occur in southeastern Arizona. New Mexico historically was home to both the Merriam's (*Cervus elaphus merriami*) and Rocky Mountain elk (*Cervus elaphus nelsoni*) sub-species. Merriam's elk were found in the southern portion of the state while Rocky Mountain elk inhabited the Sangre de Cristo, Jemez, and San Juan mountains of northern New Mexico. Unregulated hunting reduced elk numbers drastically with elk extirpated in Arizona and New Mexico sometime prior to 1900 (AGFD 2012). Merriam's elk is now extinct. Rocky Mountain elk were reintroduced into both Arizona and New Mexico in the early 1900's and is now considered restored throughout their historic range in both states.

Currently, elk are considered to be widespread, abundant, and secure at the global, national, and statewide levels (2011). In Arizona, the 2013 statewide elk population not including tribal lands was estimated to be between 40,000 to 60,000 (AGFD unpublished data 2014). A large majority of elk in Arizona occur between I-40 and I-10 (Figure 3-10). A small percentage of the statewide population occurs north of Flagstaff and no elk are found south of I-10. The 2013 elk population in Arizona south of Interstate 40 is estimated to be approximately 47,000 (AGFD unpublished data 2014).



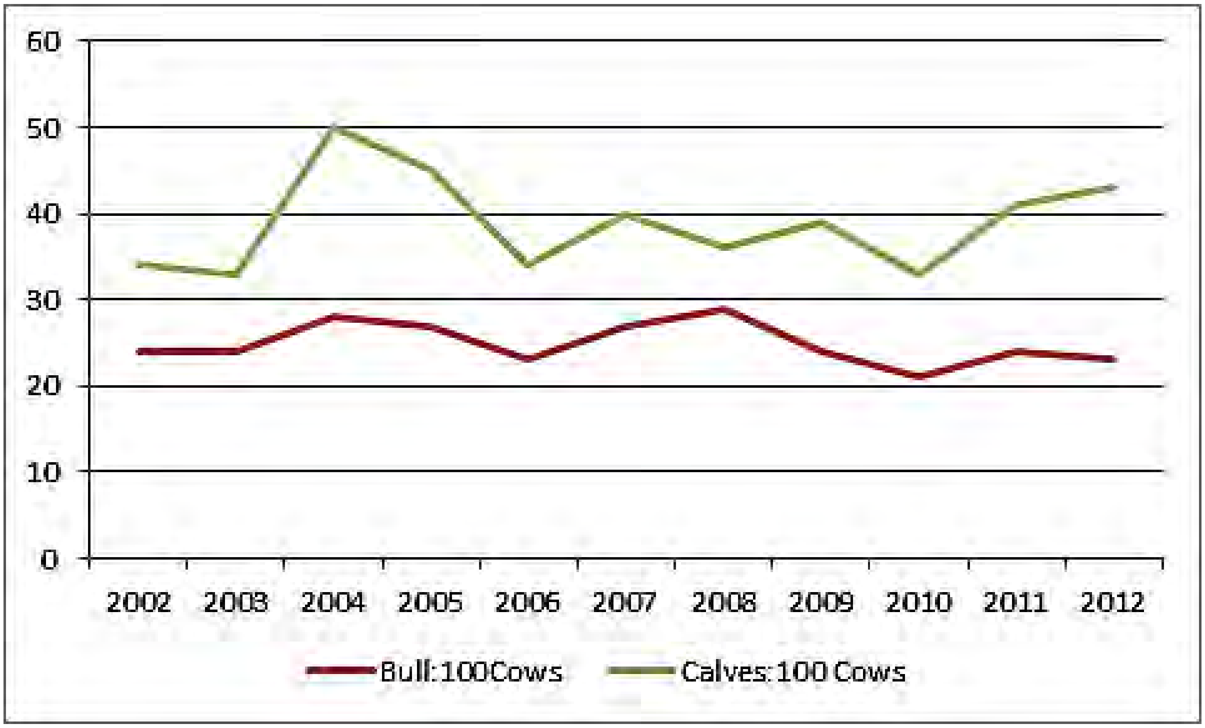
(Credit: Arizona Game and Fish Department, 2014.)

Figure 3-10. Elk Distribution in Arizona by Game Management Unit.

During elk recovery through much of the Twentieth Century, populations increased rapidly in Arizona, reaching a peak in the mid-1990s. Based on evidence of over-browsing, the Arizona Game and Fish Department increased the number of antlerless permits 4-fold, from 5,468 in 1991 to 19,275 in 2001, to reduce the population. Antlerless permits were subsequently reduced based on forage monitoring documentation of lower levels of browsing, and AGFD has since maintained populations at this lower level.

Trends in bull to cow ratios and cow to calf ratios, which can be used as an indicator of population status, 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 (Jim Heffelfinger, AGFD, pers. comm. 2014).

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.



Credit: Arizona Game and Fish Department, unpublished data, 2014

Figure 3-11. Arizona demographic ratios of elk for 10 "herd units" in the MWEPA between 2002 and 2012.

AGFD's 2013 management objective for 5 elk herd units (Units 4B, 5A, 5B, 6A, and 23) is to "stabilize or slightly increase"; to "stabilize or slightly reduce" two other herds (Units 8 and 22), and to "stabilize" at current levels for all other herd units (including Unit 1 and 27 in the BRWRA) (Brian Wakeling, AGFD, pers. comm. 2013).

Although elk are managed at the unit level or within subunits thereof, AGFD 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 3-3). None of these clustered herd units are discrete; interchange occurs among them or with adjacent tribal lands.

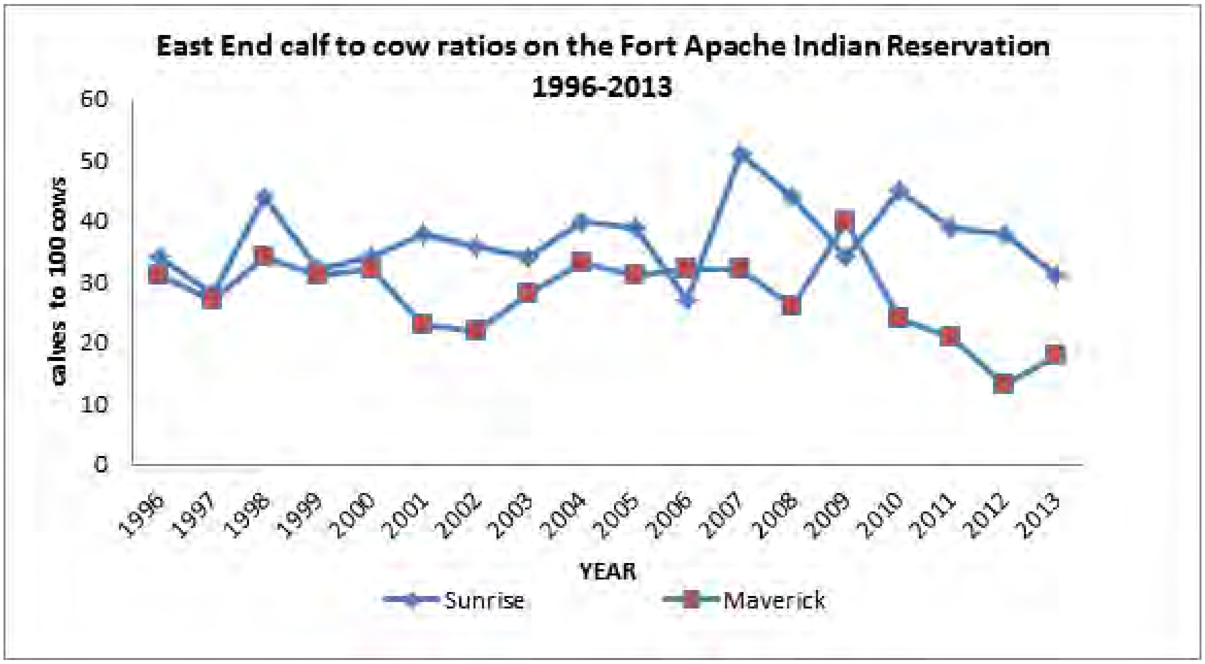
Table 3-3. Elk population estimates (2013) and demographic ratios of 10 "herd units" in the Arizona portion of the MWEPA.

Herd Unit	2013 Population Estimate	Bulls:100 Cows	Calves:100 Cows
1/2B/2C/27	13,276	47	40
3A/3C	2,067	37	43
3B	215	45	36
4A	3,017	20	35
4B	937	44	59
5A/5B/6A	15,869	37	23
6B/8	4,959	25	42
16A	50	-	-
17AB/18B/19AB/20A/20C	500	-	-
21/22/23	6,171	38	34

Credit: Arizona Game and Fish Department, unpublished data, 2014.

In addition to demographic indicators, habitat effects and ecosystem health are also considered in the management of elk abundance. Arizona Game and Fish Department uses a forage monitoring protocol that was developed in coordination with the U.S Forest Service. These state that elk populations may be reduced when elk forage use exceeds 25 percent for more than 50 percent of the sites monitored. Elk forage monitoring on the east side of the Mogollon Rim (Units 1, 3A, 3C, 3B , 4A, 27) in the fall of 2011 found only 5 of the 32 sites evaluated exceeded the 25 percent threshold (Jim Heffelfinger, AGFD, pers. comm. 2014). Rocky Mountain elk are a management indicator species for the Apache-Sitgreaves National Forest for their association with early-successional forest types; they are considered stable in this forest.

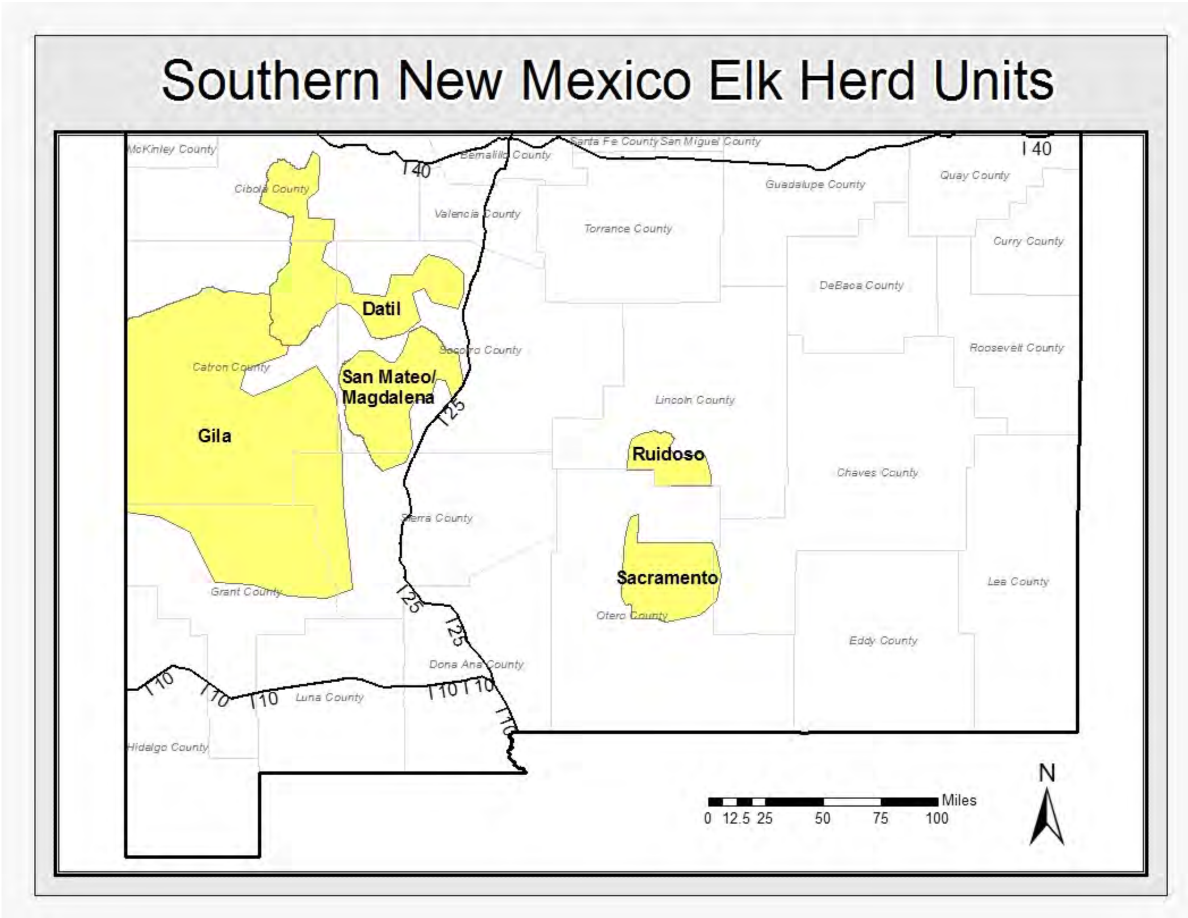
Comprehensive information on elk abundance and distribution on San Carlos Apache Reservation and Fort Apache Indian Reservation is not available to provide current estimates since those provided in the 1996 FEIS (USFWS 1996). Survey data of elk calf to cow ratios on the eastern portion of the Fort Apache Indian Reservation since 1996 have ranged between 28 and 51 calves per 100 cows for the Sunrise district, and between 13 and 40 calves per 100 cows for the Maverick district. The calf to cow ratio has been declining the last 4-5 years (White Mountain Apache Tribe, unpublished data, 2014, Palmer, pers. comm, 2014) (Figure 3-12).



Credit: White Mountain Apache Tribe, unpublished data, 2014.

Figure 3-12. East End Calf to Cow Ratios on the Fort Apache Indian Reservation 1996-2013.

In New Mexico, south of Interstate 40 (Figure 3-13), elk are estimated between 28,800 to 38,700 animals (NMGFD unpublished data 2014). Elk are the most numerous ungulate in southwestern New Mexico. There are three elk populations located in the southwestern quadrant of the state (Figure 3-13). The largest population is the Gila herd (estimated as 17,000-21,000 animals), followed by the Datil (2,400-4,200 animals) and San Mateo herds (estimated between 1,700-2,800 animals). The Datil and San Mateo herds remain stable through time and the Gila herd is slightly increasing. Elk can also be found on the periphery of the Gila, Datil, and San Mateo herds (in Game Management Units 12, 21A, and 23). However, these units are surveyed infrequently due to their low elk densities, so reliable data are not available for these areas.



(Credit: New Mexico Department of Game and Fish, 2014.)

Figure 3-13. Southern New Mexico Elk Herd Units.

On Mescalero Apache Reservation in New Mexico, the 2010 elk population estimate was 4500 (density 2.9 / km²; area surveyed 593.75 mi² (1537.8 km²)).

For the Gila herd, the 6-year average (2008-2013) of bulls to cows was 37 bulls per 100 cows and is slightly decreasing. For the Datil herd, the 6 year average (2008-2013) of bulls to cows is 41 bulls per 100 cows, and is stable. For the San Mateo herd, the 6 year average (2008-2013) of bulls to cows is 48 bulls per 100 cows, and is also stable.

The calf to cow ratio for the Gila herd has been slightly decreasing through time with the average ratio estimated at 36:100. Average calf to cow ratios for the Datil and San Mateo herds remain stable at 40:100 for each herd. In 2011, NMDGF observed decreased calf to cow ratios followed by increased ratios the next year (2012). The low ratio observed in 2011 was likely due to severe drought conditions leading up to, and immediately following calving resulting in low calf recruitment. In contrast, 2012 experienced higher overwinter and spring precipitation that resulted in higher calf recruitment in southwestern New Mexico elk herds. Elk on the Cibola National Forest, which include portions of the Datil and San Mateo elk herds, are a management indicator species, and are trending upward forest-wide. Elk graze in the Zuni Mountains on the National Forest during the summer and then transition down and off the Zuni Mountains toward Navajo and Zuni lands around Bread Springs, Pine Haven, Ramah, and private property along State Highway 53.

There is one large elk herd in southeastern New Mexico located in the Sacramento Mountains. Elk located in GMU 34 are considered part of the Sacramento herd while elk in GMU 36 are considered the Ruidoso herd. These two herds are considered separately because they are separated by the Mescalero Apache Reservation (GMU 35). Elk on the Lincoln National Forest are a management indicator species, and include the Sacramento and Rudioso herds. On the Mescalero Apache Reservation, the elk population remains stable (J. Smith, BIA, pers. comm. 2014). Based on surveys the Sacramento herd population size is estimated at 4,400 – 5,800 animals and the 6-year trend suggests the population may be increasing. The average bull to cow to calf ratios are 49:100:46. The Ruidoso herd population size is estimated at 2,600 – 3,900 and appears to be stable with bull to cow to calf ratios of 58:100:43.

To the north of the Ruidoso herd, the smaller Capitan herd is located in the Capitan Mountains. Surveys to monitor population size and age and sex ratios are infrequent. The herd is roughly estimated at between 700-1000 animals. This herd is generally considered to have been relatively stable over the last five years.

Elk are present on Laguna Pueblo in New Mexico. The Pueblo Natural Resources Program conducts annual aerial game surveys by helicopter. These surveys are used to provide a gauge for population trends rather than an absolute census. Until 2013, population trends were generally positive and elk and deer were considered to be fairly well dispersed throughout the Pueblo; however, severe droughts over the past two years appear to have shifted elk migration patterns, and may have also impacted recruitment, resulting in a significant decrease in the number of animals observed on the survey (Adam Ringia, Pueblo of Laguna, pers. comm. 2014).

The 2013 elk population in the BRWRA, not including the Fort Apache Indian Reservation, was estimated at between 29,276 and 33,276 animals (average elk density 1.76/ km^2, using the BRWRA area of 6,850 mi^2 (17,740 km^2)). The 2013 estimate was derived using pre-hunt data from September 2013. This included an estimate of 12,276 elk in the Arizona portion of the BRWRA, not including GMU 2b and 2c, and 17,000 to 21,000 elk in the New Mexico portion of the BRWRA, including GMU 16E.

The wolf to elk ratio, an indicator of predation pressure, for the BRWRA (not including Fort Apache Indian Reservation) in 2013 was 2.56 wolves per 1,000 elk, based on a wolf population in the BRWRA of 80 animals. This population estimate was derived using the 2013 population count (83 animals), and includes a 10% correction factor for wolves missed during the population census (8 animals) and excludes wolves exclusively using the Fort Apache Indian Reservation (11 animals) since an estimate for elk density on the FAIR was not provided.

Several large, landscape-level wildfires in recent history have affected elk populations in Arizona and New Mexico, including the BRWRA area. In 2002, the 460,000 acre Rodeo–Chediski Fire in east-central Arizona burned the southern portion of Unit 3C. After the fire, antlerless elk harvest was increased by AGFD in response to increases in the elk population and to aid in the recovery of the habitat. On May 29, 2011, the Wallow Fire began in Arizona and spread to over 538,000 acres (217,721 ha) by the end of June (Inciweb: www.inciweb.org/incident/2262). The Wallow Fire burned through approximately 11 percent of the BRWRA (in Units 1 and 27). The fire perimeter covered most of the summer elk habitat in Unit 27 and most of the summer elk habitat in Unit 1, south of Highway 260. In addition, some portion of the elk winter-range burned in both units at varying intensities. While there were areas of severe fire intensity, the area experienced substantial green-up immediately after the fire as monsoon rains fell across the region. The burned area has experienced a flush of browse, including aspen regrowth, and increased grass and forb production. The Wallow Fire Rapid Assessment Team's post-fire assessment hypothesized that elk and deer abundance will respond with increased recruitment as vegetation recovers, due to decreased competition of forage and browse with fire-killed conifers (Dorum 2011, AGFD 2012). On May 16, 2012, the Whitewater–Baldy Complex fire was ignited by lightning strikes. It burned at least 297,845 acres (Inciweb: www.inciweb.org/incident/2870), including an additional (to the Wallow Fire) 7 percent of the BRWRA. Although large scale high intensity fires may not result in the landscape heterogeneity required to support robust Rocky Mountain elk populations in the short-term, it is likely that elk abundance will increase as vegetation recovers in the burned areas. The elk population would be expected to respond positively to these landscape-level changes in these areas.

Mule Deer

Mule and black-tailed deer (collectively called mule deer, *Odocoileus hemionus*) are widely distributed throughout western North America. Mule deer are the most abundant big-game animal in Arizona, with the statewide population not including tribal lands estimated at 75,000-125,000 post-hunt adults in 2013 (WAWFA 2013). Rocky Mountain mule deer (*Odocoileus hemionus hemionus*) occur primarily in northern Arizona above the Mogollon Rim, while the desert mule deer (*Odocoileus hemionus eremicus*) is found in the southern areas of the state. In New Mexico, Rocky Mountain mule deer occur in the northern two-thirds of the state, while the desert mule deer occupies the southern third of the state and south into Mexico (NMDGF 1999, Findley et al. 1975). In both states, mule deer inhabit sparsely vegetated deserts upward into high, forested mountains. Important habitats for deer include sagebrush (*Artemisia* spp.), steppe, piñon pine (*Pinus edulis*) and juniper (*Juniperus* spp.) woodlands, mountain shrub communities, aspen (*Populus tremuloides*) forests, and montane and subalpine coniferous forests (Watkins et al. 2007). Mule deer are primarily browsers, with a majority of their diet comprised of forbs (broad-leaved, non-woody plants) and browse (leaves and twigs of shrubs and trees). Mountain lions, coyotes, bobcats, and eagles are the principal predators of mule deer.

Mule deer in the arid southwest may migrate in response to rainfall patterns. Fawn recruitment is highly variable depending on amount and timing of rainfall. Population fluctuations rely largely on abundance of spring forbs produced as a result of winter rainfall. Smith and LeCount (1979) analyzed 9 years of fawn to doe ratios, winter rainfall totals, and deer forage abundance in Arizona and found there was an extremely high correlation between October-April rainfall and forage (forbs and browse species) available to deer in mid-gestation (April). Further analysis showed that January fawn to doe ratios for mule deer are also highly correlated with amount of forbs produced the previous spring. Seasonal movements involving migrations from higher elevations (summer ranges) to lower winter ranges are associated, in part, with decreasing temperatures, severe snowstorms, and snow depths that reduce mobility and food supply. Deep snows can limit useable winter range.

Mule deer are found throughout the state of 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 last decade, statewide deer populations have increased about 10–15% overall and appear to be on a slow recovery despite moderate recruitment (Watkins et al. 2007). 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 per100 does (Figure 3-14). Recruitment, as indexed by the number of fawns per 100 does, however, has been below 40 fawns per 100 does 7 out of the last 11 years (AGFD, unpublished data, 2013). 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.

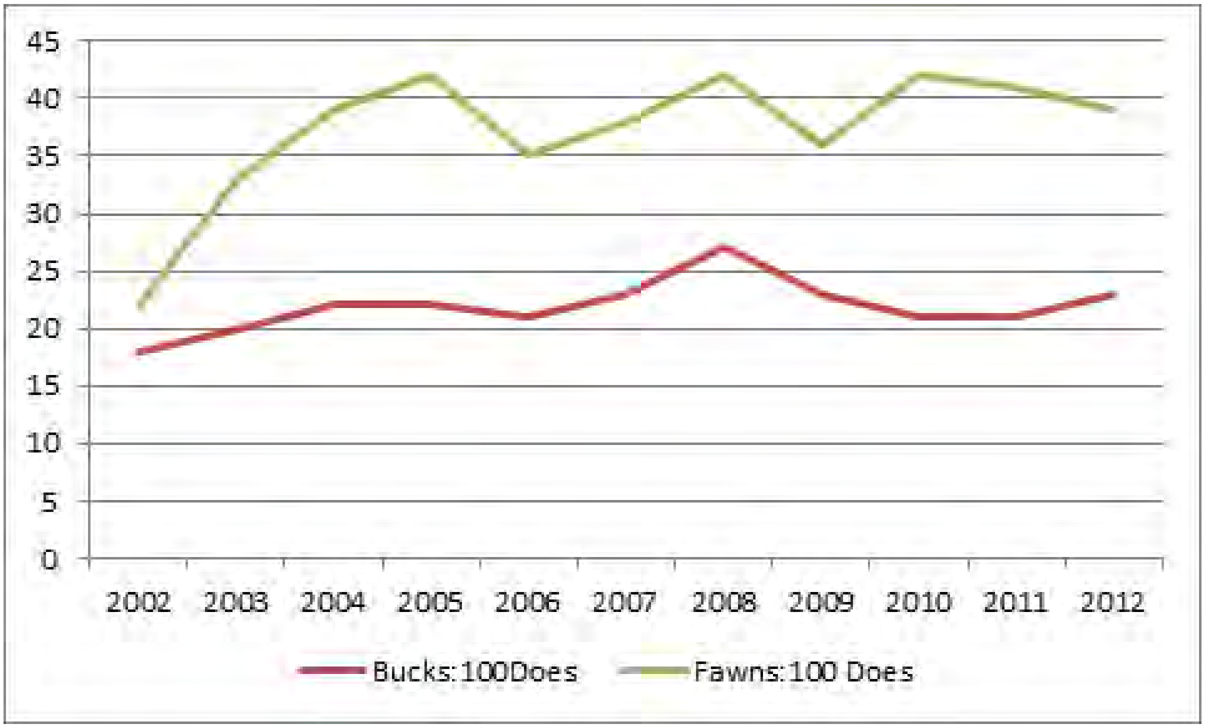


Figure 3-14. Demographic ratios of mule deer in AZ in the MWEPA between 2002 and 2012.

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 fairly 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 per100 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 (AGFD 2014). Desert mule deer in this area are low, but currently stable.

In the BRWRA, mule deer were selected by the Apache-Sitgreaves National Forest as a management indicator species for early successional habitat in forested habitat types. Between 2006 and 2011, mule deer populations on the forest have either been relatively stable (GMU 27) or increasing (GMU 3A and 3C) (AGFD 2012). Wildfire activity over the past decade (see discussion of elk) will likely improve habitat conditions by creating early successional habitats that benefit browse production. Mule deer are designated as a management indicator species of desert shrub and piñon-juniper/shrub oak woodland types on the Gila National Forest. The Gila National Forest has an estimated 43,454 acres of desert shrub and 1,591,082 acres of woodland (piñon-juniper/shrub oak) on the Gila NF (USFS 1986). Within these vegetation types there were 857,752 acres of key mule deer reproduction and/or winter range forest-wide. Mule deer are also a management indicator species on the Coconino, Kaibab, and Prescott National Forests in Arizona, and on the Cibola, and Lincoln National Forests in New Mexico. On the Cibola National Forest, mule deer populations are considered to be trending downward forest-wide. In the 1996

FEIS, mule deer and white-tailed deer were estimated at 57,170 total (average deer density 3.2/ km²) (USFWS 1996).

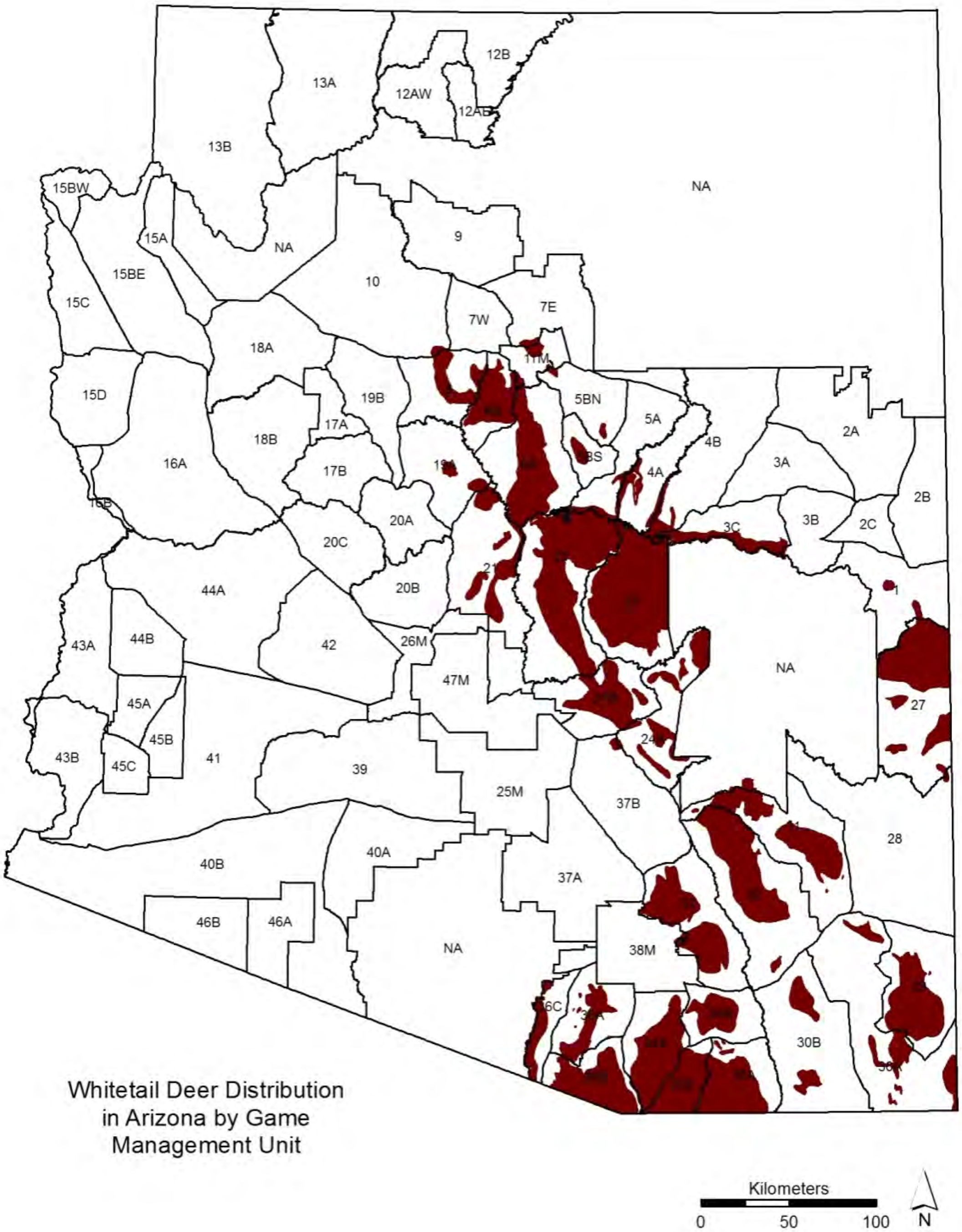
Updated estimates of mule deer populations on the Fort Apache Indian Reservation and San Carlos Apache Reservation since the 1996 FEIS are unavailable. The population and numbers of deer observed are recently on a slight decline because of poor recruitment related to drought. This decline is expected to be short term and consistent with periodic fluctuations observed in the past.

White-tailed deer

White-tailed deer are widely distributed in the eastern United States, but less so in the western United States, including the Southwest. White-tailed deer can occupy a wide range of habitats, including desert grassland and shrub lands, oak woodlands, and pine forests, from 2,500 to 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 ft. (NMDGF 1993). White-tailed deer and mule deer have very similar diets in the Southwest, although they generally stay separated spatially by occupying different elevation zones (Heffelfinger et al. 2006). White-tail deer are generally associated with Madrean evergreen woodlands of chaparral, oak, and pine with interspersed clearings and found at higher elevations and in rougher country than are mule deer which inhabit chaparral, semi-desert grasslands, and desert shrub communities (USFWS 1996). White-tailed deer require areas of predictable summer precipitation: fawn recruitment is highly variable depending on the amount and timing of rainfall, and population fluctuations rely largely on abundance of spring forbs produced as a result of winter rainfall (Heffelfinger et al. 2006). Unlike mule deer, white-tailed deer rarely form herds, and most observations are of fewer than six animals. Mountain lions, coyotes, and bobcats are the principal predators of deer in this region.

One subspecies of whitetail occurs in Arizona, the Coues' white-tailed deer or Coues deer (*O.v. couesi*) (Figure 3-15). 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 15 years, but still remains at low levels. The observed number of deer/hour of helicopter survey also indicates a slow increase in the last 10 years (Jim Heffelfinger, AGFD, 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 55,000-85,000 post-hunt adults in 2013 (WAWFA 2013). The large scale fires in the eastern portion of the Mogollon Rim (see elk discussion, above) have created an increase in palatable browse in areas occupied by white-tailed deer, and the populations appear to be responding in abundance and increased distribution.

Two subspecies of white-tailed deer occur in New Mexico (*O.v. couesi* and *O.v. texanus)*, with Coues occupying the western half of the state, and the other subspecies occupying the eastern half of the state into Texas. The Coues deer is the smaller of the two; Coues deer are also smaller than mule deer.



Credit: Arizona Game and Fish Department.

Figure 3-15. White-tailed deer distribution in Arizona by Game Management Unit.

Scattered populations of deer (mule deer and white-tailed deer combined) can be found throughout the southern half of New Mexico with population centers in and around many mountain ranges. The largest populations are centered around the Burro Mountains, the Black Range on the eastern edge of the Gila

National Forest, in the mountains surrounding Silver City, Guadalupe Mountains, and the Sacramento Mountains. Sparse deer populations can be found south of I-10 (GMU's 25, 26, and 27) in the Peloncillo, Hatchet, and Animas mountains. Deer have and continue to decline throughout much of New Mexico, especially in the southern portion of the State (Stewart Liley, NMDGF, pers. comm. 2014). Because of the widespread nature of deer herds throughout much of the southern portion of the state population estimates are hard to generate. However, since the implementation of mandatory hunter harvest reporting for deer hunters in 2006, deer harvest estimates have become more robust allowing for calculations of minimum population sizes to achieve observed harvest; population estimates do not distinguish between mule deer and white-tailed deer (Table 3-4).

Each year, the BIA, Branch of Natural Resources conducts aerial surveys to sample deer and elk populations in order to calculate a reasonable estimate of herd size on the Mescalero Apache Reservation. Data from the 2010 aerial survey report indicates that the deer population is leveling off (from a previous downward trend) with a reservation wide estimate of the deer population of approximately 1,200 to 1,600 (J. Smith, BIA, pers. comm. 2014). The fawn to doe, and buck to doe ratios for deer (white-tailed deer and mule deer) are, 65:100 and 42:100, respectively. The cow to calf and bull to cow ratios are 77:100 and 87:100, respectively (BIA 2010). The 2010 population estimate of white-tailed deer is 500 (density 1.4 / km²; area surveyed of 140.6 mi² (364.2 km²). The 2010 population estimate of mule deer is 1100 (density 1.1 / km²; area surveyed 390.6 mi² (1011.7 km²)). White-tailed deer are present on Laguna Pueblo in central New Mexico but population estimates are unavailable.

Table 3-4. 2013 Minimum Population Estimates From Reconstructed Harvest Data of Deer (Including mule deer and white-tailed deer combined) in New Mexico

Area or deer herd	GMU	Population Estimate
Southwest: Gila Forest	15,16A-E, 22	3,300
Southwest: Burro Mountains	23	5,200
Southwest: Black Range	21A & B	4,000
Southwest: Silver City	24	4,500
Southwest: Datil Mountains	13	2,000
Southwest: Zuni Mountains	10, 12	2,000
Southwest: San Mateo's	17	2,000
Southeast: Sacramento	34, 36, 28	11,000
Southeast: Guadalupe	30	9,000
Southeast: Capitan	37	4,500
Southeast: Manzano/Sandia	14 & 18	1,100
Southeast: Corona/Gallina	38	2,300

. Credit: New Mexico Department of Game and Fish 2014.

Pronghorn

Pronghorn antelope (*Antilocapra americana*) are native to the plains and grasslands of western North America. Pronghorn are grazing animals generally found in grasslands receiving 10-15 inches of rainfall annually and between 4,000 and 6,000 feet (1219-1828 m) elevation. Pronghorn are selective, opportunistic foragers feeding on forbs, shrubs, grasses, and sometimes cacti and domestic crops. Pronghorn prefer open, flat valleys with vegetation height below 30 inches so that approaching predators are readily visible and the pronghorn's speed can be used for escape (Brown and Ockenfels 2000). Pronghorn are usually observed in mixed herds most of the year led by the dominate males. With the European settlement of the plains, populations declined from an estimate 30-60 million in the early 1800s to less than 15,000 by 1915. Coyotes, bobcats, mountain lions, and golden eagles prey on pronghorn. Coyotes are the primary predator of fawns in Arizona. Pronghorn losses due to predation vary with pronghorn and predator numbers, habitat type, and availability of alternative food sources for predators.

Identification and monitoring of subspecific pronghorn is complicated in some areas due to restocking efforts in which subspecies were mixed and genetic integrity was compromised (Lee et al. 1994, NMDGF 2000).

From an estimated low of 650 animals in 1921 the statewide population of pronghorn in Arizona was estimated at 11,000 post hunt adults in 2011 (Walker 2012). Of the five subspecies of American pronghorn, three are found in Arizona: the American pronghorn (*Antilocapra americana americana*), the Chihuahuan pronghorn (*Antilocapra americana mexicana)* and the Sonoran pronghorn (*Antilocapra americana sonoriensis*). 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 subspecies of pronghorn originally found in southeastern Arizona/southwestern New Mexico was the Chihuahuan pronghorn (*Antilocapra american mexicana)*, however it was mostly extirpated from the landscape in the 1940s until Arizona Game and Fish Department began concerted efforts to reestablish and stabilize populations. Reintroductions in Arizona that took place in the 1980's were of the Mexican subspecies (A.a. mexicana) from Texas. Reintroductions conducted in the 1940's and 1950's were of the American subspecies (A.a. americana). Thus if any offspring persisted from these early reintroductions, mixing of genetic material may have occurred. Small, scattered herds of Chihuahuan pronghorn may still occur in southeastern Arizona, but the current number and distribution of Chihuahuan pronghorn in southwestern Arizona/southwestern New Mexico is unknown.

In New Mexico, pronghorn can be found on the Plains of San Agustin and the Plains of La Jencia on BLM and State Lands which are adjacent to the Magdalena Ranger District on the Cibola National Forest. In Arizona, the Buenos Aires NWR supports a population of less than 10 animals (Buenos Aires National Wildlife Refuge, unpublished data, 2014). Fort Huachuca supports a population of 35 to 40 pronghorn on the South Range. Approximately 500 pronghorn are found within the Coronado National Forest, south of I-10 and about 100 pronghorn inhabit the Lochiel Valley. The Sonoran pronghorn inhabits only the southwestern portion of the state.

The Arizona Game and Fish Department identify the pronghorn as a species of concern due to statewide habitat losses and population declines. Although many southern pronghorn herds inhabit the San Bernardino Valley (Unit 30A), Elgin area (Unit 35AB), San Rafael Valley (Unit 35AB), Altar Valley (Unit 36ABC), and Empire Cienega (Unit 34AB), all of these herds exist in low numbers. The Elgin, San Rafael Valley, and Empire Cienega populations are being augmented by AGFD in 2014 with more individuals to reverse declines in those areas. In addition, AGFD is conducting landscape-scale habitat improvements to improve the status of these populations.

In central Arizona in the Apache-Sitgreaves National Forest, the pronghorn (*Antilocapra americana*) is an indicator species for early-succession habitat, piñon-juniper with grassland understory, as well as, mountain grasslands, desert, and prairie grasslands (USFS 1987). From 2006 to 2011, pronghorn populations on the Apache-Sitgreaves National Forest have been relatively stable (GMU's 27, 3A, 3C and 1). At least low densities of the species appear to be well dispersed in suitable habitats on the Forest. The pronghorn (*Antilocapra americana*) is also an indicator species for early and late seral grassland habitat on the Coconino National Forest (USFS 2014) Habitat for pronghorn appears to be capable of continuing to support a reproducing population of the species that is well distributed in suitable habitat on the Forest. Winter range, however, which is dispersed across less productive State and private lands, may be the limiting factor for these populations.

Pronghorn inhabit the Fort Apache Indian Reservation and the San Carlos Apache Reservation, but current population estimates are not available.

The Federally endangered Sonoran pronghorn (*Antilocapra americana sonoriensis*) is found exclusively in the Sonoran Desert of Arizona and Mexico. A geographically and genetically distinct sub-species of pronghorn, the Sonoran pronghorn is smaller and lighter in color and is adapted for survival in desert conditions. The Sonoran pronghorn inhabits dry plains and desert. In southwestern Arizona, this species is found in broad alluvial valleys separated by mountains and mesas. Sonoran pronghorn are currently being reestablished in several locations in their former historic range. The Sonoran pronghorn population in Arizona has rebounded to 159 in 2012 from its low of about 21 animals in 2002 due to a captive breeding and reintroduction program based out of Cabeza Prieta National Wildlife Refuge. A second wild population is currently being reestablished at the Kofa National Wildlife Refuge as an experimental, nonessential population under section 10(j) of the ESA (76 FR 25593-25611).

The 2013 statewide population of pronghorn in New Mexico is estimated between 30,000-60,000 animals (NMDGF unpublished data, 2014). A population of approximately 300 pronghorn can be found in the grasslands between the Peloncillo, Animas, Alamo Hueco, and Hatchet mountains in southern New Mexico (NMDGF data, 2014). In 2010, the Mescalero Apache tribe estimated a population of about 100 pronghorn on their Reservation (density 0.3/km^2; area surveyed of 125.0 mi^2 (323.7 km^2). Pronghorn inhabit Laguna Pueblo; they are more common in the southern half of the Pueblo although small herds are active in the northeast as well.

Desert and Rocky Mountain bighorn sheep

Rocky Mountain bighorn sheep (*Ovis canadensis canadensis*) were historically found throughout the Rocky Mountains from Canada to southern New Mexico. By around 1900 a population estimated at over two million was reduced to only several thousand by hunting, competition from domesticated sheep, and diseases introduced by livestock (Toweill and Geist 1999). Rocky Mountain bighorn are now found in the steep rocky forested habitats in east central Arizona. Rocky Mountain bighorn were never widespread in New Mexico, with historical evidence for just four populations in Wheeler Peak, Pecos Wilderness, White Rock Canyon, and Manzano/Los Pinos Mountains (Bailey 1931). Rocky Mountain bighorn sheep were extirpated in New Mexico during the early part of the 20th century (Buechner 1960). The restoration of Rocky Mountain bighorn sheep in New Mexico began in 1932 with a transplant of six bighorn from Canada. As of 2013, the current statewide population of Rocky Mountain bighorn sheep in New Mexico is estimated between 948 to 1067 animals (NMDGF: www.wildlife.state.nm.us/conservation/bighorn/documents/Rockypopulationtrends.htm). Rocky Mountain bighorn are preyed upon by mountain lions, coyotes, bobcats, and golden eagles (*Aquila chrysaetos*) (NMDGF 2004).

Rocky Mountain bighorn sheep occur on both San Carlos Apache Reservation and Fort Apache Indian Reservation.

In Arizona, Desert bighorn sheep habitat can be found between 3,000 and 4,000 feet elevation in the jojoba communities where the dominant grass between shrubs is galleta. Desert bighorn prefer the precipitous, rocky desert ranges in Arizona. Other suitable habitats are along washes or creek beds or near natural tanks. Desert bighorn sheep prefer the leaves and fruits of mesquite, ironwood, palo verde, cat-claw, coffeeberry, jojoba, brittlebush, and calliandra.

Historically, bighorn sheep could be found in many mountain ranges and canyons of Arizona including the San Francisco Peaks, Verde Valley, Grand Canyon, and most desert ranges below the Mogollon Rim. Desert bighorn sheep numbers in Arizona declined during the early part of this century, reaching an estimated low of 2,500 in the 1950's (Toweill and Geist 1999). Domestic cattle and sheep, along with wild horses and burros, competed with bighorn sheep. Domestic stock also introduced diseases to bighorn populations. Although populations have increased as a result of intensive wildlife management efforts, many herds live in isolation, their habitat fragmented by highways, agricultural fields, mines, and other aspects of human encroachment.

Rocky Mountain bighorn sheep populations in the eastern portion of the state are currently, doing well, but desert bighorn sheep herds in Aravaipa Canyon, the Galiuro, Catalina, and Peloncillo mountains are not yet restored. The Catalina Mountain bighorn sheep population is in the early stages of recovery from extirpation and there are plans for other populations to be augmented. Transplanted populations exist north and south of Apache Lake, within the Mineral Mountains, and within the Superstition Mountains on the Mesa Ranger District. There was a transplanted population near Lion Mountain on the Cave Creek Ranger District in the 1980's that was unsuccessful due to predation (USFS 2012). The desert bighorn sheep (*Ovis canadensis*) is a sensitive species as well as a management indicator species on the Tonto National Forest. Desert bighorn sheep occur on Fort Apache Indian Reservation.

Historically, desert bighorn sheep have occurred in at least 14 mountain ranges in southern and central New Mexico. Desert bighorn sheep are present in the Ladrone Mountains on BLM land near the Magdalena Ranger District of the Cibola National Forest. Desert bighorn sheep live in open, rocky, desert mountain ranges in southern New Mexico. They are social animals that live in groups most of the year. The most important habitat requirement of desert bighorn is open, mountainous or canyon habitat, close to escape terrain defined as a minimum of 60% slope (Krausman et al. 1999). Shrubs dominate the diet of desert bighorn, but they also eat a wide range of grasses and forbs, and vary their selection based on the most nutritious plants available seasonally. Typical desert plants such as sotol, yucca, and ocotillo are popular, as are prickly pear and wild onions. Desert bighorn sheep were listed as state endangered in New Mexico when statewide populations of wild sheep had dropped to fewer than 70 in 1980. Transplanting efforts combined with aggressive mountain lion control have helped increase the statewide herd in six mountain ranges in southwestern New Mexico such that the species was delisted in New Mexico in 2011. As of 2013, the current statewide population of desert bighorn sheep is estimated between 745 and 860 (NMDGF: http://www.wildlife.state.nm.us/conservation/bighorn/documents/Rockypopulationtrends.htm). Mountain lions are the principal predators of desert bighorn sheep. Bighorn sheep could serve as potential prey for wolves, but the terrain occupied by bighorn sheep reduces their vulnerability to predation by wolves.

Javelina

The javelina *(Tayassu tajacu)* is a member of the peccary family. The javelina is capable of breeding throughout the year, the only wild ungulate in the western hemisphere with a yearlong breeding season. This long breeding season, early maturity, and the ability to have two litters in one year gives them the greatest reproductive potential of North American big game (AGFD: http://www.azgfd.gov/h_f/game_javelina.shtml). Javelina travel in small herds or "family groups" averaging eight to nine animals and seem to have a somewhat limited home range. In the winter, they are generally active in the early morning and late afternoon. Javelina are largely nocturnal during the hotter times of the year. They are opportunistic feeders eating flowers, fruits, nuts, berries, bulbs, and most succulent plants. Prickly pear cactus makes up the major portion of their diet. Mountain lions and coyotes are the principal predators of javelina.

In Arizona, javelina can be found as far north as Flagstaff and the Grand Canyon, but only at low density. Javelina abundance in central and southern Arizona (north of I-10) have been fairly stable as measured by average herd size, recruitment, and the number of javelina/hour and herds/hour seen on annual helicopter surveys. Javelina are found in herds of 7–12 throughout the mountain islands and also on the Sonoran desert and desert grasslands wherever there is sufficient cover. Having evolved in a thornscrub environment, they thrive in brushy canyon bottoms and areas of large boulders. Javelina abundance in this area (south of I-10) has been fairly stable as measured by average herd size, recruitment, the number of javelina/hour and herds/hour seen on annual helicopter surveys.

Javelina occur on both San Carlos Apache Reservation and Fort Apache Indian Reservation.

In New Mexico, javelina appear to be concentrated in the southwestern portion of the state, but have recently expanded their range to the southeast into the Guadalupe Mountains and the Rio Grande corridor. Javelina are present on the Magdalena Ranger District of the Cibola N.F. in the Magdalena, San Mateo, Bear/Gallinas and Datil Mountains.

Wild/feral horses and burros

In Arizona, the biggest concentration of wild horses (*Equus caballus*) occurs in the southwestern corner of the state in the Sonoran Desert. Wild horses also inhabit the northwest corner of the state in the Mohave Desert. A moderate population of wild horses occurs on Fort Apache Indian Reservation. Horses also inhabit the Black Mesa and Springerville-Clifton Ranger District on the Apache –Sitgreaves National Forests.In Arizona, populations of free-roaming wild horses and burros were estimated in 2013 at 538 and 3,588 respectively (BLM: http://www.blm.gov/wo/st/en/prog/whbprogram/history_and_facts/quick_facts.html.)

In New Mexico, the Mescalero Apache estimate they have a herd of approximately 500 wild horses on their reservation. Moderate populations also inhabit Laguna Pueblo. Wild horse and burro populations were estimated in 2013 at 120 and 0, respectively, in New Mexico (BLM: http://www.blm.gov/wo/st/en/prog/whbprogram/history_and_facts/quick_facts.html.)

After the passage of the Wild Free-Roaming Horses and Burros Act in 1971, the BLM became the managing agency responsible for protecting the wild horses and burros and their habitat. When the wild horse and burro populations exceed the appropriate management levels that the habitat can support, the BLM initiates its population control program by gathering excess horses and burros and offering them to the public through the BLM's Adopt a Horse or Burro Program. In Arizona, the BLM manages two wild horse herds totaling approximately 200 head in the Cerbat Mountains, located northwest of Kingman and nestled between the Cibola National Wildlife Refuge and the Army's Yuma Proving Ground. In addition, the BLM manages close to 1,600 head of wild burros roaming Arizona public lands.

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 4800 ft (1067-1463 m). They prefer stony plains with some water access, but can subsist in arid habitats with little water. The oryx population is currently estimated between 2,000-3,500 animals in New Mexico (NMDGF: http://www.wildlife.state.nm.us/education/wildlife_notes/documents/NoteOryxSm.pdf). Since there are no significant barriers to their movement, they have dispersed approximately 100 miles in all directions to private land and federally-managed lands. The diet of oryx on the WSMR overlaps with those of both the feral horse and pronghorn.

Persian Ibex

In 1970, a non-native species of wild goat was brought to New Mexico from Iran. The New Mexico Department of Game and Fish released 15 Persian ibex (*Capra aegagrus*) in the Florida Range near Deming, NM. Shortly after the initial release, 27 more were released. These animals formed the basis of New Mexico-s current ibex population. As of September 1995, about 350 Perisian ibex lived in the Florida Mountains. The 2014 Persian ibex population in the Florida range is estimated at 600-900 animals, and the ibex appear to be staying within this mountain range (Stewart Liley, NMGFD, pers. comm. 2014). The NMGFD and BLM work together to manage the population.

Barbary Sheep

Barbary sheep (*Ammotragus lervia*) also called aoudad sheep are relatively large sheep native to the dry mountains of Northern Africa. The Barbary sheep was introduced onto lands near Picacho, New Mexico in the 1940's. By 1950, NMDGF introduced Barbary sheep into several areas of the state (Ogren 1965). The sheep have expanded their range over a wide area of the state, and are now hunted. Similar to the native bighorn sheep, Barbary sheep are found in the arid mountains of the southwest United States allowing for competition between the two species for the same habitat and resources. Barbary sheep are found on Laguna Pueblo.

3.4.2.3 Other Wildlife Species Including Special Status and Threatened and Endangered Species

<u>Non-ungulate wild prey species</u>

Turkey

Two subspecies of wild turkey (*Meleagris gallopavo*) are native to Arizona, Merriam's turkey and Gould's turkey. Merriam's turkey (*Meleagris gallopavo merriami*), which occurs in the central and northern portions of the state of Arizona, inhabits Ponderosa pine forest and other vegetation types between 3,500 and 10,000 feet. Gould's turkey (*Meleagris gallopavo mexicana)* inhabits southern Arizona in Madrean evergreen woodlands, pine forests, and riparian areas (Schemnitz and Zeedyk 1992, Arizona Field Notes: Wild Turkey). Merriam's turkey is a management indicator species on the Apache-Sitgreaves National Forest for late-succession habitat (USFS 1987a). The Merriam's turkey is also management indicator species on the Coconino, Kaibab, Prescott, Tonto, and Coronado Nation Forests in AZ.

Three subspecies, Merriam's, Gould's, and Rio Grande turkeys (*Meleagris gallopavo intermedia)* occur in New Mexico. The Merriam's turkey has the widest distribution and highest abundance of the three subspecies, occurring in montane, forested areas (Shaw and Molloham 1992). On the Cibola National Forest in New Mexico, the Merriam's turkey is a management indicator species, and the population is considered sTable Dorest-wide. The Rio Grande turkey inhabits central and northeastern New Mexico along riparian areas (Beasom and Wilson 1992). The Rio Grande turkey is a management indicator species on the Cibola NF for mixed riparian hardwood Vegetation (USFS 2014). Gould's turkeys are found only in the southwestern portion of New Mexico. In Arizona, Merriam's turkeys are primarily found in Ponderosa pine (*Pinus ponderosa*), piñon-juniper, mountain shrub, and forest-meadow edge habitats but can also be found in riparian habitats and other vegetation types between 3,500 and 10,000 feet.

Mearns' Quail

Mearns' (Montezuma) quail *(Cyrtonyx montezumae)* are present in most of the mountain ranges in southeastern Arizona, southwestern New Mexico, southwestern Texas and northwestern Mexico. The species inhabits warm, temperate forests and woodlands. Their principal habitat is open oak or pine-oak woodland areas with an understory of grassland savanna in foothills and montane areas between 5,000 and 10,000 feet. They do not occur in areas without an adequate grassland component and are rarely found more than a few dozen meters from trees due to dependence on succulent, bulb- producing forbs that grow in the understory (Harveson et al. 2007). Mearns' quail are an indicator of plains and mountain grassland. Mearn's quail is a management indicator species for the Gila National Forest for grasslands.

Throughout its range, the Mearns' quail is listed as G4G5, meaning it is globally secure, uncommon but not rare, although it may be rare on the periphery of its range (NatureServe 2012). Species with this rank typically occur in more than 100 localities, and number more than 10,000 individuals. Within the United States, it is listed as N4, that is, it is apparently secure, uncommon, but not rare. In New Mexico, the Mearns' quail is listed as S3, vulnerable because it is very rare and local throughout its range, found only in a restricted range, or because of other factors making it vulnerable to extirpation (NatureServe 2012).

Species with this rank typically occur in 21 to 100 localities, and number between 3,000 and 10,000 individuals.

Small rodents, hares, rabbits and other small mammals

Potential medium- and small-sized mammals include beaver (*Castor canadensis*), porcupine (*Erethizon dorsatum*), jackrabbits (*Lepus spp*.), cottontail rabbits (*Sylvilagus spp.*), pocket gophers (*Thomomys spp*.),skunks (*Mephitis spp*.), various tree (*Sciurus* and *Tamiasciurus spp*.) and ground (*Spermophilus spp*.), squirrels, chipmunks (*Tamias spp*.), wood rats (*Neotoma spp*.), mice (*Peromyscus spp*.), and voles (*Microtus spp*.). The Gila National Forest uses the beaver as a management indicator species of low, mid, and high elevation riparian.

Abert's squirrels are arboreal mammals endemic to Ponderosa pine forests where they are obligate herbivores on pine shoots, seeds, and buds of Ponderosa pines (Keith 1965, Allred and Gaud 1994). These squirrels also forage on mycorrhizal fruiting bodies that grow in association with Ponderosa pines (Stephenson 1975, States et al. 1988). Although they have been documented using both mixed-conifer and spruce-fir forests (Hutton et. al 2003), they are thought to be primarily dependent on Ponderosa pine ecosystems to maintain stable populations (Keith 1965) and are considered indicators of forest health (States et al. 1988). Abert's squirrels occur on San Carlos Apache Reservation and Fort Apache Indian Reservation. Abert's squirrel is a management indicator species on the Apache-Sitgreaves National Forest. The red squirrel is used as an indicator of late successional habitats on the Apache –Sitgreaves National Forests, especially spruce-fir and mixed-conifer habitats (USFS 1987a).

Other Predators

Mountain Lion

The mountain lion (*Puma concolor*), a member of the cat family, is widely distributed throughout North America. Mountain lions can thrive in a variety of habitats; in the Southwest they are associated with areas of steep, craggy terrain from which they ambush their prey. In Arizona, they are found statewide except in extremely arid or highly developed urban areas. They are generally found wherever their primary prey, white-tailed deer and mule deer occur (McKinney 2011). The statewide population in Arizona is estimated at 2,500-3000 animals (AGFD: http://www.azgfd.gov/w_c/urban_lion.shtml) and is increasing. In New Mexico, mountain lions are similarly found distributed throughout most of the state, especially in areas inhabited by deer. The New Mexico statewide population was estimated at between 3,123-4,269 adults in 2011 (NMDGF 2012). Mountain lions will also prey on elk, javelina, bighorn sheep, small mammals, and livestock (McKinney 2011). Pronghorn have even been preyed upon by mountain lions (Ockenfels 1994).

Black bears

The black bear is the only bear species still found in Arizona and New Mexico. The Mexican grizzly bear that inhabited Northern Mexico and the southwestern United States was regarded as extinct by 1964 (Koford, 1969 as cited in Gallo-Reynoso et al. 2008). Black bears (*Ursus americanus*) are widely distributed in forested habitat across North America. They occur in the woodlands of Arizona, inhabiting mountainous, forested terrain above 4,000 ft (1219 m). They are also common in chaparral habitats adjacent to forests. Black bears range throughout most of Arizona, but are most numerous in central and southeastern Arizona due to food supply. Black bears are omnivorous, with a diet that includes berries, roots, grass, insects, and occasionally livestock or scavenged animal carcasses, although approximately 75% of their diet is vegetation. They hibernate from November to March (AGFD 2000). The statewide population estimate for black bears in Arizona is around 3000 animals. In New Mexico, the current statewide black bear population is estimated at between 6,000 to 8,000 animals (NMDGF unpublished data, 2014). Oaks, juniper, squawbush, and chokecherry were found to be the most important plants in the diets of black bears in New Mexico (Costello et al. 2001).

Coyotes

Coyotes (*Canis latrans*), a member of the dog family, are abundant throughout Arizona and New Mexico in all habitat types from desert to montane forest, with the exception of high-elevation densely forested areas. The decline of predators such as the wolf and mountain lion may have led to the range expansion by coyotes in the United States. Coyotes typically prey on rabbits, mice, and other small rodents, but may also prey on small deer and pronghorn, insects, and occasionally eat berries, birds and bird eggs, and carrion. In winter, their diet may predominantly consist of larger prey, such as livestock carrion, deer, or rabbits (Anthony 2011). They may also prey on domestic animals, particularly dogs and cats, near urban areas. Contrary to popular belief, coyotes do not readily interbreed with either dogs or wolves. AGFD: http://www.azgfd.gov/w_c/urban_coyote.shtml, http://www.azgfd.gov/h_f/game_coyote.shtml; NMDGF: http://wildlife.state.nm.us/education/wildlife_notes/documents/coyotenotes_2013.pdf). Bears, wolves and mountain lions prey upon coyotes.

Foxes

In Arizona common gray foxes (*Urocyon cinereoargenteus*) are typically found in pine-oak woodlands at 5,000 to 6,000 feet (1,500-1,800 m) elevation. They also occur in pine-fir, Ponderosa pine, chaparral, and desert grassland habitats (Davis and Sidner 1992). In New Mexico, the grey fox is distributed throughout the state, and is found in woodlands habitat, but is also common in old field succession areas. The grey fox is a solitary hunter, and eats berries, nuts, birds, insects, rabbits and other rodents. Its ability to climb trees allows it to eat food not eaten by the red fox. Adult common gray foxes have few predators, but are occasionally taken by golden eagle (*Aquila chrysaetos*), coyote, and bobcat (*Lynx rufus*); pups are taken by bobcat, great horned owl (*Bubo virginianus*), and possibly large hawks (Trapp and Hallberg 1975).

The red fox (*Vulpes vulpes*) is uncommon in Arizona, occurring only in the northeast portions of the state on the Navajo Indian Reservation. The red fox is also uncommon in New Mexico, limited to the northern latitudes in montane and cropland habitats (Findley et al. 1975). The swift fox (*Vulpes velox)* and kit fox *(Vulpes macrotis)* have been grouped as a single species (*Vulpes velox*) with two subspecies, *V. v. macrotis* (kit fox) and *V. v. velox* (swift fox)). Swift foxes are not found in Arizona, but inhabit eastern New Mexico. In Arizona, kit foxes are distributed widely across the southern, western and northeastern portions of the state. Both the swift fox and kit fox are native to New Mexico. Swift foxes inhabit prairies of short-, mid- or mixed grasses where the topography is flat or gently rolling. Kit foxes are found in semiarid or arid desert and shrub-steppe areas and are most common in low elevation, desert-like habitats (McGrew 1979). Both species are opportunistic predators and feed on small mammals, reptiles, birds and insects. They also consume small amounts of vegetation and will feed on carrion. Though kit fox populations have declined in recent years due to drought and large-scale land conversions (Knapp 1978), they are still common throughout their range in Arizona (McKinney and Smith 2010, deVos 2011). Predators of the kit fox include coyotes, and great horned owls.

Bobcat

The bobcat (*Lynx rufus*) is found throughout Arizona and New Mexico. It is found in the river bottoms, the Alpine zone of the high mountains, and in the sandy areas of the desert habitats. It even survives in heavily populated areas. In general, bobcats prefer areas with rocky terrain, thick cover, and abundant prey populations. They generally avoid large open areas. McKinney and Smith (2010) state that abundance may be higher in interior chaparral and ponderosa pine habitats than other habitats. The bobcat's principal prey is cottontail rabbits and jackrabbits but they also take small mammals such as mice and pack rats, birds, reptiles, and occasionally larger mammals including the young of some big game species (McKinney 2011a). Snakes and lizards are also part of the bobcat's diet. Predators of the bobcat include mountain lions, coyotes, foxes, and owls.

Jaguar

Historically, the jaguar (*Panthera onca*) inhabited 21 countries throughout the Americas, from the United States south into Argentina; currently the jaguar is found in 19 of those countries (no longer in El Salvador and Uruguay) (Caso et al. 2008). The population trend of jaguars is declining (Caso et al. 2008), although the rate of decline is unknown and likely highly variable throughout the jaguar's range. The jaguar is listed as endangered with critical habitat (79 FR 12571 12654).

Jaguars can inhabit a variety of vegetation communities (Seymour 1989) from warm, tropical climate, usually associated with water (Swank and Teer 1989) to arid areas, including thornscrub, lowland desert, desertscrub, mesquite grassland, Madrean oak woodland, and pine-oak woodland communities of northwestern Mexico and southwestern U.S. (López-González and Brown 2002, Boydston and López-González 2005, McCain and Childs 2008). The more open, dry habitat of southwestern U.S. has been characterized as marginal in terms of water, cover, and prey densities (Rabinowitz 1999). Jaguars rarely occur above 2,591 m (8,500 ft) (Brown and López-González 2001). They have been documented using oak forest and semi-tropical thornscrub as corridors (Rosas-Rosas et al. 2010). Javelina and white-tailed deer are thought to be the mainstays in the diet of jaguars in the United States and Mexico borderlands (Brown and López González 2001). Other known prey include, but are not limited to, white-lipped peccaries (*Tayassu pecari*), capybaras (*Hydrochoerus* spp.), pacas (*Agouti paca*), agoutis (*Dasyprocta* spp.), armadillos (*Dasypus* spp.), caimans (*Caiman* spp.), turtles (*Podocnemis* spp.), livestock, and various other reptiles, birds, and fish (Núñez et al. 2000, Rosas-Rosas 2006, Rosas-Rosas et al. 2008).

In the United States, jaguars historically occurred in Arizona and New Mexico (62 FR 39147). While jaguars have been documented as far north as the Grand Canyon, Arizona, occurrences in the U.S. since 1963 have been limited to south-central Arizona and extreme southwestern New Mexico. Jaguars in the U.S. are thought to be part of a population, or populations, that occur largely in Mexico.

From 1996 through 2013, several individual adult jaguars have been documented in Arizona and New Mexico (Glenn 1996, Brown and López- González 2001, Childs 1998, Brown and López-González 2001, McCain and Childs 2008). One adult male has been observed numerous times in the Santa Rita Mountains of Arizona.

Ocelot

The ocelot (*Leopardus pardalis*) historically ranged from Louisiana, Arkansas, Texas, and Arizona in the U.S. southward through Mexico, Central and South America to Peru and northern Argentina (Murray and Gardner 1997). Currently, the ocelot ranges from extreme southern Texas and southern Arizona through Mexico and Central America to Ecuador and northern Argentina (Murray and Gardner 1997, USFWS 2010b). The Arizona/Sonora ocelot subspecies occurs in southern Arizona and northwestern Mexico (Sonora and northern Sinaloa) (USFWS 2010b). Ocelots inhabit a wide variety of densely vegetated habitat types, including, but not limited to, thorn scrub, semi-arid woodland, tropical deciduous and semi-deciduous forest, subtropical forest, lowland rainforest, palm savanna, and seasonally flooded savanna woodland (Ludlow and Sunquist 1987, Crawshaw and Quigley 1989, Crawshaw 1995). The ocelot is listed as endangered (USFWS 1972). A draft revised recovery plan was made available for public comment in 2010 (USFWS 2010b), with the goal of improving the status of the species to the point that it no longer needs the protection of the ESA. Critical habitat has not been designated for this species.

Ocelots are likely generally nocturnal because they follow the nocturnal habits of their primary prey, small mammals (Crawshaw and Quigley 1989). Ocelots are solitary hunters and eat a wide variety of prey, but small mammals, especially rodents, comprise most of their diet (Emmons 1987, Crawshaw1995, de Villa Meza et al. 2002, Fernandez 2002). Ocelot diets, however, also include medium to large mammals, reptiles, amphibians, birds, fishes, and insects (Emmons 1987, De Villa Meza et al. 2002, Fernandez 2002).

In Arizona, no population estimates exist, but four individuals have recently been documented (Avila-Villegas and Lamberton-Moreno 2013; Tim Snow, AGFD, March 13, 2013, electronic mail).

Mexican Gray Wolf

See subspecies description and listing history in Chapter 1. At the end of 2012, the wolf density within the BRWRA and on the FAIR was estimated at 4.3-4.8 wolves per 1,000 km^2 (calculation based on method 2, see Appendix D).

Scavengers

Field observations in the BRWRA confirm that ravens (*Corvus spp*.), bald eagles (*Haliaeetus leucocephalus*) and golden eagles, turkey vultures (*Cathartes aura*), coyotes, and black bears scavenge Mexican wolf kills.

Bald eagles

Bald eagles occur in both Arizona and New Mexico. Bald eagles have recovered and are no longer protected by the Endangered Species Act, although they receive protection through The Bald and Golden Eagle Protection Act (16 U.S.C. 668-668c), the Migratory Bird Treaty Act, and the Lacey Act (USFWS 2014). The bird occurs in association with aquatic ecosystems, frequenting estuaries, lakes, reservoirs, major river systems, and some seacoast habitats. Generally, suitable nesting habitat for bald eagles includes those areas that provide an adequate food base (quantity, quality, continuity, accessibility) (Stalmaster 1987) of fish, waterfowl, and/or carrion, with large trees for perches and nest sites (Stalmaster 1987). In winter, bald eagles often congregate at specific wintering sites that are generally close to open water and offer good perch trees and protected night roosts. Bald eagles consume a diversity of food items. However, their primary food is fish, which are generally consumed twice as often as birds, and four times as often as mammals. Bald eagles are known to catch live prey, steal prey from other predators (especially osprey), and use carrion. Carrion constitutes a higher proportion of the diet for juveniles and subadults than it does for adult eagles. Diet varies depending on what species are available locally. This can be affected by the type of water system on which the breeding area is based (Hunt et al. 1992). Most bald eagles nest and live within a mile to water, although some are considered “dry-land” eagles because they nest away from the water. Bald eagles feed primarily on fish and waterfowl, but will also eat carrion and prey on small animals such as jackrabbits (NMDGF 2007).

In New Mexico, most bald eagles are migratory, nesting in New Mexico in the summer and then dispersing in autumn to over-winter in Mexico. Reservoirs with wintering populations of eagles include Ute, Conchas, Ft. Sumner, Santa Rosa, Elephant Butte, Caballo, Cochiti, El Vado, Heron, and Navajo. Other areas where bald eagles may be seen in winter months are the Maxwell National Wildlife Refuge and riparian habitat such as McAllister, Stubblefield, and York Lake. Dry-land eagles frequently occur in between the Pecos Valley and the Sandia, Manzano, Capitan, and Sacramento Mountains, as well as on the Mogollon Plateau (NMDGF 2007). A breeding pair survey in New Mexico in 2005 observed 4 breeding pair. (USFWS: http://www.fws.gov/midwest/eagle/population/nos_state_tbl.html).

In Arizona, nesting bald eagles occur in the central portion of the state along the Salt and Verde Rivers at elevations of 1000-4500 ft. (AGFD 2006). Juvenile and sub-adult eagles migrate by early summer to northern California, Canada, and the Northern Rocky Mountains, returning to Arizona in the fall. Adult birds tend to stay in Arizona year-round. Over 60 nesting areas have been documented in Arizona. Arizona also has wintering populations of bald eagles that migrate to the Southwest from more northern locations. Eagles inhabit the Agua Fria, Bill Williams, Gila, Salt, and Verde riparian areas, as well as the White Mountains, Mogollon Rim, and northeastern Arizona (http://www.azgfd.gov/pdfs

/inside_azgfd/eagle/EagleManagement.pdf . The bald eagle Nestwatch survey conducted in 2012 in Arizona reported 54 breeding pair (AGFD 2013, online http://www.swbemc.org/Productivity.html).

Golden eagles

The golden eagle population in the western United States has been recently estimated at around 30,000 animals (USFWS 2008) and appears to be stable (Millsap et al. 2013) . In Arizona, very little information exists about the population size, habitats, habits, or basic vital rates, but the species prefers desert grasslands and chaparral habitats (Millsap 1981). In New Mexico, golden eagles breed locally in suitable habitat throughout the state (Kochert et al. 2002, Parmeter et al. 2002). Size of the New Mexico breeding population is unknown. The golden eagle is a Biodiversity Conservation Concern, Level 2 species for the state of New Mexico. Most common nesting areas in New Mexico are steep-walled mountain canyons. Although cliffs are the most common nesting substrate, trees or man-made structures are also sometimes used. Many nests have a wide view of surrounding area or are on prominent escarpments. Proximity to hunting grounds is an important factor in nest-site selection (Kochert et al. 2002). Preferred territory sites include those that have a favorable nest site, a dependable food supply, and broad expanses of open country for foraging. Hilly or mountainous country where takeoff and soaring are supported by updrafts is generally preferred to flat habitats. Deeply cut canyons rising to open mountain slopes and crags are ideal habitat (Kochert et al. 2002). Golden eagles are known to prey on bighorn sheep, mule and white-tailed deer, and fox.

California Condor

The California condor (*Gymnogyps californianus*) was listed as endangered on March 11, 1967 (32 FR 4001). Critical habitat was designated in California on September 24, 1976 (41 FR 187, USFWS 1976). Critical habitat has not been designated outside of California. The California condor remains one of the world's rarest and most imperiled vertebrate species.

The first release of condors into the wild in northern Arizona occurred on December 12, 1996. They were released within a designated nonessential experimental population area in northern Arizona and southern Utah. The area is bounded by Interstate 40 on the south, U.S. Highway 191 on the east, Interstate 70 on the north, and Interstate 15 to U.S. Highway 93 on the west. Any condors outside of the experimental population area are fully protected as endangered (61FR 54044, October 16, 1996).

Condors are scavengers and rely on finding their food visually, often by investigating the activity of ravens, coyotes, eagles, and other scavengers. Most California condor foraging in northern Arizona occurs in open areas and throughout the forested areas of the rims of Grand Canyon. Roost sites include cliffs and tall trees, including snags. As of May 31, 2011, a total of 198 California condors existed in the wild, with 68 individuals in Arizona, including 60 free-flying individuals previously released into the population, 7 wild-fledged individuals, and one chick in a nest.

Other avian scavengers: ravens, vultures, magpies

Two subspecies of raven occur in Arizona and New Mexico, the common raven (*Corvus corax*), which occurs throughout both states, and the white-necked or Chihuahuan raven (*Corvus cryptoleucus*), which occurs in the southern portion of both states. Ravens prefer wooded habitat, nesting in trees or shrubs. Ravens feed on insects, cereal grains, carrion, and other items. Ravens are frequently observed in the BRWRA in proximity to or feeding on wolf kills (AMOC and IFT 2005). Ravens are numerous in both states.

The black-billed magpie (*Pica hudsonia*), is found in northern New Mexico. It is an opportunistic omnivore, eating many types of insects, carrion, seeds, rodents, berries, nuts, eggs, and also garbage and food from pets that are fed outside. Magpies typically forage on the ground, usually walking, sometimes hopping, and sometimes scratching with their feet to turn over ground litter. They sometimes land on large mammals, such as cattle, to pick at the ticks that often plague these animals. Black-billed magpies frequent open country with thickets and scattered trees, especially riparian groves. They can be found within cities and suburbs as well.

Turkey vultures (*Cathartes aura*) are widespread throughout the United States, including the Southwest. They can live in a wide range of open habitats in the Southwest, including deserts, grasslands, pastures, and shrublands. Their diet consists primarily of carrion; they rarely if ever, kill prey themselves. The turkey vulture has few natural predators. Adult, immature and fledging vultures may fall prey to golden eagles, bald eagles and great horned owls, while eggs and nestlings may be preyed on by mammals such as raccoons, virginia opossum and foxes.

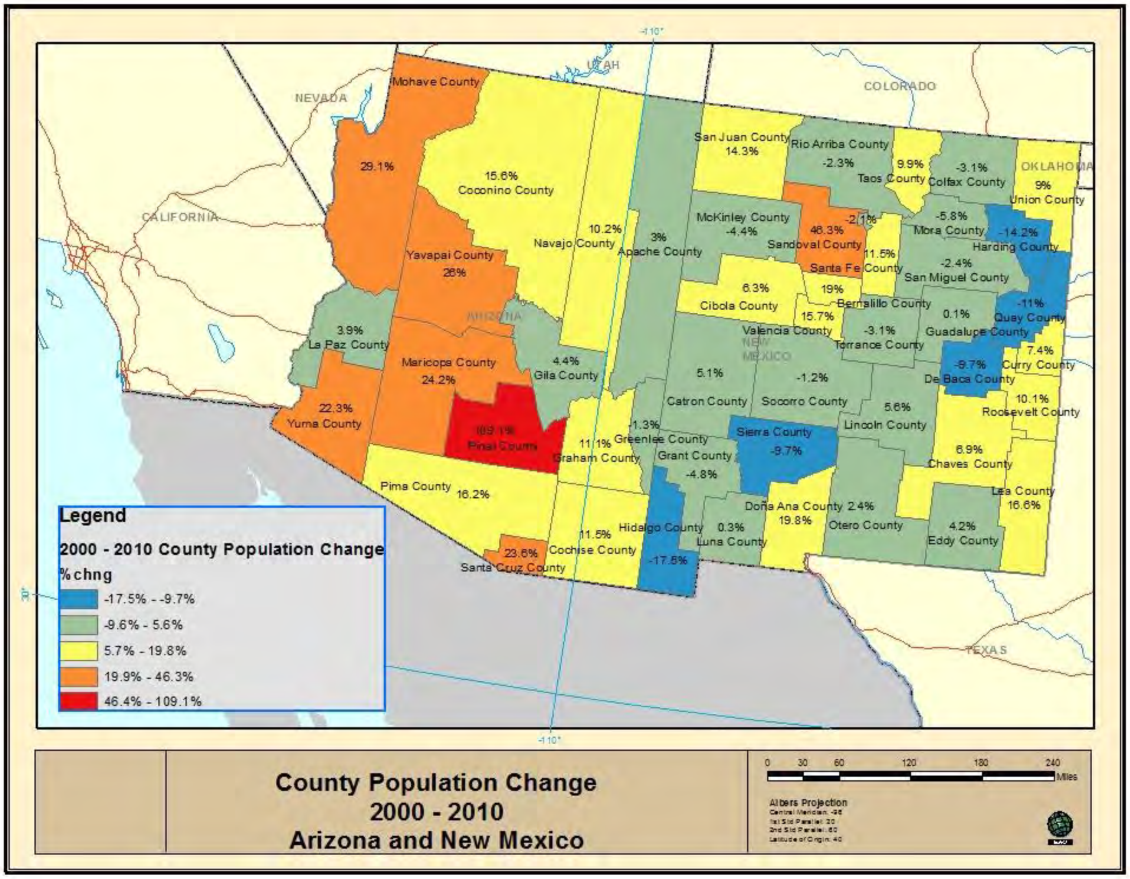
3.5 ECONOMIC ACTIVITY

Economic Activity refers to the economic conditions of the project study area. In this section we provide a brief overview of the economies of the states of Arizona and New Mexico and a more detailed description of the ranching activities/livestock production, hunting, and tourism, which are the economic components we consider to be potentially affected by the proposed action and alternatives. We provide state and regional socioeconomic descriptions in this chapter, and detailed descriptions of counties and tribes in Appendix B. These local population level descriptions contain information on demographics, the labor market, and local economic activity in the aforementioned sectors where data are available.

3.5.1 Existing Setting: Overview of Arizona and New Mexico

In 2010 the U.S. Census estimated that the population for Arizona was approximately 6.5 million and 2.0 million for New Mexico. The majority of the population lives in major metropolitan areas such as Phoenix (1.5 million), Tucson (524,295), Albuquerque (555,417), and Las Cruces (101,047) (U.S. Census 2012a). The economic conditions of the major metropolitan areas are not described because suitable wolf habitat does not occur within the urban environment and no effects are expected in these areas.

Between the 2000 and 2010 Census, the total population for Arizona grew 13.3 percent. The total population in New Mexico grew 13.2 percent. Both states grew at a greater rate than the average for the country (9.7 percent) (U.S. Census 2010). Growth within each of the States was not uniform. In general, urban areas and surrounding counties grew more rapidly than rural counties. Maricopa County, with a 2010 population of 3.8 million experienced nearly a 25 percent increase in population since 2000. Nearby Pinal County was one of the fastest growing counties in the nation. The population of Pinal County more than doubled since 2000 from 180,000 to over 375,000 in 2010 (U.S. Census, 2010, table 4). A general discussion of each county's socio-economic characteristics can be found in Appendix B. Figure 3-16 below shows how each county's population grew (or shrank) between the Census years 2000 and 2010.



Credit: USFWS Division of Economics.

Figure 3-16. County Population Change 2000-2010, Arizona and New Mexico.

Table 3-5 below presents a general overview of the socio-economic condition for both the State of Arizona and the State of New Mexico. Both States had a greater percentage of children under the age of 18 than the national average and a higher percentage of adults aged 65 and older. Both States are predominately White with high percentage of Whites being persons of Hispanic or Latino origin. Both States also have a significant population of Native Americans. Over 5 percent of Arizona's population and 10 percent of New Mexico's is Native American. Per capita income in both States is below the national average and relatedly the percentage of people living in poverty is greater in both States than the national average.

In Arizona and New Mexico, Mexican wolves generally inhabit evergreen pine-oak woodlands, pinion-juniper woodlands, and mixed-conifer montane forests that are inhabited by elk, mule deer, and white-tailed deer, which they naturally prey upon for food. Depending on the land use activities occurring in specific places within the project study area, certain entities could be affected by the presence of Mexican wolves. For example, the majority of the land base in Catron County, New Mexico is suitable habitat for the wolf. In contrast, little of the land base in Maricopa County in Arizona is suitable wolf habitat. Data at the county level is gathered and can be compared but socio-economic information within a county that has both areas of suitable wolf habitat and areas of no suitable habitat cannot be easily parsed so that only the areas with suitable habitat areas are described. In fact, the majority of suitable wolf habitat is on federally managed lands. Even so, nearby communities and populations can be affected by management decisions on Federal lands.

Table 3-5. General Socio-economic Profile for Arizona and New Mexico.

People QuickFacts	Arizona	New Mexico	USA
Population, 2012 estimate	6,553,255	2,085,538	313,914,040
Population, 2010	6,392,017	2,059,179	308,745,538
Population, percent change, April 1, 2010 to July 1, 2012	2.5%	1.3%	1.7%
Persons under 18 years, percent, 2011	25.1%	24.9%	23.7%
Persons 65 years and over, percent, 2011	14.2%	13.6%	13.3%
Female persons, percent, 2011	50.3%	50.5%	50.8%
White persons, percent, 2011 (a)	84.6%	83.4%	78.1%
Black persons, percent, 2011 (a)	4.5%	2.5%	13.1%
American Indian and Alaska Native persons, percent, 2011 (a)	5.2%	10.1%	1.2%
Asian persons, percent, 2011 (a)	3.0%	1.6%	5.0%
Other	2.7%	2.4%	2.6%
Persons of Hispanic or Latino Origin, percent, 2011 (b)	30.1%	46.7%	16.7%
White persons not Hispanic, percent, 2011	57.4%	40.2%	63.4%
Per capita money income in the past 12 months (2011 dollars), 2007-2011	$ 25,784	$ 23,537	$ 27,915
Persons below poverty level, percent, 2007-2011	16.2%	19.0%	14.3%

Source: US Census Bureau, State and County Quickfacts, http://quickfacts.census.gov. Accessed on 6/24/2013.

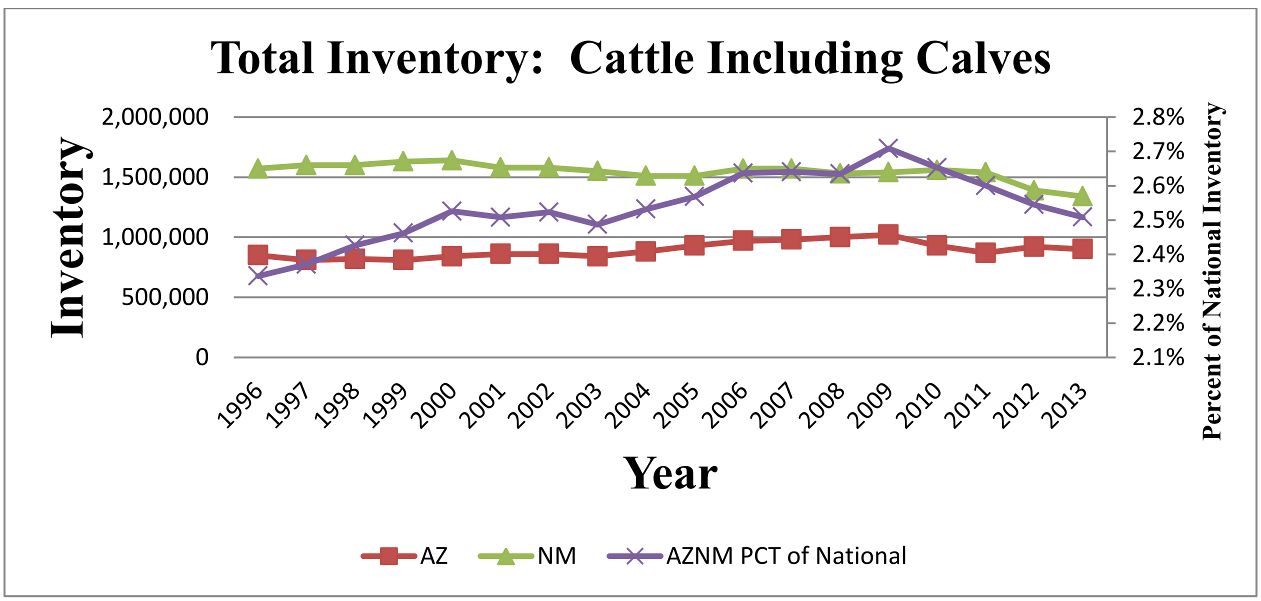
3.5.2 The MWEPA including the BRWRA

3.5.2.1 Ranching Activities/Livestock Production

Cattle were initially introduced to the landscapes of Arizona and New Mexico by Spanish colonists in the late 1600s, beginning a long tradition of ranching in the American Southwest. Settlers were awarded land grants from the Spanish Colonial government and later the Mexican government. In many cases, land grants consisted of relatively small parcels for homesteading and included access privileges to much larger community land grants for grazing cattle and sheep herds. After the U.S. Civil War and the signing of the Treaty of Guadalupe Hidalgo between the U.S. and Mexican governments in 1848, many ranchers had to reapply to the U.S. government for a recognized land title. This was an expensive process and required copies of many supporting documents related to the original land grants issued by Spanish and Mexican governments. Many ranchers lost access to community grazing lands and even their own properties due to lost documents, vaguely defined boundaries, and speculators.

During this period Anglo ranchers moved into the area and began large-scale ranching operations funded by outside investors. The growing population of the United States fueled an increased demand for beef and the arrival of railroads made it economically and technically feasible to raise larger numbers of cattle and sheep in the Southwest and be able to supply the Eastern market. The race for profits and returns on investments correlated with overgrazing of grasslands and a subsequent crash of the number of sheep and cattle that were raised on the American Southwest grasslands in the late 1800s. These degraded lands were often obtained by the U.S. government and ultimately became part of the National Forest system. Thus, in the end, many of the National Forests contain land that initially constituted the community rangelands of the original Spanish ranchers. Today over 30 percent of the land area in Arizona and New Mexico is owned by the federal government mainly in the form of BLM or Forest Service lands, while an additional 8 percent is held in trust by the U.S. government for the benefit of Native American tribes.

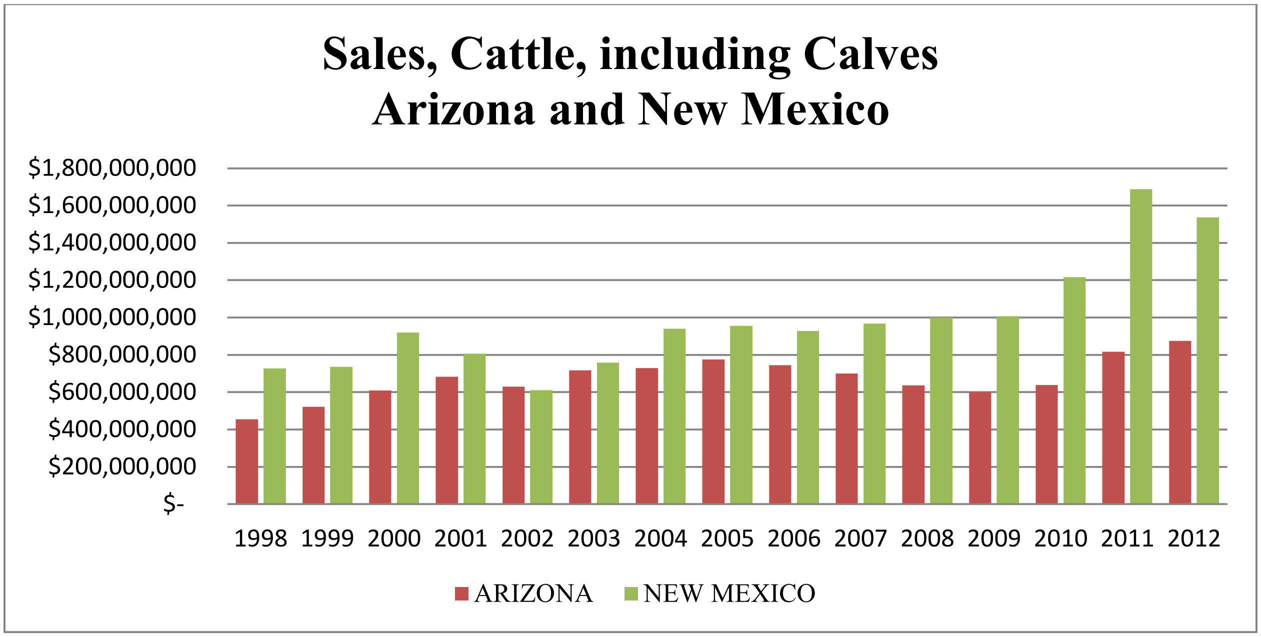
Figure 3-17 shows the total inventory for cattle and calves in Arizona and New Mexico since 1996. In 1996 the States had an estimated 2.4 million head of cattle. By 2013 the head count dropped nearly 200,000 to an estimated 2.2 million. The year 2009 was a peak year for cattle inventories (2.56 million) and 2013 was the year with the least amount of inventory. The Department of Agriculture reported a national estimate of 89.3 million cattle and calves in 2013, which implies that together, Arizona and New Mexico contribute approximately 2.5 percent to the overall national supply (NASS: http://quickstats.nass.usda.gov).



(Credit: NASS, http://quickstats.nass.usda.gov)

Figure 3-17. Total Inventory: Cattle Including Calves.

The total value of cattle and calf sales for Arizona and New Mexico has increased over time. In 1998 the total sales for Arizona cattlemen was $4.5 million and for New Mexico $7.3 million. By 2012 sales increased to $8.75 million for Arizona and $1.5 billion for New Mexico. Figure 3-18 shows the total sales figures for each State for the years 1998 through 2012.



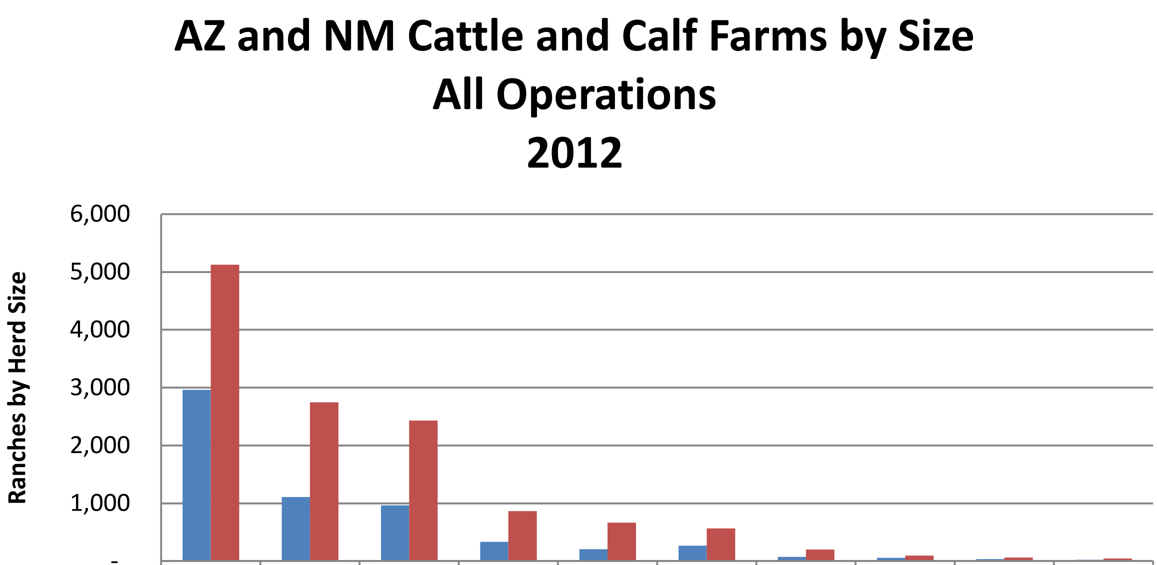
Source: NASS, http://quickstats.nass.usda.gov/
(Sales figures exclude inter-farm in-state sales.) Sales estimates are in nominal dollars.

Figure 3-18. Sales Figures Arizona and New Mexico, 1998-2012.

Figure 3-19 shows the distribution of cattle and calf operations by size of ranch measured in number of cattle. In 2012, U.S. Census reported that there were 6,029 cattle and calf operations in Arizona with a total herd size of 911,334 and in New Mexico there were 12,796 cattle and calf operations with a total herd size of 1,354,240. The overall vast majority of operations are small in terms of herd size. Over 80 percent of Arizona and New Mexico operations had a herd size of less than 50 head. Nearly 50 percent of Arizona operations and 40 percent of New Mexico operations had a herd size of less than ten.

These small sized ranch operations represent the majority of the number of ranches in the States but they produce less than ten percent of the total cattle and calf inventory. The largest operations, with an inventory greater than 2,500, account for over 50 percent of the total livestock. In Arizona operations with over 2,500 head account for 65 percent of the State's inventory and in New Mexico 46 percent (NASS 2012).

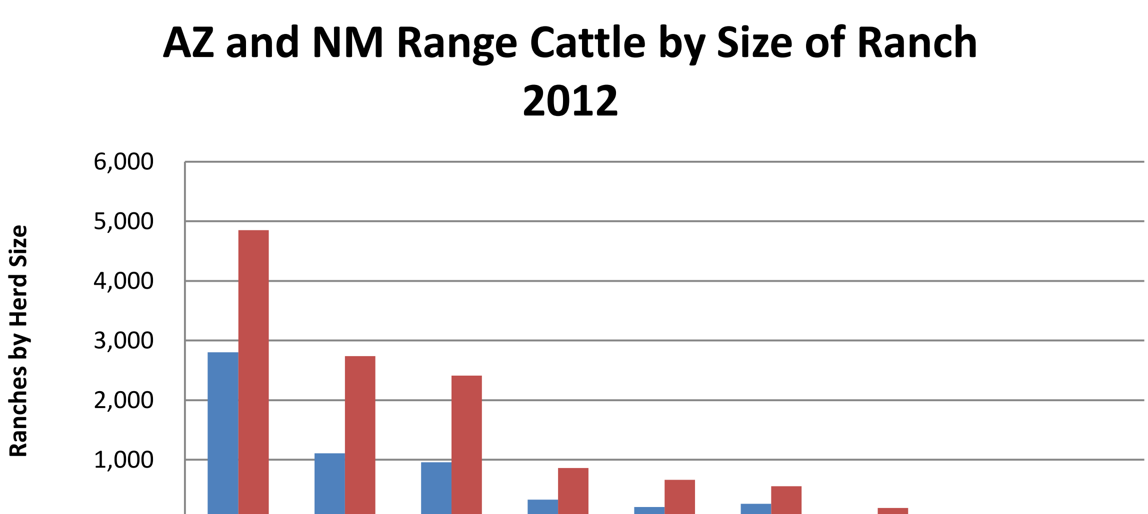
Figure 3-20 shows the estimated number of cattle and calf ranching operations in the States by excluding the number of milk cow operations and feeder cattle operations. Over 95 percent of all cattle and calf operations are estimated to be associated with ranching operations. Figure 3-21 shows the proportion of range cattle in Arizona and New Mexico associated with ranch size. Ranches with 2,500 or more head of cattle account for over 40 percent of the total cattle inventory in Arizona and New Mexico. In contrast, ranching operations with less than 50 head account for nearly 20 percent of the total herd size. For the majority of ranches that operate with less than ten head their cumulative total accounts for nearly 2.5 percent of the State's total herd of estimated range cattle.



	1-9	10-19	20-49	50-99	100-199	200-499	500-999	1,000-2,499	2,500-4,999	5,000 or more
AZ Farms	2,961	1,109	966	331	207	266	72	59	33	25
NM Farms	5,126	2,746	2,428	865	664	566	200	95	61	45

Credit: 2012 Census of Agriculture.

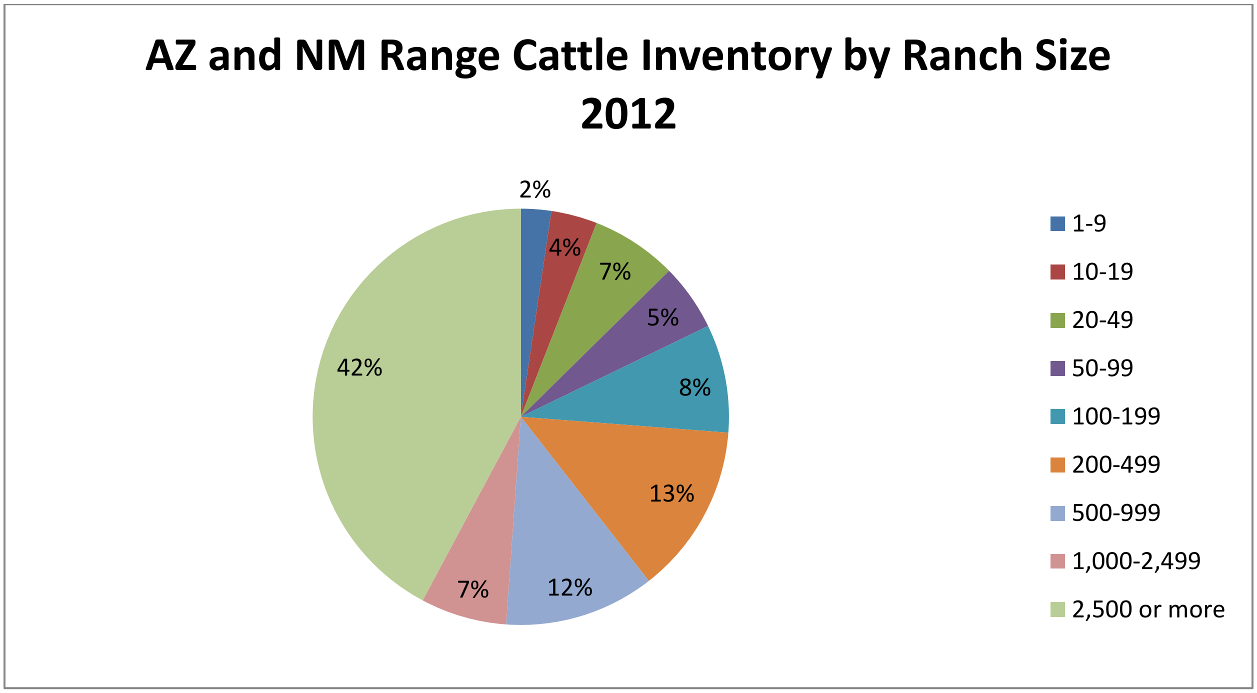
Figure 3-19. Arizona and New Mexico Cattle and Calf Farms by Size, All Operations, 2012.



	1-9	10-19	20-49	50-99	100-199	200-499	500-999	1,000-2,499	2,500 or more
Arizona	2,801	1,108	960	331	207	262	62	30	23
New Mexico	4,854	2,739	2,414	861	663	558	192	50	43

Credit: 2012 Census of Agriculture.

Figure 3-20. Arizona and New Mexico Estimated Range Cattle Operations by Size, 2012.



Source: 2012 Census of Agriculture

Figure 3-21. AZ and NM Inventory by Herd Size.

The BRWRA includes parts of two counties in Arizona (Apache and Greenlee counties) and three counties in New Mexico (Catron, Grant, and Sierra counties). Similar to what is observed for ranching operations in the two states, operations with less than 50 head of cattle represent over 85 percent of all the ranching operations in the BRWRA and manage nearly 25 percent of the total range herd. The majority of ranches in the BRWRA have less than ten head of cattle (46.5 percent of the estimated total number of ranching operations in the counties) and manages almost five percent of the region's total herd. In total, the cattle and calf inventory for ranching operations in the five counties is estimated to be 97,686 animals, which represents nearly 7 percent of the estimated total herd size of all the ranching operations in the two States. The five counties had a total of 2,301 ranches in 2012. Apache County had the greatest number of ranches of the five counties, as well as the greatest inventory. Much of the county, however, lies outside of the BRWRA. Table 3-6 shows the breakout for each county for the number of ranches as well as inventory categorized by ranch herd size.

As previously mentioned, many cow-calf operations in Arizona and New Mexico depend heavily on federal lands for forage. Important forage lands in the Southwest are primarily managed by the U.S. Forest Service and the Bureau of Land Management, to a lesser extent. Typically, a ranch will have a limited number of privately owned acres that can support some forage depending on the herd size, time of year, and environmental circumstances. Often though, a ranch relies on surrounding public lands for forage. The quality of the forage on these lands will vary based on factors such as location, elevation, range management, and drought, but nonetheless most ranches would no longer be economically viable or sustainable without access to these public land resources.

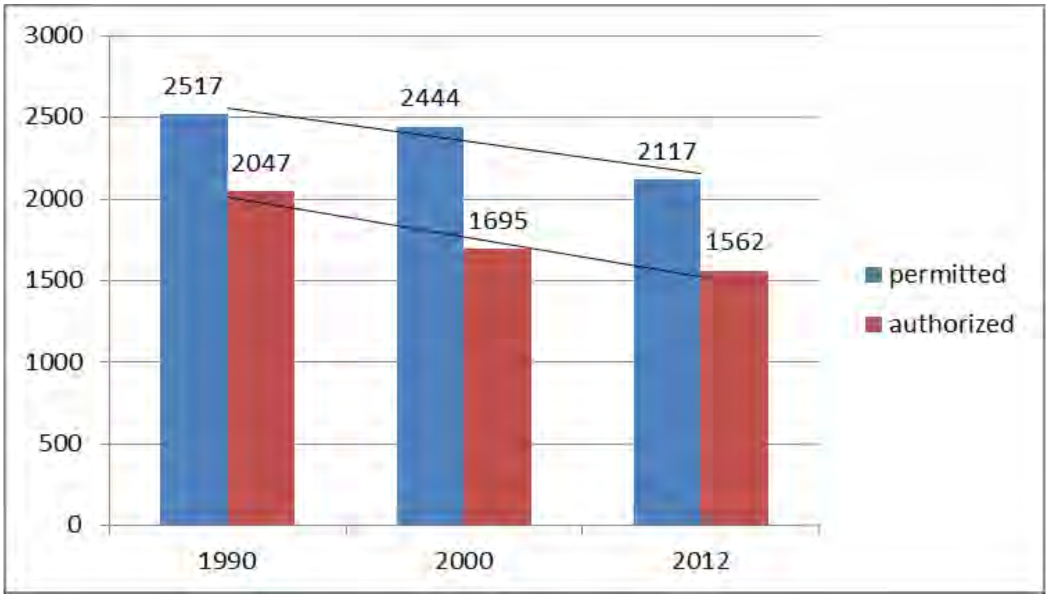
Ranchers typically hold allotments for public grazing lands surrounding the base of their operations. In turn, both the Forest Service and BLM determine the terms and number of head (i.e., animal unit months) and when and how allotment holders may use the land depending on factors such as drought and forage conditions. Because federal grazing lands vary greatly in their productivity it reasons that ranches themselves are not homogeneous operations. In addition to a ranch's dependence on the availability and productivity of surrounding public lands, the ranch is subject to a myriad of economic conditions, including equity, debt, operational cost, maintenance costs, and the ever changing market price for beef; all of which have an effect on a ranch's financial profit for the year.

Table 3-6: Cattle and Calf Herd Size and Inventory by Farm Size for Counties in the BRWRA (2012).

Herd Size	Apache	Greenlee	Catron	Sierra	Grant	Total	Pct of Total
Ranches							
1-9	859	11	44	31	124	1,069	46.5%
10-19	365	5	56	18	56	500	21.7%
20-49	262	16	62	38	48	426	18.5%
50-99	36	7	31	15	21	110	4.8%
100-199	12	5	16	16	28	77	3.3%
200-499	13	6	28	18	22	87	3.8%
500 +	3	2	10	1	13	32	1.4%
Total	1,553	52	247	137	312	2,301	100.0%
Inventory							
1-9	3,430	64	294	169	555	4,512	4.6%
10-19	4,883	71	805	251	793	6,803	7.0%
20-49	7,385	516	1,861	1,146	1,506	12,414	12.7%
50-99	2,350	492	2,210	782	1,676	6,728	6.9%
100-199	1,574	642	2,246	2,694	3,322	10,178	10.4%
200-499	3,430	1,653	8,551	3,668	6,258	19,892	20.4%
500 +	9,588	4,393	10,299	10,359	12,879	37,159	38.0%
Total	32,640	7,831	26,266	3,960	26,989	97,686	100.0%

Source: 2012 Census of Agriculture – County Data, Table 11. http://www.agcensus.usda.gov/Publications/2012/.

There are a total of eleven national forests in Arizona and New Mexico. Over the past twenty years the total number of permitted and authorized AUMs has declined. (An Animal Unit Month (AUM) is the amount of forage required to sustain one cow, either dry or with calf at side up to six months of age, for one month.) Forage conditions change annually depending on weather and range management conditions. Consequently, the authorized number of AUMs in any given season may be less than the total number permitted. In 1990, the Forest Service permitted 2.5 million AUMs and authorized 2.0 million AUMs throughout the national forests in Arizona and New Mexico. These numbers declined to 2.1 million permitted AUMs and 1.6 million in 2012. Figure 3-22 shows the trend in AUMs since 1990.



Source: US Forest Service – Kevin Sanchez, 11/25/13 email correspondence.

Figure 3-22. US Forest Service Permitted and Authorized Use in Arizona and New Mexico.

Figure 3-23 shows the combined number of AUM's permitted and authorized to graze in the Apache-Sitgreaves and Gila National Forests by the U.S. Forest Service since 2007 (data was unavailable for earlier years). Ranchers are issued permits by the Forest Service to graze their livestock on specific sections of land. Each year the Forest Service determines the maximum number of livestock that can forage in these areas based typically on environmental factors and authorizes the permitted ranchers to graze that number during the specified season for which they are subsequently billed. These Apache National Forest and the Gila National Forest comprise the BRWRA where wolves have been present since the reintroduction began in 1998. In 2007 the Forest Service authorized 307,313 AUMs between the two national forests. Authorizations increased to a high of 395,427 in 2011 before declining in the last two years to an authorized 361,191 in 2013. This trend mirrors the trend observed for the two states during the same time period.

Assuming that the typical allotment allows for grazing eight months out of the year in 2012 the 369,230 AUMs authorized by the Forest Service equates to 46,154 animal units.[1] As previously stated, an animal unit could be a mature cow or a cow-calf pair if the calf is six months or less in age. Assuming that all animal units grazing in the two national forests were cow-calf pairs the estimated total number of cattle (cows and calves) grazing on the national forest in 2012 would be 92,308 head. This estimate is very close to the total inventory of cattle within the five counties comprising BRWRA as reported by the 2012 Agricultural Census.

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[1] Allotments within the two National Forests are varied. Some allotments allow for only seasonal use while others allow yearlong grazing access. Without individually reviewing the thousands of allotments in the National Forest, there is no 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.

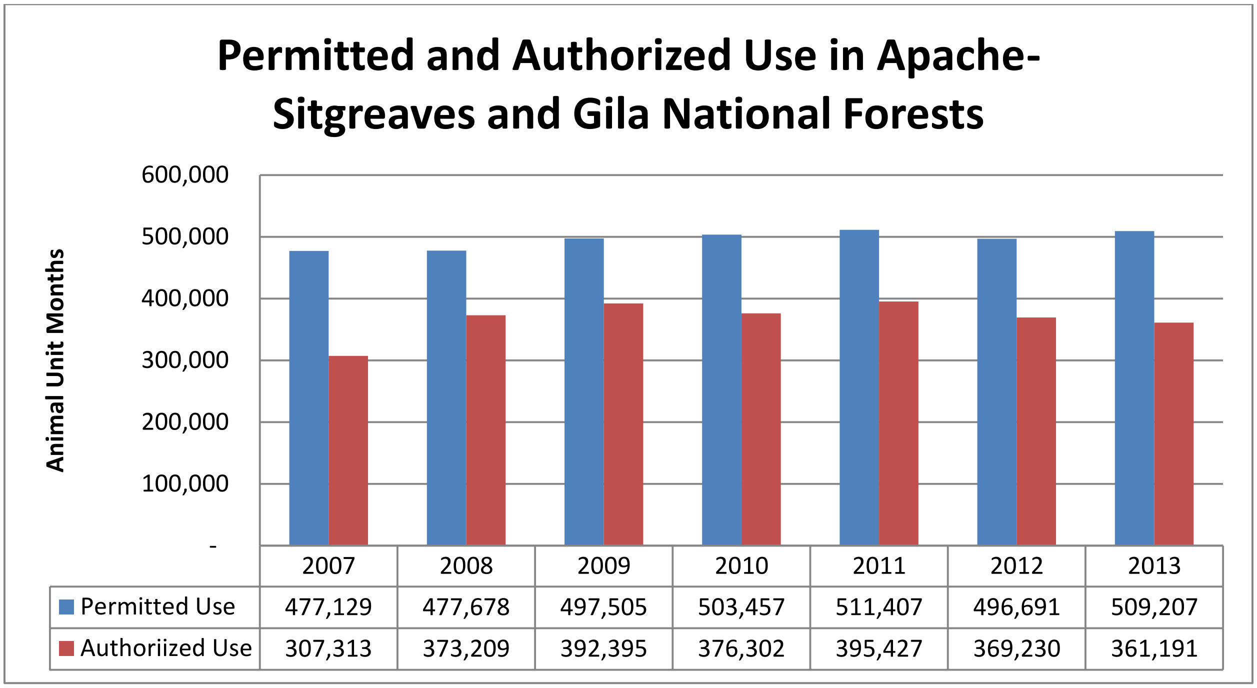


Figure 3-23. Permitted and Authorized use in Apache-Sitgreaves and Gila National Forests.

3.5.2.2 Sheep and Lambs

For the most part, there is very little sheep and lamb inventory within the five counties that comprise the BRWRA, with the exception of Apache County. The 2012 Census of Agriculture reported that there were 3,534 sheep and lamb ranches in Apache County with a total inventory of 63,942. Census does not produce a more detailed geographic breakdown of ranches or inventory beneath the county level but given the size of the County and the relative scarcity of sheep and lamb ranches and inventory in the other four counties it is believed that the overall vast majority of sheep and lamb ranches and inventory in Apache County is associated with ranches lying outside the BRWRA. Table 3-7 shows the breakout for sheep and lamb ranches and inventory by herd size for each of the five counties in the BRWRA.

Table 3-7: Sheep and Lamb Herd Size and Inventory by Farm Size for Counties in the BRWRA (2012).

Sheep and Lamb Ranch Size and Inventory: 2012							
Herd Size	Apache	Greenlee	Catron	Sierra	Grant	Total	Pct of Total
Ranches by inventory							
1-24	2,733	1	7	4	13	2,758	77.0%
25-99	764	6	1	9	2	782	21.8%
100-299	37	5	-	-	-	42	1.2%
300-999	-	-	-	-	-	-	0.0%
1,000 or more	-	-	-	-	-	-	0.0%
Total	3,534	12	8	13	15	3,582	100.0%

Inventory							
1-24	28,648	n/a	n/a	36	n/a	28,684	44.5%
25-99	30,807	178	n/a	285	n/a	31,270	48.5%
100-299	4,487	n/a	-	-	-	4,487	7.0%
300-999	-	-	-	-	-	-	0.0%
1,000 or more	-	-	-	-	-	-	0.0%
Total	63,942	n/a	79	321	131	64,473	100.0%

Source: 2012 Census of Agriculture – County Data, Table 13. http://www.agcensus.usda.gov/Publications/2012/.

3.5.2.3 Big Game Hunting

Hunting in both Arizona and New Mexico is a popular activity. Based on the National Hunting License Report the total number of license holders in Arizona increased 4.6 percent from 2001 to 2011 and in New Mexico decreased by 13.7 percent. According to the most recent National Survey of Fishing, Hunting, and Wildlife Recreation in 2011 Arizona hunters spent an average of nearly ten days out in the field, while in New Mexico the average hunting participant spent over 13 days in the field. Hunters are an important source of economic activity to the rural communities that are proximate to the State hunting areas. The typical Arizona license holder spent an average of $1,841 in 2011 and the typical New Mexican hunter spent an average of $1,452. Table 3-8 shows the general findings for the National Survey.

Table 3-8: Hunting Activity in Arizona and New Mexico, 2011, 2001

		All Hunting ($2012)		
State		2011	2001	Pct Chnge
Arizona	License Holders	183,478	191,834	4.6%
	Days of participation	2,634	1,694	55.5%
	Total expenditures	$337,759	$268,613	25.7%
	Average expenditure per license holder	$1,841	$1,400	-30.4%
New Mexico	Participants	95,927	111,188	-13.7%
	Days of participation	927	1,667	-44.4%
	Total expenditures	$139,264	$153,386	-9.2%
	Average expenditure per license holder	$1,452	$1,380	83.8%
Note: Days of participation, and total expenditures all reported in thousands. All Hunting includes big game, small game, and migratory birds.				
Source: U.S. Department of the Interior, U.S. Fish and Wildlife Service, and U.S. Department of Commerce, 2011, 2001. U.S. Census Bureau. 2011 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation. Tables 2, 13, and 16.				

Both Arizona and New Mexico are renowned for their big game hunting opportunities. In particular, elk are a highly sought after species. Every year the demand for elk permits significantly outweighs supply.

In Arizona there were 51,137 applications for 18,900 licenses statewide in 2011 (AGFD 2011). In New Mexico, there were 58,407 applications for a total of 21,235 licenses statewide in 2013 (NMDGF 2013). Both Arizona and New Mexico manage their game lands based on management units. Applicants must specify their preferred game management units when applying for a permit. Both States limit the number of permits awarded per game management unit based on game management factors to ensure the viability of the herds.

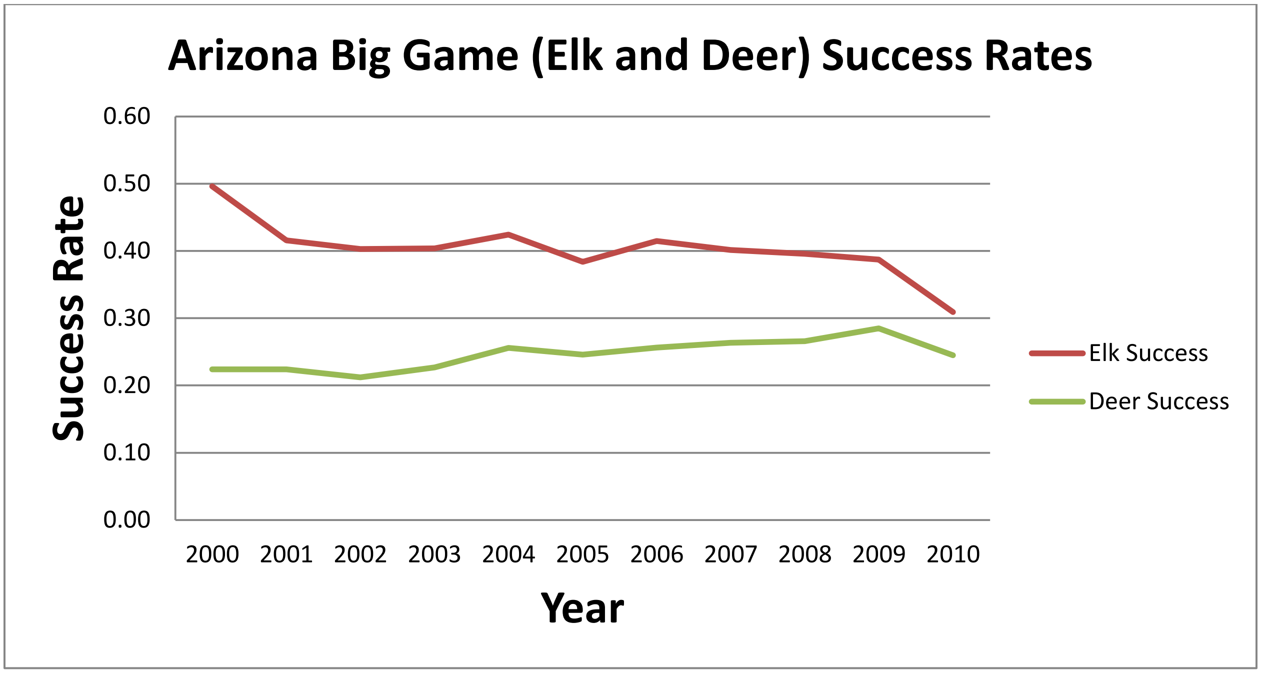
Table 3-9 shows the trend in the total number of hunters, harvest, and success ratio for both elk and deer hunting in Arizona. The total number of elk hunters has increased over the past ten years and success rates have declined, perhaps as a result of the increased hunting pressure on the herds. In contrast to elk hunting, the number of deer hunters declined then rose again and success rates followed a similar inverse trend most likely due to the decrease, then increase in hunting pressure. Figure 3-24 depicts the overall success rates for both elk and deer hunters in Arizona for the previous ten years.

Table 3-9: Arizona Big Game Hunting, 2000 – 2010.

	Elk			Deer		
Year	Hunters	Total Harvest	Percent Success	Hunters	Total Harvest	Percent Success
2000	14,940	7,415	0.50	41,677	9,334	0.22
2001	17,628	7,330	0.42	41,110	9,218	0.22
2002	15,767	6,349	0.40	38,368	8,135	0.21
2003	12,983	5,240	0.40	33,905	7,690	0.23
2004	14,399	6,112	0.42	33,395	8,552	0.26
2005	15,254	5,854	0.38	34,883	8,571	0.25
2006	15,773	6,544	0.41	35,016	8,969	0.26
2007	16,189	6,502	0.40	37,002	9,750	0.26
2008	16,968	6,715	0.40	38,770	10,309	0.27
2009	17,408	6,741	0.39	40,468	11,528	0.28
2010	18,021	5,574	0.31	40,584	9,940	0.24

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

Note: Total elk harvest includes bulls, spikes, cows and calves. Total deer harvest includes all mule deer and white-tailed deer. Success rates are calculated as total harvest divided by total number of hunters.



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

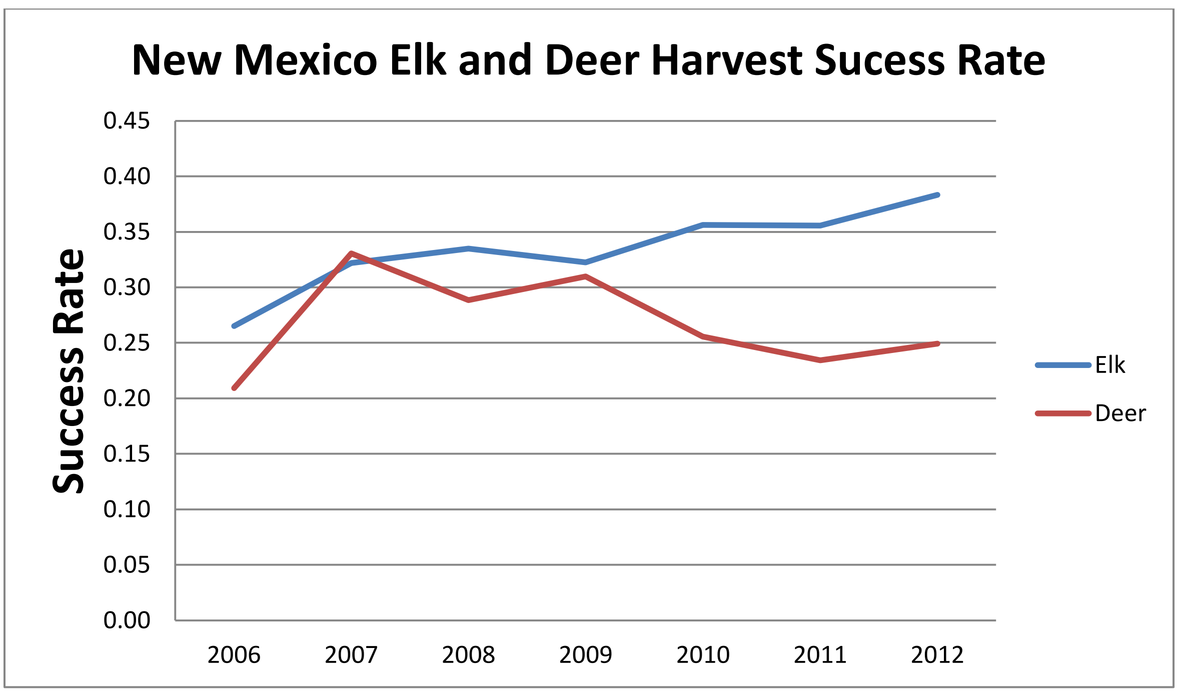
Figure 3-24. Big Game Arizona Hunting Success Rates, 2000 – 2010.

In New Mexico, total success rates for elk have been increasing since 2006, while that for deer has been on a slight decline since 2007 (Figure 3-25). Since 2006 the number of elk and deer hunters has remained relatively flat. The average number of elk hunters has been 31,517 and the average number of deer hunters has been 41,551. While data are reported for years earlier than 2006 the State does not deem them reliable compared to post 2006 data due to data collection discrepancies (Table 3-10).

Table 3-10. New Mexico Deer and Elk Hunters and Harvest.

	Elk	Harvest			Deer	Harvest	
Year	Hunters	Bulls	Cows	Success	Hunters		Success
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

(Credit: New Mexico Department of Game and Fish, http://www.wildlife.state.nm.us/recreation/hunting/index.htm. Email correspondence with Stewart Liley, March 6, 2014 and June 18, 2014.)

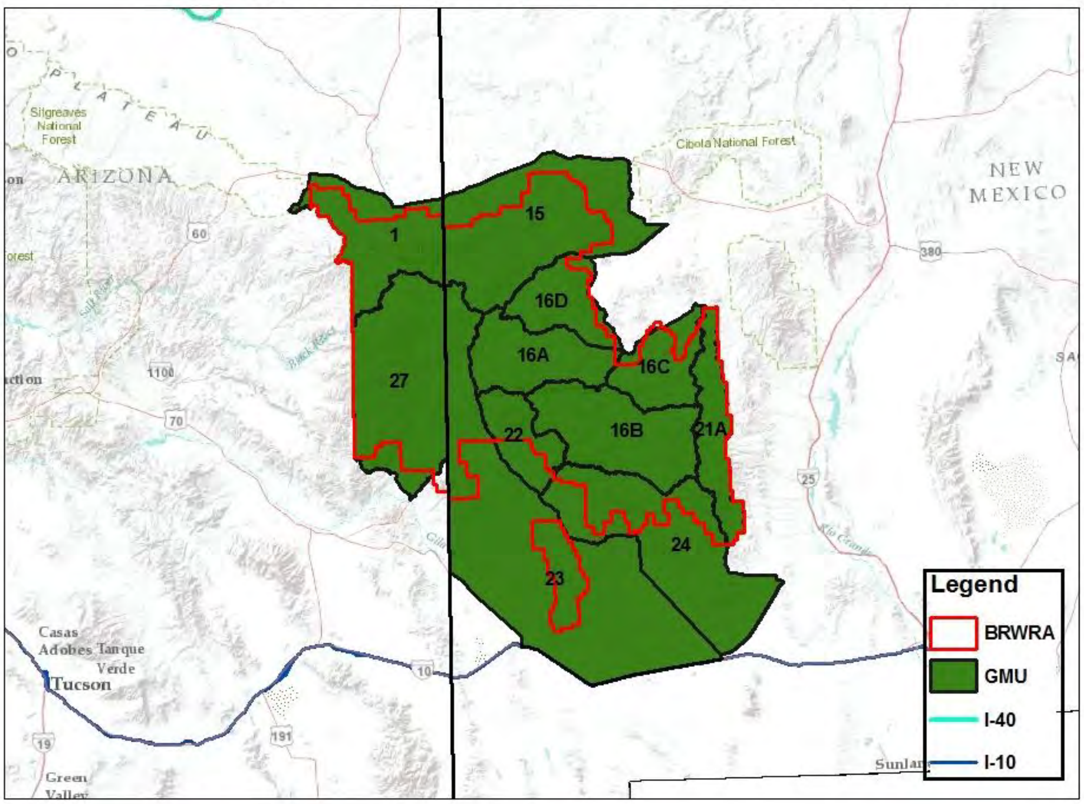


Source: New Mexico Department of Game and Fish Annual Elk and Deer Harvest Reports.
Note: The State of New Mexico changed its reporting requirements in 2006 making it difficult to compare previous year’s data.

Figure 3-25. New Mexico Elk and Deer Harvest Success Rate.

The State Game and Fish Agencies in New Mexico and Arizona are responsible for managing game resources within the States, on both public and private land. The majority of lands within the BRWRA are divided into nine Game Management Units. Apache National Forest, which is on the Arizona side of the BRWRA is divided into Arizona Game Management Units (GMUs) 1 and 27. The majority of lands in the Gila National Forest, which is on the New Mexico side of the BRWRA, is comprised of seven principle GMU's: 15, 16A, 16B, 16C, 16D, 21A, and 23. These units provide habitat for the Greater Gila elk herd (see Biological Resources for estimates of herd sizes). Other game species found in these units include mule deer, white-tailed deer, and wild turkey. Secondary game species include antelope, javelina, and Rocky Mountain bighorn sheep. While the State tracks harvest numbers for other game species taken in the area, population estimates are not provided. Figure 3-26 presents the GMUs in the BRWRA.

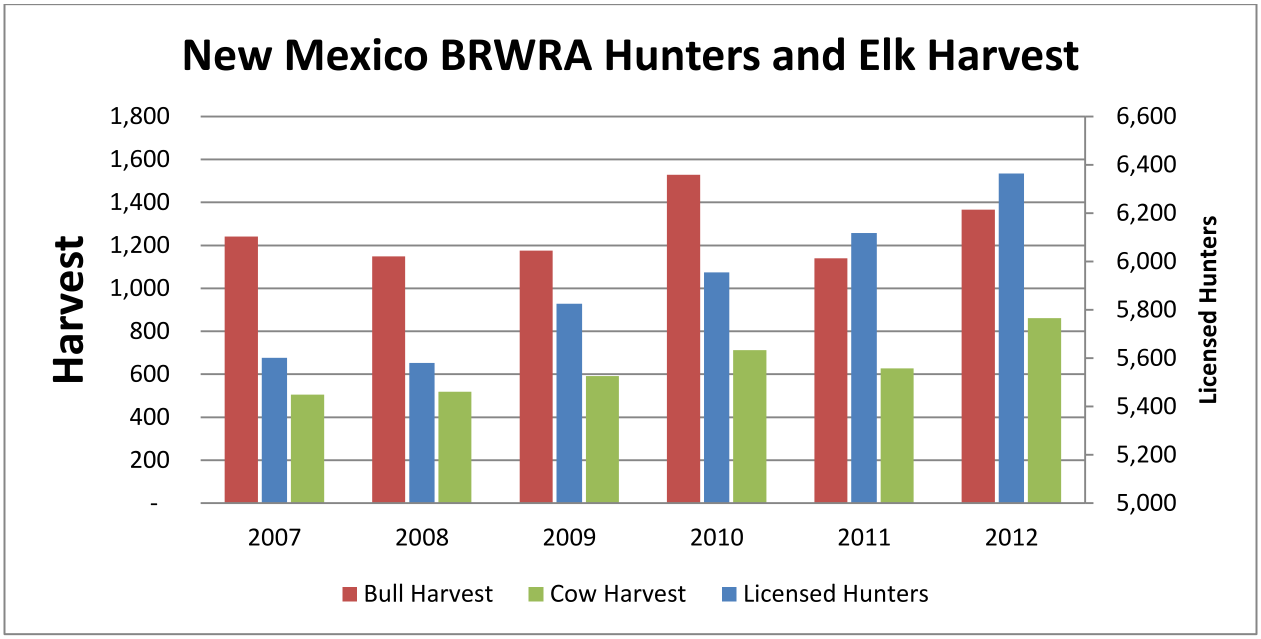
Blue Range Wolf Recovery Area Game Management Units



Credit: U.S. Fish and Wildlife Service, Division of Economics.

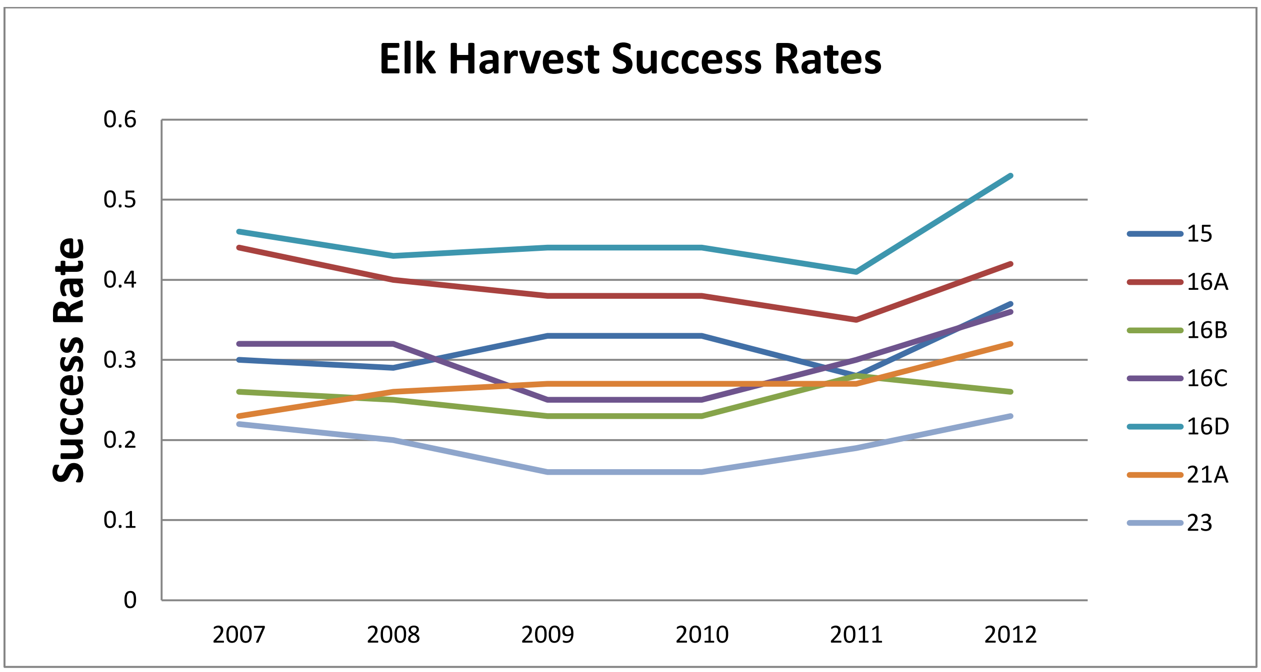
Figure 3-26. Blue Range Wolf Recovery Area Game Management Units.

Both States manage elk and deer herds by tracking hunter harvest reports, which help to provide managers with estimates of the health and size of the herds. In New Mexico the number of licensed elk hunters in the BRWRA ranged from a low of 5,580 in 2008 to a high of 6,364 in 2012. Since 2007 the number of licensed hunters has increased by about 2.5 percent a year. During the period 2007 through 2012 hunters harvested a total of 11,418 elk. Nearly 70 percent of the harvest (7,600) was for bull elk. Annual total harvest (both bull and cow) ranged from a low of 1,668 in 2008 to a high of 2,241 in 2010. In general, the total harvest grew about 6.5 percent each year with the bull elk harvest growing about 4.0 percent annually and the cow elk harvest growing about 12.0 percent. Figure 3-27 shows the trend in the number of hunters and harvest for the BRWRA within New Mexico.



Source: Division of Economics, US FWS and New Mexico Department of Game and Fish

Figure 3-27. New Mexico BRWRA Hunters and Elk Harvest.



Source: New Mexico Department of Game and Fish.

Figure 3-28. New Mexico BRWRA Annual Elk Harvest Success Rate.

Figure 3-28 illustrates the overall success rate for elk hunters during the years 2007 through 2012 for the New Mexico portion of the BRWRA. The success rate is calculated as the number of harvested elk divided by the number of licensed hunters. The figure shows the success rate for the primary GMUs.

Between 2007 and 2012 only GMU 16A showed a decrease in hunter success, dropping by about five percent. GMU 21A showed the greatest increase between 2007 and 2012, increasing by 39 percent.

Table 3-11 shows success rates for each of the principle GMUs in New Mexico BRWRA for the years 2007 through 2012. While success rates fluctuated for all the GMUs from year to year only GMU 16A experienced an overall decline between the year 2007 and 2012.

Table 3-11. Overall Elk Hunting Success Rates – Year Over Year Change, New Mexico BRWRA GMUs: New Mexico Game and Fish Department, unpublished data.

	New Mexico Game Management Units						
Year	15	16A	16B	16C	16D	21A	23
2007	-	-	-	-	-	-	-
2008	-3.3%	-9.1%	-3.8%	0.0%	-6.5%	13.0%	-9.1%
2009	13.8%	-5.0%	-8.0%	-21.9%	2.3%	3.8%	-20.0%
2010	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
2011	-15.2%	-7.9%	21.7%	20.0%	-6.8%	0.0%	18.8%
2012	32.1%	20.0%	-7.1%	20.0%	29.3%	18.5%	21.1%
Percent Change 2007 - 2012	23.3%	-4.5%	0.0%	12.5%	15.2%	39.1%	4.5%

Note: NM Game and Fish changed their methodology for estimating hunter and harvest data in 2007 resulting in practical difficulties in making comparisons to earlier years.

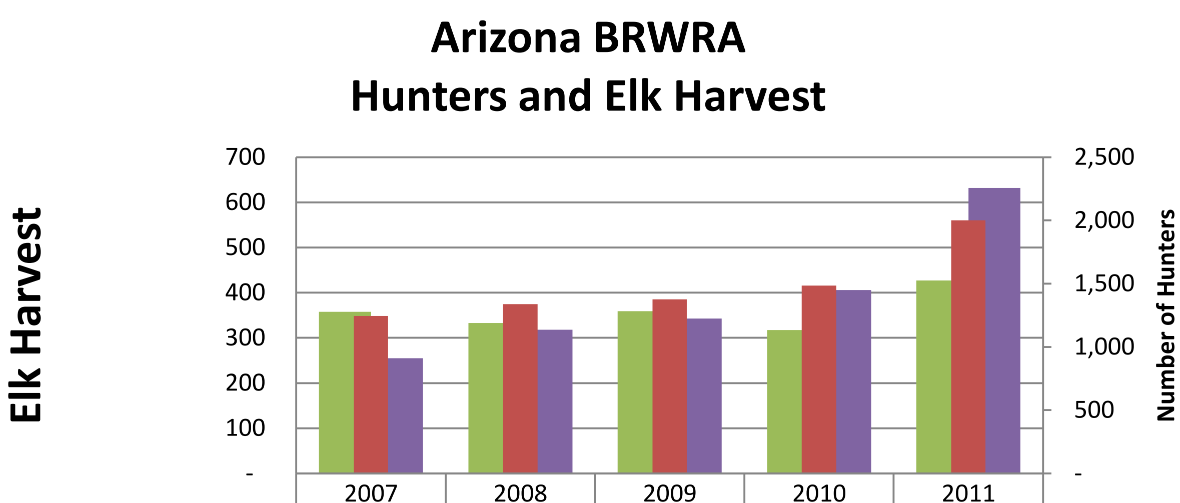
Table 3-12 shows the annual number of hunters, harvest, and success rate for the years 2007 through 2012 in Table Dormat for the New Mexico portion of the BRWRA. Overall, participation and harvest of elk in the New Mexico portion of the BRWRA has experienced a slight increase over this time period. In 2007 there were 5,601 licensed elk hunters that harvested a total of 1,747 elk. In 2012 the number of licensed hunters increased to 6,364 as well as the harvest to 2,227. Correspondingly, the number of bull elk harvested increased from 1,241 in 2007 to 1,366 in 2012.

Table 3-12. State of New Mexico – BRWRA Elk Hunting Statistics.

	2007	2008	2009	2010	2011	2012
Licensed Hunters	5,601	5,580	5,825	5,955	6,118	6,364
Bull Harvest	1,241	1,149	1,176	1,529	1,139	1,366
Cow Harvest	506	519	592	712	628	861
Total Harvest	1,747	1,668	1,768	2,241	1,767	2,227
Elk Harvest Success Rate	31.2%	29.9%	30.4%	37.6%	28.9%	35.0%
Bull Elk Success	22.2%	20.6%	20.2%	25.7%	18.6%	21.5%
Cow Elk Success	9.0%	9.3%	10.2%	12.0%	10.3%	13.5%

(Source: New Mexico Department of Game and Fish, Stewart Liley.) Note: NM Game and Fish changed their methodology for estimating hunter and harvest data in 2007 resulting in practical difficulties in making comparisons to earlier years.

Figure 3-29 below shows the total number of hunters and bull elk and other elk harvest for Arizona game management units 1 and 27 (i.e., the BRWRA) for the years 2007 through 2011. The exhibit shows the total number of hunters steadily increasing over the period from 1,245 in 2007 to 2,002 in 2011. Corresponding elk harvest ranged from 613 in 2007 to 1,059 in 2011. While the harvest numbers for both bull and cow elk increased over this time period, the increase in cow elk harvest was much more significant.

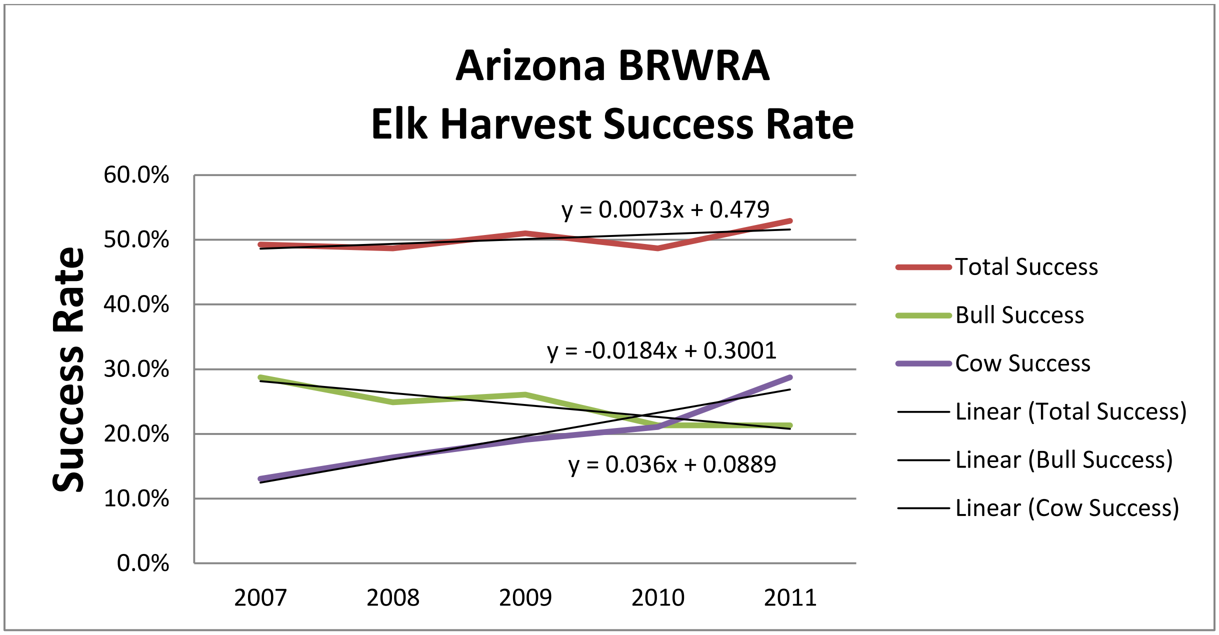


	2007	2008	2009	2010	2011
Bull Harvest	358	333	359	317	427
Cow/calf/spike Harvest	255	318	343	406	632
Hunters	1,245	1,337	1,377	1,485	2,002

Source: Hunt Arizona, 2012.

Figure 3-29. Arizona BRWRA Hunters and Elk Harvest.

Success rates for harvesting Arizona elk in the BRWRA have been increasing moderately since 2007 (Figure 3-30). Underlying this trend however is the steady increase in the success rate for harvesting a cow elk compared to the declining success rate for harvesting a bull elk. While the actual number of bull elk harvests have not declined significantly over time the decline in the overall success rate is attributable to the steadily increasing number of hunters over the years. Between the year 2007 and 2011 the number of hunters has increased by 60 percent.



Credit: Hunt Arizona 2012. Success rates calculated by the U.S. Fish and Wildlife Service Division of Economics.

Figure 3-30. Arizona BRWRA Elk Harvest Success Rate.

A factor affecting the recent rise in the number of Arizona hunters in the BRWRA may be correlated to the management objectives of the Arizona Game and Fish Department. The elk herd in GMU 1 represents a very large proportion of the State's entire game herd. Maintaining an appropriate balance between a very large game herd and adverse effects on local communities can be complicated. As herds increase in size they end up competing for forage with other animals including cattle. Nuisance complaints from community members in Springerville, Eagar, Nutrioso, and Alpine have increased with herd size. In 2012 the Game and Fish Department aimed to reduce the overall herd size by 10 percent to better balance habitat availability and suitability with other demands. To achieve this objective the Department has been increasing the number of authorized elk permits each year. As noted above the number of hunters has increased by 60 percent while the number of hunter days has increased by 140 percent. Correspondingly the average number of hunting days per hunter has increased from 2.64 days in 2007 to 3.94 days in 2011. These figures are summarized in Table 3-13.

Table 3-13. Arizona Hunter and Harvest in the BRWRA (2007 – 2011). Source: Hunt Arizona

Year	Permits Authorized	1st Choice Applicants	Permits Issued	Hunters	Hunter Days	Harvest				
						Bull	Spike	Cow	Calf	Total
2007	1,290	12,093	1,283	1,245	3,291	358	72	163	20	613
2008	1,420	7,033	1,420	1,337	5,516	333	77	219	22	651
2009	2,163	7,771	994	1,377	5,536	359	51	263	29	702
2010	1,580	6,660	1,580	1,485	5,967	317	74	313	19	723
2011	2,150	9,749	2,146	2,002	7,880	427	36	575	21	1,059

Source: Hunt Arizona

3.5.2.4 Tourism

A recent report by the Outdoor Industry Foundation indicates that participation in outdoor recreation activities in the United States for the year 2011 was the highest since 2007 with over 140 million people enjoying 11.5 billion outings (Outdoor Foundation 2012). The U.S. Forest Service (Cordell 2012) reports that the number of people who participated in outdoor recreation nationwide between 2000 and 2009 grew by 7.5 percent, and the number of activity days grew about 32 percent. Participation in nature-based outdoor recreation increased by 7.1 percent over the period, while nature-based activity days increased by about 40 percent. The strongest growth has been in wildlife viewing and photography. Visitation at recreation and historic sites, and non-motorized boating also showed moderate growth in total activity days. Hunting, fishing, backcountry activities and motorized activities had 2009 participation levels similar to those of 2000, while skiing and snowboarding declined in total days over the period.

Both Arizona and New Mexico offer a wealth of opportunities for outdoor enthusiasts. The State of Arizona reported recently that in 2012 the State had 38.1 million visitors who collectively spent a total of \$19.3 billion. These dollars flowed to businesses involved in such tourism-related industries as lodging, food services, recreation, transportation, and retail sales. The expenditure of these dollars supported approximately 161,300 jobs. The re-spending of these direct expenditures within the State supported an additional 139,000 jobs (Dean Runyan Associates 2013). In New Mexico, travel and tourism also have a significant role in the state's economy. In 2011 the number of visitors to the State was reported to be 32.3 million with associated expenditures of \$5.5 billion (Tourism Economics 2011). Total expenditures (i.e., direct tourist dollars re-spent within the State economy) were \$7.8 billion and supported 85,766 jobs with a total income of \$2.1 billion.

In Arizona and New Mexico a subset of outdoor recreation tourism, wildlife-watching activities, is an important economic activity for both States. The U.S. Fish and Wildlife Service conducts an outdoorsman survey every five years called the National Survey of Fishing, Hunting, and Wildlife-Associated Recreation. The survey is conducted by the U.S. Census Bureau and estimates many things including the number of sportsmen, types of activities they engage in, and their associated expenditures. In 2011 the Survey estimated that there were a total of 732,000 wildlife watching participants in Arizona and 170,000 in New Mexico. Of these participants, the Survey estimated that 394,000 people in Arizona targeted viewing opportunities related to large mammals and in New Mexico 83,000. Compared to the year 2001, wildlife watching visits increased for the State of Arizona but decreased for the State of New Mexico. Table 3-14 summarizes this information.

Arizona and New Mexico both offer unique wildlife viewing opportunities not commonly available outside the region, and the U.S. Fish and Wildlife Refuge system provides for many of these opportunities. In 2012 the Fish and Wildlife Service reported that there were a total of over 500,000 visitors to wildlife refuges in Arizona and 237,000 in New Mexico. As an example, the Bosque del Apache National Wildlife Refuge located in New Mexico reported 165,000 visitors in the year 2012. Many of these visitors come to watch the sandhill cranes on their annual migration. Kofa National Wildlife Refuge, near Phoenix, Arizona reported over 72,000 wildlife observation visits in 2012 (RAPP 2012). Many visitors come to see the desert bighorn sheep in its natural environment.

Table 3-14. Away-From-Home Wildlife Watching Participants by Wildlife Observed, Photographed, or Fed.

Year		2011			2001			Change
		Total	State Residents Only	Out-of-State	Total	State Residents Only	Out-of-State	Total
Arizona	Total all Wildlife	732,000	443,000	289,000	638,000	271,000	367,000	14.7%
	Total Birds	639,000	427,000	212,000	593,000	247,000	346,000	7.8%
	Total Land Mammals	470,000	304,000	166,000	486,000	190,000	296,000	-3.3%
	Large Mammals	394,000	232,000	162,000	350,000	159,000	191,000	12.6%
New Mexico	Total all Wildlife	261,000	170,000	91,000	387,000	185,000	202,000	-32.6%
	Total Birds	226,000	135,000	91,000	329,000	170,000	159,000	-31.3%
	Total Land Mammals	164,000	97,000	67,000	291,000	142,000	149,000	-43.6%
	Large Mammals	83,000	69,000	14,000	190,000	92,000	98,000	-56.3%

(Source: US FWS National Survey Fishing, Hunting, and Wildlife-Watching, 2011 and 2001, Table 27 and 2011 Table 26.)

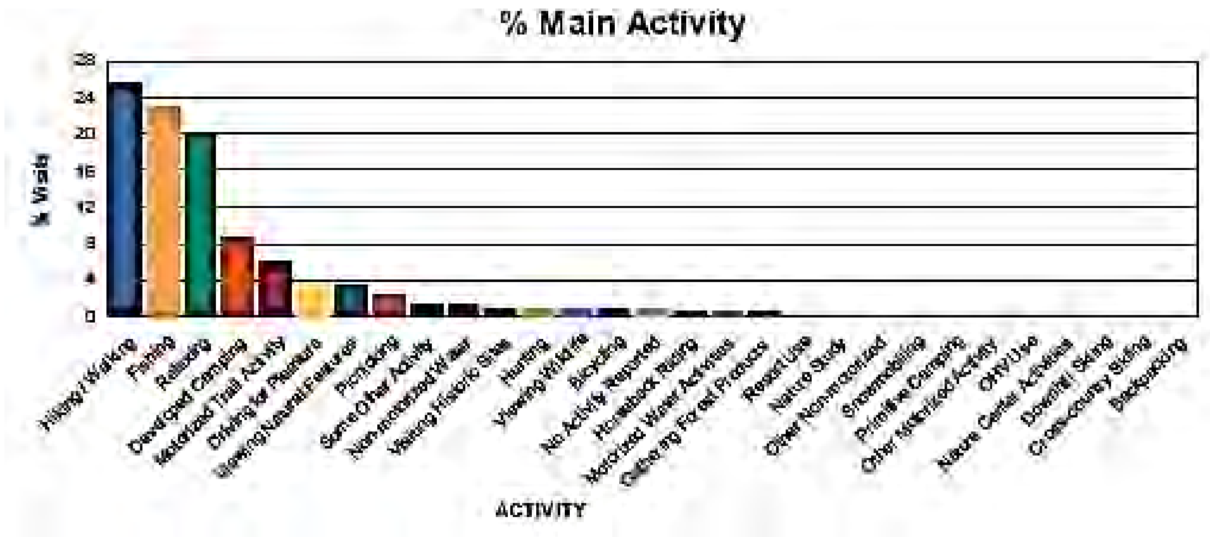
In Arizona wildlife watching participants spent over $900 million in 2011 and in New Mexico participants spent a total of $327 million. Equipment and other expenditures accounted for over one-half of total expenditures with wildlife watching equipment in particular accounting for 16 percent of total expenditures in Arizona and 24 percent in New Mexico. (Wildlife watching equipment includes expenditures on such items as binoculars, cameras, day packs, bird food and houses. Other equipment expenditures include items such as camping equipment and supplies, guide fees, boats and ATVs among other items.) Expenditures related directly to trips in Arizona totaled $391 million in 2011 and $147 million in New Mexico. These expenditures include items such as food and lodging expenses and transportation expenditures. Table 3-15 shows both total expenditures and the average amount spent by participant.

Table 3-15. Expenditures by State Residents and Nonresidents Combined for Wildlife Watching (2011).

Expenditure Item	Arizona		New Mexico	
	Expenditures ($1,000)	Average per participant (dollars)	Expenditures ($1,000)	Average per participant (dollars)
Total, all items	$935,880	$583	$327,117	$567
Total, trip-related	$391,198	$516	$146,937	$558
Food and lodging	$194,925	$266	$106,077	$406
food	$142,032	$194	$53,043	$203
lodging	$52,893	$72	$53,035	$203
Transportation	$176,576	$223	$38,740	$144
Other trip costs	$19,697	$27	$2,120	$8
Equipment and Other Expenditures, total	$544,681	$341	$180,180	$309
Wildlife Watching Equipment, total	$153,714	$97	$77,186	$128
Other Expenditures	$390,967	$244	$102,994	$181

Source: US FWS National Survey Fishing, Hunting, and Wildlife-Watching, 2011, Table 31

In the BRWRA neither the Apache-Sitgreaves nor the Gila National Forests report visitation on an annual basis. Instead, forests are sampled on a five-year basis. The Apache-Sitgreaves National Forest reported that there were an estimated 1.86 million site visits in FY 2007. In a ranking of the principle purpose of visiting the national forest, wildlife watching was 13th with less than one percent of the visitors reporting this activity to be their primary purpose. Figure 3-31 shows the breakdown by activity to visitors to the Forest. While less than one percent of the visitors reported visiting the national forest primarily to view wildlife, nearly 70 percent of the visitors engaged in wildlife viewing activities while participating in their primary activity as shown in Table 3-16.



Source: USDA Forest Service, National Visitor Use Report.

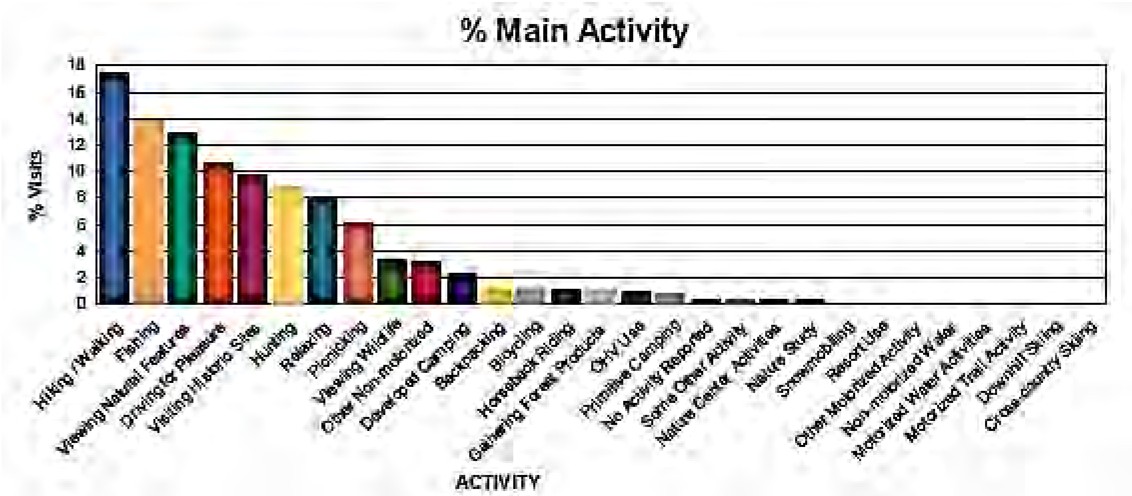
Figure 3-31. Visitor Activity Breakdown – Apache-Sitgreaves National Forest, FY 2007.

Activity	% Participation*	% Main Activity‡	Avg Hours Doing Main Activity
Relaxing	81.1	19.8	51.9
Viewing Wildlife	69.9	0.8	17.0
Viewing Natural Features	67.6	3.4	3.2
Hiking / Walking	63.3	25.4	11.0
Driving for Pleasure	46.9	3.4	5.0
Fishing	35.9	22.9	5.1
Developed Camping	24.8	8.7	29.9
Nature Study	16.9	0.0	3.0
Picnicking	16.9	2.6	7.4
Gathering Forest Products	10.6	0.5	4.0
OHV Use	9.1	0.0	0.0
Motorized Water Activities	7.7	0.5	1.0
Motorized Trail Activity	7.3	6.0	2.0
Visiting Historic Sites	6.8	0.8	4.0
Backpacking	6.7	0.0	0.0
Bicycling	5.9	0.7	1.0
Non-motorized Water	4.3	1.2	6.4
Primitive Camping	4.1	0.0	0.0
Nature Center Activities	3.8	0.0	0.0
Other Non-motorized	2.7	0.0	2.0
Some Other Activity	2.5	1.3	10.8
Resort Use	2.3	0.0	48.0
Horseback Riding	1.6	0.5	3.0
Hunting	1.3	0.8	12.5
No Activity Reported	0.7	0.7	
Cross-country Skiing	0.0	0.0	0.0
Downhill Skiing	0.0	0.0	0.0
Snowmobiling	0.0	0.0	0.0
Other Motorized Activity	0.0	0.0	0.0

Source: USDA Forest Service, National Visitor Use Report.

Table 3-16. Visitor Activity Participation and Hours, FY 2007. Apache-Sitgreaves National Forest.

In the Gila National Forest there were an estimated 452,000 site visits in FY 2006. In a ranking of the principle purpose of visiting the national forest, wildlife watching was 9th with 3.4 percent of the visitors reporting this activity to be their primary purpose. While less than four percent of the visitors reported visiting the national forest primarily to view wildlife, nearly 56 percent of the visitors engaged in wildlife viewing activities while participating in their primary activity. Figure 3-32 and Table 3-17 summarize the latest trends.



Credit: USDA Forest Service, National Visitor Use Report.

Figure 3-32. Visitor Activity Breakdown – Gila National Forest, FY 2007.

Activity	% Participation*	% Main Activity‡	Avg Hours Doing Main Activity
Viewing Natural Features	65.4	12.8	10.5
Relaxing	57.0	8.1	14.7
Viewing Wildlife	55.7	3.4	2.9
Hiking / Walking	53.2	17.4	6.1
Driving for Pleasure	50.5	10.6	2.2
Visiting Historic Sites	31.3	9.8	2.4
Picnicking	22.1	6.1	5.0
Nature Center Activities	21.3	0.3	1.8
Fishing	18.1	13.8	9.6
Developed Camping	14.2	2.2	33.1
Nature Study	14.1	0.2	7.4
Hunting	10.5	8.9	35.2
Primitive Camping	8.3	0.8	32.6
OHV Use	6.0	0.8	2.0
Other Non-motorized	4.7	3.1	2.7
Some Other Activity	4.5	0.3	1.6
Backpacking	4.4	1.1	51.5
Motorized Trail Activity	4.1	0.0	0.0
Gathering Forest Products	4.1	0.9	2.9
Bicycling	3.0	1.1	13.7
Horseback Riding	2.0	1.0	2.9
Resort Use	1.4	0.0	0.0
Motorized Water Activities	0.6	0.0	0.0
Non-motorized Water	0.4	0.0	0.0
Snowmobiling	0.2	0.0	0.0
Cross-country Skiing	0.2	0.0	0.0
Other Motorized Activity	0.0	0.0	0.0
Downhill Skiing	0.0	0.0	0.0
No Activity Reported	0.0	0.4	

Credit: USDA Forest Service, National Visitor Use Report.

Table 3-17. Visitor Activity Participation and Hours, FY2007, Gila National Forest.

3.6 HUMAN HEALTH/ PUBLIC SAFETY

In this section, we describe the human health and public safety issues and concerns regarding human-wolf interaction that may be associated with the proposed action and alternatives.

3.6.1 Existing Setting: Overview of Human Health/Public Safety Issues Associated with Wolves in North America

Prior to the arrival of European settlers the wolf was widespread over much of the North American continent from central Mexico to Alaska and Canada north of the Arctic Circle (Boitani 2003). Government sponsored predator control programs, bounties, hunting, trapping, the use of poison and the westward expansion of the livestock industry, coinciding with the reduction of native ungulate prey and loss of habitat, led to the disappearance of the wolf from almost all of the forty-eight contiguous United States by the 1930's (Boitani 2003). By 1700 the wolf had been eliminated in New England. The last wolves were killed in Arkansas in 1928, in Washington in 1940 and in Colorado and Wyoming in 1943. In the Great Lakes region the last wolves in Wisconsin were killed by 1970 although a small number of wolves persisted on Isle Royale, Michigan and several hundred wolves continued to survive in Minnesota due to its proximity to wilderness areas in Canada (Boitani 2003). In the southwest United States the last Mexican wolves were killed in Texas in 1970. Although occasional dispersal into the southern border counties of Arizona and New Mexico from remnant wild Mexican wolf populations in Mexico continued through the 1950's and 1960's wolves were considered to be extirpated throughout most of those two states by the late 1920's. The last wolf reported taken in northern Arizona was on the Paria Plateau around 1928. The last wolf carcass found in New Mexico was reported in the Peloncillo Mountains in southwestern New Mexico in October 1970 (Brown 1988).

In the United States growing environmental awareness, improved scientific research on the role of predators in ecosystems, and the passage of laws such as the Endangered Species Act (ESA, the Act) led to policy changes in the management of predators, including wolves. In 1978 the gray wolf was listed as endangered at the species level (*Canis lupus*) throughout the contiguous United States and Mexico, except for in Minnesota where the gray wolf was listed as threatened (43 FR 9607 March 9,1978). Subsequent to this listing, recovery programs for the gray wolf were initiated in the western Great Lakes and northern Rocky Mountain states, and for the Mexican wolf in Arizona and New Mexico. In the last forty years wolf populations have increased and expanded their range both in Canada and Alaska as well as the contiguous United States. Gray wolf populations in the Western Great Lakes (WGL) and Northern Rocky Mountain (NRM) states have increased such that those Distinct Population Segments (DPS) have been removed from the list of threatened and endangered species.

3.6.1.1 Public Safety

Concern that wolf recovery may pose a threat to public safety is often cited as justification for reducing existing wolf populations or for the termination of wolf recovery programs. A visual observation or an encounter with a wolf can be perceived in many ways and reports of a "wolf sighting" or descriptions of a wolf's behavioral response to human presence can be unreliable (Linnell et al. 2002). Investigations of many reports of a wolf sighting determine that wolves were not actually involved (e.g., the animal was a coyote or a dog) and reports of aggression may depend more on the observer's perception of a threat and their level of experience with wolves than the wolves' actual behavior (McNay 2002b, Linnell et al. 2002). Deaths or serious injury caused by large cats [e.g. lion (*Panthera leo*), tiger (*Panthera tigris*), jaguar (*Panthera onca*), and cougar (*Puma concolor*)] and bears (*Ursus sp*.) (e.g. brown bear, black bear, polar bear and sloth bear) are regularly documented worldwide however, data concerning wolf attacks on humans is "highly fragmented and of variable quality" (Linnell et al. 2002). In their global review of wolf attacks on humans Linnell et al. (2002) researched numerous historical and contemporary records and accounts in Europe, Asia and North America. An attempt was made for each case examined to separate "fact from fiction" and to answer two basic questions: (1) was the person actually attacked or killed; and (2) was it really a wolf responsible (Linnell et al. 2002).

Linnell et al. (2002) identify three types of wolf attacks: (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. They cite four factors that are associated with wolf attacks on humans: (1) rabies; (2) habituation; (3) provocation; and (4) highly modified environments (Linnell et al. 2002). McNay (2002a) organizes his review of the case history of wolf-human encounters in Alaska and Canada by cataloguing incidents in which a wolf's response to human presence was something other than what would be considered "normal" avoidance behavior. He uses five behavioral categories that describe aggressive behaviors and two categories for nonaggressive but fearless behavior.

Aggressive Encounters

Aggressive behaviors by wolves are often associated with habituation and food conditioning. Wild animals can gradually lose their natural avoidance response to people in areas where they are protected (such as parks) or where humans act passively toward them during encounters (Fritts et al. 2003). Habituation results when an animal loses its fear response to people as a result of "frequent non-consequential encounters" (McNay 2002b). Food conditioning occurs when wolves scavenge in landfills, garbage cans and campgrounds or are given food by people in a manner that can promote habituation. They can therefore come to associate food with the presence of humans (McNay 2002b). In addition, wolves are aggressive toward domestic dogs (*Canis familiaris*) and when dogs are present they can act as the primary stimulus for wolf aggression. Wolves may attack a dog even when people are present and a wolf excited by the presence of a dog may be more likely to act aggressively toward people (ADFG 2008, McNay 2002b). Categories used by McNay (2002a) to describe aggressive behavior by wolves include:

Agonism – Defined as a behavioral pattern "arising from a conflict between aggression and fear" (McNay 2002a). Agonistic behavior is associated with aggression and may exihibit elements of threat display, attack, appeasement, fear, retreat or avoidance (http://www.encyclopedia.com/doc/1O6-agonisticbehaviour.html). An animal exhibiting agonistic behavior may provide a warning or threat display and may reflect a response to a human action the wolf perceives as threatening, annoying, or unexpected. Snarling behavior can precede either offensive or defensive aggression (McNay and Mooney 2005). Most of the instances of agonistic aggression reviewed in McNay (2002a) involved habituated or food-conditioned wolves or were incidents where people were accompanied by dogs.

Predation – While large ungulates are the wolf's main prey, wolves are a flexible and opportunistic predator that can also effectively hunt small mammals and are adapted to a diverse diet that can include carrion, garbage and fruit (Peterson and Ciucci 2003, Mech and Peterson 2003). Unprovoked attacks by non-rabid wolves on people are rare but can occur under circumstances that cause the wolf to evaluate the human as prey or that triggers a predatory response. Wolves are adept at determining prey vulnerability and the human victims of predatory attacks tend to be mainly children (Mech 1970, Linnell et al. 2002, McNay 2002a). A predatory attack by wolves occurs in stages from: (1) locating the prey (detection); (2) the stalk; (3) the encounter; (4) the rush; and (5) the chase (Mech 1970).

Prey testing or agonistic charges – Incidents in which aggressive approach behavior caused people to defend themselves at close range could be either predatory or agonistic. Prey testing may occur when a wolf encounters unknown/unfamiliar alternative/potential prey for which previous experience or learning is not applicable. It may be part of a progression of behaviors from observation, through hesitant approach and withdrawal, through tentative attack and then aggressive charge or lunge (Geist 2007). An incident involving an aggressive charge may also be the case of misidentification where the wolf misidentifies the person as prey or it could be an agonistic response where the wolf or wolves attempt to actively drive people away (McNay 2002a).

Self-defense – Defensive behavior by a scared or cornered wolf may be provoked by human aggression or intrusion. Attacks in self-defense are agonistic and generally consist of a single bite after which the wolf seeks to escape rather than continue the attack (Linnell et al 2002).

Rabid attacks – Rabies is a viral infection of the central nervous system of mammals. In the "furious" phase of the disease the affected animal is hyper-reactive to external stimuli and will bite at anything near. A rabid wolf is extremely dangerous, can travel widely, and can attack and bite multiple people and livestock (Linnell et al. 2002).

Nonaggressive Encounters

Nonaggressive encounters with wolves include cases in which wolves approached or passed by people or entered human occupied areas such as camps, campsites and even developed areas and then either ignored or were not aware of the people, or withdrew when confronted or hazed. Wolves that have not been conditioned through hunting or other negative associations to avoid humans, may display investigative behavior that seeks to explore unfamiliar contexts. Nonaggressive investigative behavior may also be the result of habituation or food conditioning. In places where wolves commonly encounter people they may exploit garbage dumps and landfills or may have been given food by people and have therefore been "conditioned" to associate food with the presence of humans.

Investigative search behaviors –This behavior is often associated with habituation and food conditioning in which the wolf seeks out and searches human-use areas for food (scavenging) and may also show interest, chew, or steal non-food items such as shoes, sleeping bags, clothing, camping and cooking gear (McNay 2002a).

Investigative approaches – Non-habituated but wary wolves may approach to investigate something unfamiliar in their environment and then quickly withdraw once they become aware that they have encountered humans. An investigative approach by a habituated wolf may involve close observation or following of the human in a fearless manner. The wolf's actions may seem inquisitive, curious, and even docile (McNay 2002a).

3.6.1.2 Human Health

Human health concerns associated with wild animals include the carrying and transmission of parasites and disease. Many viruses, bacteria and external and internal parasites are common in the environment and some can affect humans, as well as livestock and wildlife. Zoonotic infectious diseases (e.g. diseases that are transmitTable Drom animals to humans) are increasingly associated with urban areas and the interface between urban areas and wildlands and are of growing concern even in isolated wilderness areas (Stronen et al. 2011). For example, raccoons and skunks inhabiting urbanized areas can serve as hosts and vectors of diseases and parasites that may affect humans and domestic animals, as well as other species (Gehrt 2004). Infectious diseases carried by canids may be of particular concern because: widespread species such as red foxes (*Vulpes vulpes*) and coyotes (*Canis latrans*) can carry infections such as rabies and hydatid disease; canids' trophic position exposes them to infections carried by prey as well as conspecifics; interspecies contact between canid competitors (e.g. wolves and coyotes) provides a possible route of infection; close contact among social group members through licking and grooming increases exposure to infection; and the large populations of domestic dogs associated with human populations coupled with the close relation and shared receptivity to numerous pathogens of dogs to wild canids (Woodroffe et al. 2004).

Disease in wild wolves is most likely an indicator of what diseases are circulating in the environment. Many diseases can be density dependent. For example, coyotes, feral dogs and foxes are more numerous in the environment and likely play a larger role in disease cycles than do wolves. Pathogens that wolves could potentially be exposed to in the wild include canine parvovirus, canine distemper, infectious canine hepatitis, leptospirosis, brucellosis (*Brucella canis*), plague, tularemia, and rabies. Wolves are considered definitive hosts and frequent carriers of internal (endoparasites) and external (ectoparasites) parasites. Common endoparasites include the protozoan (unicellular animals) parasites Sarcocystis sp and Giardia sp. and the three major groups of helminth (worm-like) parasites: trematodes (flukes), cestodes (tapeworms), and nematodes (roundworms). Common ectoparasites include various arthropod parasites such as fleas, ticks, lice and the mange mite (*Sarcoptes scabiei*) (Kreeger 2003, Stronen et al. 2011). Of these pathogens and parasites the pathogenic virus rabies and the intestinal tapeworm parasite *Echinococcus granulosus* can be transmittable to humans and Leptospirosis is a bacterial zoonosis (a disease that is transmitTable Drom animals to humans) that is common worldwide.

Intestinal parasites – In North America, the adult form of the tapeworm Echinococcus granulosus is found primarily in wolves, coyotes, and domestic dogs. It is well established in wolf populations in Alaska and Canada and is also found in the Northern Rocky Mountains and Western Great Lakes wolf populations. The adult tapeworm is approximately 3 mm in length. The intermediate larval form is a hydatid cyst found primarily in the lungs and liver of wild ungulates such as elk, deer, moose, bison, and caribou which serve as intermediate hosts (Elkin and Zarnke 2001, Foreyt et al. 2009). The tapeworm requires two mammalian hosts to complete its life cycle: a carnivore (e.g., wolf or dog) and a herbivore (e.g., elk or deer). Carnivores become infected when they eat the internal organs of prey that contain cysts (Elkin and Zarnke 2001). The adult tapeworm grows and lays eggs in the intestines of the carnivore. The eggs come out in the carnivore's droppings and contaminate plants which are eaten by the herbivore. The eggs hatch into larvae that travel to the herbivore's lungs or liver where they form cysts. Although most infections in humans are asymptomatic, echinococcosis, also known as hydatid disease, causes harmful, slowly enlarging cysts in the liver, lungs, and other organs that often grow unnoticed and neglected for years (CDC 2014). To prevent echinococcosis and many other pathogens in humans, it is important to wash hands and wear gloves. Humans should not handle canine feces, eat under-cooked meats, or handle any wild animals or parts without gloves.

Rabies – Rabies is an infectious viral disease of the central nervous system typically transmitted by the bite of an infected animal. It is one of the most significant zoonoses worldwide. Rabies is caused by the rabies virus, a neurotropic virus in the genus Lyssavirus, family Rhabdoviridae. There are many variants (or strains) of this virus, each maintained in a particular reservoir host. All mammals are susceptible to rabies, but only a limited number of species act as reservoir hosts (Iowa State 2012). Each rabies variant is maintained in a particular host, and usually dies out during serial passage in species to which it is not adapted. However, any variant can cause rabies in other species (Iowa State 2012). While it is unlikely that wolves serve as a population reservoir for rabies they can become infected from other species in which rabies is more common (Kreeger 2003). In North America populations of bats, skunks, raccoons, coyotes, foxes can serve as reservoir host of the disease and fox variants of rabies have been the primary vectors when the disease is reported in wolves. An animal infected by rabies may exhibit a variety of symptoms as it proceeds through several stages of the disease; the animal may experience paralysis of the throat and excessive salivation, advancing to a state of agitation in which the animal may bite at inanimate objects, people, or other animals, to an advanced paralysis that leads to death. Once an animal exhibits symptoms of the disease, it is untreatable and almost always fatal. Rabies can spread between infected wolves in a population (e.g., among and between packs), or between populations, resulting in severe population declines (Kreeger 2003).

Leptospirosis – Leptospirosis is a zoonotic bacterial disease that affects both humans and animals. It is caused by various species of the Leptospira spirochete bacterium. There are many types represented in domestic animals, wildlife, and humans and many different kinds of wild and domestic animals carry the bacterium including livestock, rodents, dogs, and wild canids. Clinically affected species include dogs, cattle, sheep, goats, horses and pigs. There are relatively few reports of clinical Leptospirosis among wildlife, with the exception of pinnipeds (Iowa State 2013). A variety of Leptospira species and serovars can cause disease in humans and Leptospirosis can be transmitted either directly between hosts or indirectly through the environment. The disease is most common in warm, humid environments, and areas with a high disease incidence in humans are primarily found in the tropics and sub-tropics (Iowa State 2013). Humans can become infected through direct contact with the urine or body fluids of infected animals or with a urine-contaminated environment. Contact with contaminated water sources are the most common way Leptospirosis is transmitted. The bacteria enter the body through cuts or abrasions on the skin, or through the mucous membranes of the mouth, nose and eyes. Human infections can vary from asymptomatic to severe. Symptoms may include high fever, severe headache, muscle pain, chills, redness of the eyes, abdominal pain, jaundice, hemorrhages in the skin and mucous membranes, vomiting, diarrhea, and rash. To prevent Leptospirosis in humans, it is important to vaccinate pets, wash hands and wear gloves when handling animals, avoid contact with animal urine or body fluids, avoid contact or drinking water that may contain animal urine (CDC 2014).

3.6.2 Human Health/Public Safety Issues Associated with the Mexican Wolf Reintroduction in Arizona and New Mexico

In March 1998, 11 captive-reared Mexican wolves were released into the BRWRA, in eastern Arizona and western New Mexico. Through natural increase and the release of additional wolves from the captivity, the nonessential experimental population of Mexican wolves within the BRWRA and FAIR has grown to a 2013 minimum population of 83 animals. Although sporadic but unconfirmed “wolf” sightings occasionally occur, no wolves are known to currently occupy territory in areas of Arizona or New Mexico wholly outside of the BRWRA and FAIR. Under current regulations wolves that do disperse to establish territories in the MWEPA wholly outside of the BRWRA or the FAIR are captured and returned to the BRWRA or placed in captivity.

3.6.2.1 Public Safety

Prior to the extirpation of Mexican wolves in Arizona and New Mexico in the 1970s, there are no confirmed or reliable reports of Mexican wolf attacks that may have occurred on humans, or wolf -caused human fatalities. Subsequent to the 1998 initiation of the reintroduction of Mexican wolves, wolf-human interactions have occurred but there have been no attacks on humans. The Mexican Wolf Blue Range Reintroduction Project 5-Year Review: Technical Component (AMOC and IFT 2005) summarized human-wolf encounters during the first five years of the reintroduction effort (1998-2003). Mexican Wolf Recovery Program Annual Progress Reports for the years 2004 through 2013 (USFWS 2001 through 2012) provide for each year a summary of management actions in response to wolf nuisance behavior or wolf sightings.

1998-2003

The 5-Year Review categorized human-Mexican wolf encounters based on the categories described by McNay (2002a). Three categories were applied to behavior exhibited by Mexican wolves: investigative search, investigative approach, and aggressive charge. Because each documented aggressive charge by a Mexican wolf occurred when a dog was present, the 5-Year Review made the evaluation that the other terms used by McNay (2002a) to describe aggressive encounters (e.g. agonism, predation, prey testing, self-defense, and rabies) were not applicable to these incidents (AMOC and IFT 2005). Encounters triggered by a dog were considered provoked, while other cases were considered non-provoked (McNay 2002a). The 5-Year Review also identified whether the interaction was related to food conditioning. It further identified wolves that appeared habituated to people. It also identified cases where aversive conditioning (e.g. hazing with cracker shells or rubber bullets, translocations) was applied and determined what proportion of the wolves were removed for nuisance behavior and the general trend of wolf/human interactions (See Appendix C).

Between 1998 and 2003, 33 cases of Mexican wolf-human interactions were documented by the Reintroduction Project. The majority of these incidents (64%) were considered investigative searches in which wolves did not approach people, but simply ignored human presence. Most other cases were considered investigative approaches (27%) where the wolf approached a human in a non-threatening manner. Three charge incidents (9%) occurred where wolves were more aggressive. In all of the charge incidents, and most of the investigative approaches (5 out of 9), dogs were involved, and these cases were considered provoked. Similarly, most of the investigative search cases involved dogs (12 of 21) and were considered provoked. Of the nine non-provoked incidents where wolves displayed a lack of fear of humans, six involved wolves or a wolf considered habituated (Appendix C). One involved a carcass hanging in a deer camp that the wolves fed on, and another was an unknown large canid (a wolf or large dog). Two other incidents involved people encountering wolves while riding horses, followed by a brief interaction. Overall, between 1998 and 2003, nine wolves were removed due to human nuisance behavior on 11 occasions. Further, 23 of the 33 known wolf incidents occurred within three months of initial release or translocation of the animal, including all of the aggressive charges, and all of the non-provoked cases. Of the remaining ten cases, seven involved domestic dogs, one was unknown if dogs were present, and two were the result of unverified wolf reports. In 20 of the 33 cases, aversive conditioning and/or removal was applied in an attempt to prevent recurrence of the behavior. On several occasions (n = 6) aversive conditioning may have contributed to the ultimate success of the wolves with minimal future problems (Appendix C).

2004-2013

For the purposes of this EIS, we reviewed our incident database and files, monthly updates, and annual reports to tally Mexican-wolf human interactions between 2004 and 2013 (Appendix C). Consistent with the methods used in the 5-Year-Review we documented at least 75 cases of Mexican wolf-human interactions between 2004 and 2013. The majority of these incidents (93%) were considered investigative searches in which wolves did not approach people, but simply ignored human presence. Four other cases were considered investigative approaches (5%) where the wolf approached a human in a non-threatening manner. One charge incident (1%) occurred where a wolf was more aggressive. In many of the wolf-human interactions documented (32 of 75) dogs were involved, and these cases were considered provoked. Of the 43 non-provoked incidents, 9 involved a wolf or wolves considered habituated. Overall between 2004 and 2013, six wolves were removed for human nuisance behavior. Further, 19 of the 57 known wolf incidents occurred within three months of initial release or translocation of the animal(s).

3.6.2.2 Human Health

Mexican wolves are susceptible to many of the same diseases that can affect domestic dogs, coyotes, foxes and other wildlife. General parasitic infections with external and internal parasites can also occur in Mexican wolves. Many of these parasites are common in domestic dogs and other wild canines such as coyotes.

External and internal parasites – External parasites such as fleas, ticks and mange can occur in wolves. Topical antiparasitics are applied to all Mexican wolves when handled. Intestinal parasites such as roundworms and tapeworms are also possible and are treated with common deworming protocols in captivity and given to wild wolves when captured. These common parasites have been found infrequently in wild and captive Mexican wolves. Routine laboratory fecal screenings assist with surveillance for these parasites. Mexican wolves are administered praziquantel (an antitapeworm medicine used to treat Echinococcus granulosus) upon release, and any tapeworm positive samples found in the pre-release facility or the wild are tested further for Echinococcus species (there are many types of common non-zoonotic tapeworms). No positive Echinococcus spp samples have been found in pre-release facilities or wild Mexican wolves.

Rabies – All Mexican wolves of appropriate age are administered killed rabies vaccine according to USDA guidelines for use in dogs. No rabies has been documented in Mexican wolves. A rabies outbreak in eastern Arizona in and near the BRWRA began in 2006 and continued through 2009, with positive rabies diagnoses (fox variant) in both foxes and bobcats. No wolves in the Mexican wolf experimental population were diagnosed with rabies during this outbreak (AZDHS 2008: Rabies Statistics and Maps) or throughout the history of the reintroduction (USFWS: http://www.fws.gov/southwest/es/mexicanwolf/MWPS.cfm).

Leptospirosis – Serological testing (blood sampling for exposure) in Mexican wolves to multiple serovars (e.g. a group of closely related microorganisms distinguished by a characteristic set of antigens). has not produced any positives (including testing for the serovar that commonly produces livestock abortion).

Other pathogens – Plague is a bacterial disease commonly found in rodents. It can be transmitted by rodent fleas (not the fleas commonly found on canines). Canines are fairly resistant to becoming actively ill with plague. Wolves will occasionally consume smaller prey such as rodents, and it is common to find titers in Mexican wolves indicating exposure to plague, though this does not necessarily indicate contagious illness in the wolf. Tularemia is a bacterial disease especially associated with rabbits. Mexican wolves can occasionally show exposure titers, but all canines are fairly resistant to becoming actively ill from tularemia. Neospora is a protozoal disease with canines as definitive hosts. It can cause abortion in cattle. The role of wildlife is unknown, but domestic dogs are most commonly implicated in transmission, as well as contaminated feed sources. To date, no Mexican wolves have been documented with Neospora. Chronic Wasting Disease (CWD) is a disease thought to be caused by proteins called prions. CWD is primarily associated in wildlife with deer and elk. CWD has been detected in New Mexico, but not Arizona. Wolves are not known to become sickened by CWD, or to transmit it and it is possible that wolf predation upon deer and elk populations may serve to decrease incidence of CWD, where it exists (Wild et al. 2011). Anthrax is a worldwide bacterial disease often associated with tropical or temperate regions with alkaline soils, rich in organic matter and nitrogen (these soil types are not commonly found in the BRWRA or on the FAIR). Livestock are most commonly infected by grazing or eating feed contaminated with anthrax spores. Carnivores are fairly resistant, and anthrax has not been documented in Mexican wolves. Listeria is a bacterial disease commonly isolated from soils, water, sewage and contaminated foodstuffs. Disease is usually associated with ingestion of contaminated feed by livestock or ingestion of contaminated meat and dairy products by humans. No known listeria cases have been documented in Mexican wolves. Brucellosis is a worldwide bacterial disease. Specific types infect carnivores and herbivores. New Mexico and Arizona livestock are certified Brucellosis-free, and no known Brucellosis has been detected in Mexican wolves. Tuberculosis is a worldwide bacterial disease. Bovine tuberculosis is present in limited areas in the U.S. Canines are fairly resistant to tuberculosis. Livestock in Arizona and New Mexico are certified free of bovine tuberculosis, and no known tuberculosis has been detected in Mexican wolves.

Active disease surveillance programs and health protocols for the Mexican wolf

To ensure public health, the health of individual Mexican wolves, and the health of the general Mexican wolf population, an active disease surveillance program and comprehensive health protocols are administered by the Mexican Wolf Recovery Program for captive Mexican wolves, wolves released into the experimental population from pre-release facilities, and captured wild Mexican wolves.

Captive Mexican wolves – The Mexican Gray Wolf Species Survival Plan Husbandry Manual is referenced for health protocols and guidelines for all Mexican wolves resident in the Service's captive breeding program. Prior to transfer to a pre-release facility, Mexican wolves are given a general health exam (including laboratory blood and fecal evaluations), provided vaccine booster shots as appropriate, and anti-parasitics and deworming effective for a wide range of external and internal parasites. All captive Mexican wolves wolves housed at the Service's Sevilleta Wolf Management Facility and the Ladder Ranch Wolf Management Facility (pre-release facilities) receive an annual physical exam by a veterinarian and laboratory evaluation of feces and blood. Comprehensive vaccinations with canine distemper, parvo, adeno 2, parainfluenza viruses (DA2PP) vaccine and killed rabies virus are administered, with yearly boosters. All wolves are preventively dewormed with products appropriate for a wide range of intestinal and external parasites and at least twice a year a fecal evaluation (fecal floatation) to screen for intestinal parasitism is conducted.

Pre-release screening and treatment – Prior to release all wolves are screened with laboratory evaluations of feces and blood, provided vaccine booster shots as appropriate, and given preventive anti-parasitics and deworming (against external parasites and intestinal parasites, including tapeworm).

Mexican wolves captured in the wild – Mexican wolves in the experimental population are handled under specific protocols. Every wolf captured receives a physical examination, is vaccinated (DA2PP and rabies), dewormed, treated for external parasites, has blood drawn for surveillance of canine distemper virus, canine parvovirus, plague, tularemia and leptospirosis (multiple types), and has feces obtained (if available) for fecal floatation.

Necropsy – In the event of any (captive or wild) Mexican wolf mortality, recovered carcasses undergo extensive necropsy (animal autopsy) procedures to inform managers about the cause of death and acquire medical data.

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* (E.O. 12898, February 11, 1994). The EO 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…" (E.O. 12898, February 11, 1994). The U.S. Environmental Protection 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. Fair treatment means that no group of people, including racial, ethnic, or socioeconomic group, should bear a disproportionate share of the negative environmental consequences resulting from industrial, municipal, and commercial operations or the execution of Federal, State, local, and tribal programs and policies*" (EPA 2011).

The Service considers environmental justice issues through the implementation of NEPA (USFWS 2011). 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 Indian tribes, or from related social or economic impacts (CEQ 1997). In Section 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 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 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 Indian tribes, and minority populations that comprise over 50 percent of the population of an affected area or that are substantially 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" (EPA 2013). Within the 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 Indian tribes within the project study area that may be disproportionately affected by the proposed action and alternatives.

Minority and low income populations are identified by county of residence with the reference community being the United States. Table 3-18 provides the percentage of American Indian and Hispanics in Arizona and New Mexico compared to the national figures for these minority populations.

Table 3-18. Percentage of American Indian and Hispanics in Arizona and New Mexico.

State	% American Indian 2012	% Hispanic 2012
Arizona	4.4%	29.4%
New Mexico	9.3%	45.9%
US	0.8%	16.10%

(Census Bureau 2012)

Poverty rate is one criteria traditionally used for the identification of a low-income group with possible environmental justice concerns. Additional socioeconomic characteristics such as educational attainment, baseline health status, and health insurance coverage, may also be useful in identifying low-income groups (EPA 2013). For the purposes of this analysis we define a population group as low-income if it deviates from the national average in three of the following four listed four elements:

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

Per capita personal income is used instead of per capita income as it more closely represents available resources. The definition of per capita personal income is the income that is received by persons from all sources. It is calculated as 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 (http://bea.gov/regional/ definitions/nextpage.cfm?key=Per capita personal income). For each of these elements Table 3-19 provides a comparison of the states of Arizona and New Mexico to the United States as a whole.

Table 3-19. Comparison of Low Income Elements for the states of New Mexico and Arizona to the National Average.

State	Unemployment Rate, 2011	Average Earnings Per Job, 2011 (2012 $)	Per Capita Personal Income, 2011 (2012 $)	Poverty Rate, 2011	Low-Income Elements[1]
New Mexico	7.5%	**$46,954**	**$34,850**	**19.0%**	3
Arizona	**9.4%**	**$50,280**	**$35,798**	**16.2**	4
US	8.9%	$54,897	$42,433	14.3	-

Credit: Census 2012, Headwaters Economics 2014.

Unemployment Rate, Average Earnings and Per Capita Personal Income: Headwaters Economics 2013 - Economic Profile System-Human Dimensions Toolkit, A summary profile, County, 4/29/2013 3:25:19 PM. (U.S. Department of Commerce. 2012. Bureau of Economic Analysis, Regional Economic Information System, Washington, D.C. Tables CA05N & CA30; Economic Profile System-Human Dimensions Toolkit, A profile of demographics, 4/29/2013 3:31:49 PM.)

Poverty rate: US Census American Community Survey 2007-2011

Note 1. Summarizes how many low-income criteria were met.

Data in **bold** indicates that the state is below the national average in this element

3.7.2 The MWEPA including the BRWRA and the proposed expansion south of Interstate-10

Section 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. Detailed socioeconomic descriptions for these counties and tribes are provided in Appendix B.

3.7.2.1 Counties with Minority (Race or Ethnic) Population Groups of Concern

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

- American Indian or Alaska Native;
- Asian;
- Black or African American;
- Native Hawaiian or Other Pacific Islander;
- White; and
- Hispanic or Latino (OMB 1997)

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. CEQ (1997) provides guidance to identify a population as minority if "either (a) the minority population of the affected area exceeds 50 percent or (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." The term "meaningfully greater" is not defined. CEQ's EJ Guidance for NEPA 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" The analysis "may consider as a community either a group of individuals living in geographic proximity to one another, or a geographically dispersed/transient set of individuals (such as migrant workers or Native Americans), where either type of group experiences common conditions of environmental exposure or effect (EPA 2013). In accordance with this guidance Table 3-20 provides the percentage of American Indians and Hispanics in the population for each of the counties within the project study and identifies those counties where the percentage of these minority groups is meaningfully greater than the national rate, here identified as 50 percent more than the national rate (1.2% American Indian, 24.15% Hispanic, or 25.35% combined).

Table 3-20: Percentage of American Indians or Hispanics in counties within the project study area (CENSUS 2012 a)

County	% American Indian 2012	% Hispanic 2012	% Combined American Indian and Hispanic 2012
US	0.8%	16.10%	16.90%
Arizona	**4.4%**	**29.4%**	**33.80%**
Apache	**72.40%**	6.10%	**78.50%***
Cochise	1.0%	32.10%	33.10%
Coconino	27.1%	13.40%	40.50%
Gil	14.7%	17.80%	32.50%
Graham	14.2%	30.10%	44.30%

Greenlee	1.8%	46.40%	48.20%
Maricopa	1.8%	29.40%	31.20%
Mohave	1.8%	14.70%	16.50%
Navajo	42.6%	10.70%	**53.30%***
Pima	3.2%	34.10%	37.30%
Pinal	5.4%	28.80%	34.20%
Santa Cruz	0.6%	**82.30%**	**82.90%***
Yavapai	1.9%	13.40%	15.30%
New Mexico	9.3%	45.9%	**55.20%***
Bernalillo	**4.6%**	**47.30%**	**51.90%***
Catron	4.6%	17.28%	21.88%
Cibola	**42.5%**	**36.3%**	**78.8%**
Chaves	1.7%	**51.2%**	**52.90%***
Dona Ana	1.1%	**65.5%**	**66.60%***
Eddy	0.8%	43.5%	44.30%
Grant	2.0%	**48.0%**	**50.00%**
Hidalgo	0.5%	**56.5%**	**57.00%***
Lincoln	1.2%	29.4%	30.60%
Luna	1.1%	**60.8%**	**61.90%***
McKinley	**74.3%**	13.6%	**87.90%***
Otero	6.7%	34.3%	41.00%
Sierra	1.9%	27.1%	29.00%
Socorro	10.7%	47.9%	**58.60%***
Torrance	1.9%	**38.6%**	**40.50%**
Valencia	3.8%	**57.7%**	**61.50%***

Notes: Data in bold indicates that the county has minority group or combination of groups that is over 50 percent of the total county population.

3.7.2.2 Counties with Low-income Population Groups of Concern

Per-capita income in both Arizona and New Mexico is below the national average and the percentage of people living in poverty is higher than the national average in both states (Table 3-21). The general population of Greenlee County in Arizona, and Eddy County and Lincoln County in New Mexico are not defined as low-income. However, these three counties are likely to have smaller groups of low-income populations. All counties in the project area are therefore identified as having low-income groups of concerns. The summary of low-income data is presented in Table 3-21 below.

Table 3-21: Comparison of Low Income Elements for New Mexico and Arizona counties within the project study area to the National Average.

County	Unemployment Rate, 2011	Average Earnings Per Job, 2011 (2012 $)	Per Capita Personal Income, 2011 (2012 $)	Poverty Rate, 2011	Low-Income Elements[1]
US	8.9%	$54,897	$42,433	14.3%	-
Arizona	**9.4%**	**$50,280**	**$35,798**	**16.2%**	4
Apache	**18.8%**	**$38,656**	**$26,355**	**34.7%**	4
Cochise	8.8%	**$54,502**	**$36,488**	**16.2%**	3
Coconino	**9.2%**	**$40,598**	**$35,074**	**19.8%**	4
Gila	**10.5%**	**$39,027**	**$32,515**	**20.9%**	4
Graham	**10.4%**	**$39,856**	**$25,745**	**21.6%**	4
Greenlee	8.20%	$64,518	**$31,991**	**17.2%**	2
Maricopa	8.4%	**$53,112**	**$38,870**	**14.9%**	3
Mohave	**11.0%**	**$38,589**	**$26,694**	**16.8%**	4
Navajo	**15.8%**	**$38,875**	**$26,091**	**26.2%**	4
Pima	8.3%	**$46,384**	**$35,695**	**17.4%**	3
Pinal	**10.3%**	**$44,252**	**$24,797**	14.3%	3
Santa Cruz	**17.0%**	**$45,673**	**$25,563**	**26.2%**	4
Yavapai	**9.7%**	**$35,341**	**$30,109**	**14.9%**	4
New Mexico	7.5%	**$46,954**	**$34,850**	**19.0%**	3
Bernalillo	7.6%	**$49,015**	**$36,994**	**16.6**	3
Catron	8.4%	**$25,020**	**$29,724**	**15**	3
Chaves	7.0%	**$43,169**	**$30,956**	**20.3**	3
Cibola	7.1%	**$40,837**	**$26,510**	**25.9**	3
Dona Ana	7.6%	**$43,984**	**$30,592**	**25.6**	3
Eddy	4.6%	$57,416	**$42,411**	12.8	1
Grant	7.8%	**$39,476**	**$33,544**	**16.6**	3
Hidalgo	6.6%	**$40,819**	**$33,106**	**23.7**	3
Lincoln	5.7%	**$29,915**	**$32,987**	12.4%	2
Luna	**17.9%**	**$43,431**	**$29,954**	**30.8**	4
McKinley	**9.2%**	**$35,125**	**$24,585**	**30.7**	4
Otero	6.6%	**$49,661**	**$30,787**	**20.8**	3
Sierra	6.4%	**$32,649**	**$33,666**	**20**	3
Socorro	5.6%	**$39,741**	**$31,102**	**27.4**	3
Torrance	**9.7%**	**$31,754**	**$31,078**	**25.2**	4
Valencia	8.8%	**$34,699**	**$29,528**	**21.1%**	3

Credit: BEA Census 2012, USDA 2013Headwaters Economics 2014.

Notes:
Unemployment Rate, Average Earnings and Per Capita Personal Income: Headwaters Economics 2013 - Economic Profile System-Human Dimensions Toolkit, A summary profile, County, 4/29/2013 3:25:19 PM. (U.S. Department of Commerce. 2012. Bureau of Economic Analysis, Regional Economic Information System, Washington, D.C. Tables CA05N & CA30; Economic Profile System-Human Dimensions Toolkit, A profile of demographics, 4/29/2013 3:31:49 PM.) Poverty rate: US Census American Community Survey 2007-2011
Note 1. Summarizes how many low-income criteria were met.

3.7.2.3 Indian Tribes as Population Groups of Concern

For issues of environmental justice all Indian tribes are considered as population groups of concern. Counties with high American Indian populations were identified above as areas with population groups of concern since many tribal members may not live on the reservation. Section 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 Section 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. Detailed socioeconomic descriptions of these tribes are provided in Appendix B. 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.

Table 3-22: 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 US	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%

(BIA 2005)

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.http://www.bia.gov/cs/groups/public/documents/text/idc-001719.pdf
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.

In section 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 is not available. Data on the number of minority groups engaged in the hunting/guiding and tourism industries were not available. Quantitative data is not available for Indian tribes and their involvement in the beef cattle ranching industry although the majority of 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 the five counties comprising the BRWRA (Apache, Greenlee, Catron, Sierra and Grant) over 85 percent of the beef cattle ranches have fewer than 50 head. Over 80 percent of the ranches in Arizona and New Mexico are small scale operations and raise a herd of fewer than 50 head. Data is 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 3-23). 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 the national statistics New Mexico has a much higher percentage of both Hispanics and American Indians engaged as the principal operators of beef cattle ranching operations. Nearly three-fifths of the principal operators of beef cattle ranching operations in Arizona are American Indian.

Table 3-23 Minorities in Beef Cattle Farms: Principal Operator (USDA 2012)

Minorities in Beef Cattle Farms: Principal Operator					
	All	Hispanic	Percent	American Indian	Percent
US	619,172	24,213	4%	13,712	2%
Arizona	4,201	189	4%	2,472	59%
New Mexico	8,989	3,518	39%	2,046	23%
USDA National Agricultural Statistics Services, 2012 Census of Agriculture: US, Arizona, and New Mexico Tables 60 and 58					

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4 ENVIRONMENTAL CONSEQUENCES

In accordance with Executive Order 11514-Protection and Enhancement of Environmental Quality and Executive Order 1352 - Facilitation of Cooperative Conservation, the Service seeks to carry out our programs, projects and activities in a manner that promotes cooperative conservation, and protects, restores, and enhances the quality of the human environment while protecting public health and safety. The environmental impact analysis of the reintroduction of wolves into the BRWRA, and the management activities now carried out in the MWEPA under the authority of the 1998 Final Rule, have been addressed and analyzed in previously completed NEPA documents (See Section 1.1). The environmental impact analysis provided in these documents is therefore incorporated by reference (40 CFR §1502.21) and, where appropriate, we tier from the previously completed NEPA analysis in an effort to eliminate repetitive discussions of the same issues, exclude from consideration issues already decided, and to focus, in this environmental review, on the actual issues ripe for decision (40 CFR §1502.20 and 1508.28).

4.1 DEFINITIONS OF IMPACTS AND DETERMINATION OF SIGNIFICANCE

This chapter details the environmental consequences (i.e., effects or impacts) that may occur from implementation of the proposed action and alternatives. "Effects" and "impacts" as used in this EIS are synonymous (40 CFR §1508.8). 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, as a result of the proposed action and alternatives. Effects may occur directly as a result 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 (CEQ) regulations (40 CFR §1500-1508), the determination of a significant impact is a 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. As described in Section 3.1 the project study area for this EIS incorporates all of the states of Arizona and New Mexico between Interstate-40 south to the international border with Mexico but does not include those areas of the proposed expanded 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 duration 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 expect implementation of our proposed action and alternatives to, over time, result in both the growth and the wider distribution of the experimental population of Mexican wolves. We expect the intensity of the potential effects to vary, both temporally and spatially, within the regional and local context of the project study area. Appendix D provides our population, distribution and density projections for the experimental population of Mexican wolves for each alternative until the Mexican wolf populations reaches a projected medium high density or an established population objective (see Appedix D).

Using the projections provided in Appendix D we evaluate the level of significance (i.e., no significant, less than significant, or significant impacts) of the environmental impacts from our proposed action and alternatives relative to the proposed management zones (Zones 1, 2, and 3) that would be established within the project study area. We use the following questions for each resource area as guidelines for this evaluation:

Land Use

- Will our proposed action and alternatives lead to (no significant, less than significant, significant) impacts in Federal land use within: Zone 1; Zone 2; Zone 3?
- Will our proposed action and alternatives lead to (no significant, less than significant, significant) impacts in non-Federal (private, state lands, tribal lands) land use within: Zone 1; Zone 2; Zone 3?
- 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, less than significant, significant) impacts on populations of special status (including federally listed threatened/endangered) species within: Zone 1; Zone 2; Zone 3?
- Will our proposed action and alternatives lead to (no significant, less than significant, significant) impacts on native ungulate herds or populations within: Zone 1; Zone 2; Zone 3?
- Will our proposed action and alternatives lead to (no significant, less than significant, significant) impacts on other wildlife species within: Zone 1; Zone 2; Zone 3?

- Will our proposed action and alternatives lead (no significant, less than significant, significant) impacts on vegetation within: Zone 1; Zone 2; Zone 3?
- 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, less than significant, significant) impacts on livestock production within: Zone 1; Zone 2; Zone 3?
- Will our proposed action and alternatives lead to (no significant, less than significant, significant) impacts on hunting activity within: Zone 1; Zone 2; Zone 3?
- Will our proposed action and alternatives lead to (no significant, less than significant, significant) impacts on tourism/outdoor recreation within: Zone 1; Zone 2; Zone 3?
- Will any impacts be cumulatively significant when related to other actions within the project study area?

Health and Human Safety

- Will our proposal lead to (no significant, less than significant, significant) impacts in the transmission of disease and parasites to humans within: Zone 1; Zone 2; Zone 3?
- Will our proposal lead to (no significant, less than significant, significant) impacts in the safety of humans within: Zone 1; Zone 2; Zone 3?
- 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/public safety lead to disproportionately high and adverse environmental effects on a low income population, minority population, or Indian tribe within: Zone 1; Zone 2; Zone 3?

4.2 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 described in section 3.3. In this assessment we considered distribution of suitable habitat for the Mexican wolf across the Federal and non-Federal land within the project study area and the projected Mexican wolf experimental population, distribution, and density estimates provided in Appendix D.

4.2.1 Potential Environmental Impacts and Proposed Mitigation Measures

Approximately 63 percent of the suitable habitat that occurs in the project study area occurs on Federal land. The wolf habitat in the large blocks of public land (in particular the National Forests) that dominate much of the project study in Arizona and New Mexico is mostly contiguous. This habitat also encompasses a number of wilderness areas and other areas of limited human use. Therefore, we expect that the majority of the projected population growth of the experimental population will be supported by the available suitable habitat on Federal land.

Regardless of the differences in growth of the experimental population projected in Appendix D, we do not expect that the effects of project implementation on land use are likely to differ substantially between Alternative One (proposed action and preferred alternative) and Alternatives Two and Three. The presence of Mexican wolves on Federal land would be in conformance with the existing land use and the resource management plans of the Federal agencies, primarily the Forest Service and BLM, which manage this land. Tribal lands provide approximately 17.5 percent of the available suitable wolf habitat within the proposed expanded MWEPA. If any wolves were to occupy tribal trust land within the MWEPA, the Service would develop management actions in cooperation with the tribal government including capture and removal of the wolf or wolves if requested by the tribal government. Voluntary management agreements between the Service and tribal governments for the management of wolves would provide tribes the option of allowing or prohibiting wolf re-establishment, whether through natural dispersion, initial release, or translocation, on recognized tribal trust lands. Approximately 20 percent of suitable wolf habitat within the proposed expanded MWEPA occurs on state and private land. Under the proposed action and alternatives, wolves would be allowed to disperse into, and occupy, suitable habitat on both Federal and non-Federal (state and private) land within the MWEPA and would not be removed from these lands except in the case of depredation or nuisance behavior. Under voluntary management agreements, entered into with the concurrence of the state government, we could release or translocate wolves at release sites located on private land in Zones 1 and 2. However, section 10(j) of the Act does not provide for the designation of critical habitat for nonessential experimental populations and no changes in land use on non-Federal lands would be required as part of implementation of the proposed action and alternatives. In regard to section 7(a)(2) of the Act, the population is treated as threatened on National Park Service and National Wildlife Refuge lands. Thus, Federal action agencies, other than the National Park Service and the Service on National Refuge lands, are not required to consult on activities that they authorize, fund or carry out. Section 7(a)(4) of the Act requires Federal agencies to confer (rather than consult) with the Service on actions that are likely to jeopardize the continued existence of a species proposed for listing under the ESA. However, because a nonessential experimental population is, by definition, not essential to the survival of the species, conferencing will unlikely be required within the MWEPA. Furthermore, the results of a conference are strictly advisory in nature and do not restrict agencies from carrying out, funding, or authorizing activities. In addition, section 7(a)(1) requires Federal agencies to use their authorities to carry out programs to further the conservation of listed species, which would apply on any lands within the experimental population area. As a result, some modifications to the Federal actions within the experimental population area may occur to benefit the Mexican wolf, but we do not expect projects on Federal lands to be halted or substantially modified due to implementation of the proposed action and alternatives.

Alternative One (Proposed Action and Preferred Alternative)

Federal Land

Within the land use plans prepared by federal land management agencies, standard operating procedures or Best Management Practices (BMPs) are developed to minimize the impacts associated with actions taken on federal lands. These BMPs can be part of individual agency policy, rules, regulations or land use planning documents. Standard operating procedures or BMPs relative to the Mexican wolf would be developed as necessary to support the Mexican wolf reintroduction. For example, the existing USFS procedures associated with the temporary closure of Forest Service land for wolf management actions sets standards for timely public notification to minimize impacts to forest users. Mitigation, the implementation of a specific action to reduce impacts associated with the proposed action or alternatives, is developed when standard operating procedures or BMPs fail to reduce a specific impact. Generally, the adherence to SOP's and BMPs limits the need for addition mitigation because SOPs and BMPs generally support the objectives of the Mexican wolf Program.

USFS and BLM

Over time unoccupied suitable habitat in the national forests and on BLM land in proposed management Zones 1 and 2 may become occupied. As wolves disperse to unoccupied territory, or are released to an area through management actions (i.e., initial release or translocation), population density would be expected to be low but would increase over time. Short term impacts to public land users could occur when wolf management requires temporary land closures for disturbance-causing land-use activities. In instances where any activity on Federal lands the Service determines could adversely affect reproductive success, natural behavior, or 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 within a 1-mi (1.6-km) radius around release pens when Mexican wolves are in them, around active dens between March 1 and June 30, and around active Mexican wolf rendezvous sites between June 1 and September 30, as necessary.

All such closures around the temporary pens that would be used for initial releases would occur on USFS land. Similar restrictions (closures) could occur in association with translocation actions. Such closures may not be necessary if releases are conducted in wilderness areas in which disturbance-causing land-use activities are not occurring. As specified in the proposed rule definition, restricted areas are small, and temporary, with little or no expected impact to the public.

Casual uses of the national forest and BLM public lands such as camping, fishing, hiking and off-highway vehicle use, are expected to continue in accordance with the respective agency land use plans. Likewise, commercial uses such as forest management, mineral extraction, grazing and oil and gas and development are expected to continue as permitted by the agency. Livestock grazing and hunting are important land uses on the public lands in Arizona and New Mexico. No restrictions on the use of these lands for hunting or grazing would be imposed by implementation of Alternative One. The effects on the economic aspects of these activities are analyzed in section 4.4.

Other Federal

As discussed in section 3.3, some suitable Mexican wolf habitat in proposed management Zones 2 and 3 is present on land managed by other federal land owners including the National Park Service (NPS), Department of Defense (DOD), and the Service. Under–section 7(a)(2) of the Act, the experimental population is treated as threatened on National Park Service and National Wildlife Refuge lands. In accordance with these provisions Mexican wolves that might disperse into and occupy NPS managed parks and monuments or Service managed wildlife refuges would not be subject to the take provisions of the proposed rule that authorize management actions such as harassment and removal. However, Mexican wolf occupancy on NPS and Service land would be consistent with agency mission and land use policy.

The military training and testing mission requires large blocks of undeveloped open space. Because military installations are often protected from human access and impact this land often preserves intact ecosystems and may support threatened and endangered species. Military installations under the Sikes Act (16 U.S.C. 670a-670f, as amended) are responsible for carrying out programs and implementing management strategies to conserve and protect biological resources. The Sikes Act requires installations to develop and implement Integrated Natural Resource Management Plans (INRMPs). INRMPs are planning documents that allow DOD installations to implement landscape-level management of their natural resources and are management tools that ensure military operations and natural resources conservation are integrated and consistent with stewardship and legal requirements. The nonessential experimental designation provides regulatory flexibility for federal agencies, including the military services. The proposed rule revision provides allowance for unintentional take while engaged in otherwise lawful military training and testing. The INRMPs for the DOD installations within the project study area integrate the conservation of the natural resources present on military installations with the training and testing mission. Because of this integration and because of the regulatory flexibility of the experimental population rule we do not expect restrictions on the use of the military lands for testing or training would be imposed by implementation of Alternative One.

Non-Federal Land

Non-Federal lands are minimally represented within proposed management Zone 1. The non-Federal land within Zone 1 that contains suitable wolf habitat is primarily private inholdings within the national forests. Non-Federal lands in proposed management Zones 2 and 3 that contain suitable wolf habitat is a mix of tribal, state and private lands. Approximately 37 percent of the suitable habitat in this part of the MWEPA is on non-Federal land. Tribal areas such as the Fort Apache Indian Reservation and private or state land that is contiguous to large blocks of habitat in the national forests or BLM land are the most likely areas to support Mexican wolf occupancy. Disjunct and isolated blocks of suitable habitat on state or private land in Zone 3 or portions of Zone 2 are less likely to support the establishment of wolf territories because they are not adjacent to larger blocks of contiguous habitat on Federal land.

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. Mexican wolves on private or state land would not be subject to removal except in the case of nuisance or depredation. Under Alternative One proposed modifications to take provisions offer several mechanisms (i.e., take of wolves in the act of attacking domestic animals, take for intentional harassment, and conditional take permits) that will limit depredation activity and related impacts on non-federal land. Because of these management provisions and because of the regulatory flexibility of the experimental population rule we do not expect restrictions on the use of the non-Federal land would be imposed by implementation of Alternative One.

Summary

Because of the regulatory flexibility provided by the nonessential experimental designation, we do not expect implementation of Alternative One to require the imposition of restrictions on any activities within Federal, state, private, or tribal trust lands within the MWEPA. Under this alternative, land uses on all of the federally owned lands would remain the same as that currently occurring. No changes to agency land use plans would be required and public use of the land would continue unchanged with only short-term, temporary and small scale restrictions imposed to protect release sites, active den sites and rendezvous sites from human disturbance. For these reasons, we expect implementation of Alternative One will result in no significant direct or indirect effects to land use on federal or non-federal land and would not require the development or implementation of additional mitigation measures to ensure the continuation of current land uses.

Alternative Two

Under Alternative Two the area proposed for the initial release of wolves in the proposed management Zone 1 would be smaller (limited to the existing BRWRA) than under Alternative One. Under this alternative, additional areas of national forest would not be added to Zone 1. Therefore, fewer potential release sites in remote locations, including additional wilderness areas would be available for the initial release of wolves. Alternative Two would implement changes to the take provisions authorized under the experimental population rule that would allow domestic animal owners or their agents to take (including kill or injure) any Mexican wolf that is in the act of biting, wounding or killing domestic animals on non-federal land anywhere within the MWEPA. This alternative would also allow the Service or designated agency to issue permits to allow domestic animal owners or their agents to take (including intentional harassment or kill) any Mexican wolf that is present on non-federal land where specified in the permit. Alternative Two does not propose to adopt a phased management approach to minimize or avoid possible impacts to wild ungulate populations (specifically elk) in portions of western Arizona nor does it proposed to establish a Mexican wolf experimental population objective of from 300 to 325 wolves within the entire MWEPA.

Under Alternative Two we expect the experimental population of Mexican wolves to grow in accordance with the population projections provided in Appendix D. Although the population could eventually grow larger than the population objective proposed under Alternative One we do not expect this to change the impacts on land use on Federal or non-Federal land within the project study area that we expect under Alternative One. For these reasons, we expect implementation of Alternative Two will result in no significant direct or indirect effects to land use on federal or non-federal land and would not require the development or implementation of additional mitigation measures to ensure the continuation of current land uses

Alternative Three

Alternative Three proposes changes in the management of the experimental population of Mexican wolves that would allow the initial release of wolves in a larger area to be known as management Zone 1 and would allow wolves to disperse into and occupy the entire MWEPA (proposed management Zones 1, 2 and 3). Alternative Three does not propose the changes to the take provisions for Mexican wolves within the MWEPA that are included in Alternatives One and Two. Alternative Three does not propose to adopt a phased management approach to minimize or avoid possible impacts to wild ungulate populations (specifically elk) in portions of western Arizona nor does it proposed to establish a Mexican wolf experimental population objective of from 300 to 325 wolves within the entire MWEPA.

Under Alternative Three we expect the experimental population of Mexican wolves to grow in accordance with the population projections provided in Appendix D. Although the population could eventually grow larger than the population objective proposed under Alternative One we do not expect this to change the impacts on land use on Federal or non-Federal land within the project study area that we expect under Alternative One. For these reasons, we expect implementation of Alternative Three will result in no significant direct or indirect effects to land use on federal or non-federal land and would not require the development or implementation of additional mitigation measures to ensure the continuation of current land uses

Alternative Four (No Action)

Alternative Four proposes no changes to the 1998 Final 10(j) rule for the Mexican Wolf. The Mexican Wolf Recovery Program's section 10(a)(1)(A) research and recovery permit (TE-091551-8 dated 04/04/2013 would continue to apply to the MWEPA, but revision to the permit would not be implemented.

Without changes in the Reintroduction Project management governing initial releases or modifications to the regulations which designate the area that wolves are allowed to occupy within the MWEPA, we would expect the wolf population to grow in accordance with the population projection provided in Appendix D. Under this alternative the Apache and the Gila National Forests, managed by the U.S. Forest Service, would continue to be designated as the BRWRA. Because the initial release of wolves will continue to be limited to the PRZ of the BRWRA, there would be no deviation from those actions and activities previously addressed in Forest Service Decision Memos (DMs) for both the Gila (USFS 2006) and the Apache National Forests (USFS 2009), which analyzed the on-site effects at wolf release sites (installation of temporary wolf-acclimation pens and short-term occupancy of associated caretaker/monitoring camps). Area closures of a one-mile radius from the pen site may continue to be necessary to limit human access and remove potentially harmful disturbances as wolves acclimatize to their surrounding environment. The closures would remain in effect for the duration that wolves occupy the pen or are using the area as a den or rendezvous site as described in the Nonessential Experimental Rule. The IFT would continue to coordinate with personnel from the respective Ranger District and Forest Service Law Enforcement personnel to develop specific closure orders related to individual plans for releases or translocations. These actions under the Reintroduction Project were found to be consistent with the Apache–Sitgreaves National Forest's Land and Resource Management Plan to reintroduce indigenous species, work with other agencies on reintroduction, and allow area closures for wildlife (USFS 2009). Similarly, the Gila National Forest Decision Memo (USFS 2006) found that all management practices and activities associated with the installation and use of temporary wolf holding pens were consistent with the management direction, including standards and guidelines, in the final Land and Resource Management Plan for the Gila National Forest (1986), as amended. Wolf occupancy and the release and translocation of wolves on the FAIR would continue to be under the WMAT-Mexican Wolf Management Plan in accordance with the 2002 Cooperative Agreement between the Service and the Tribal Council of the White Mountain Apache Tribe. No adverse effects to land use on the FAIR from the presence and management of Mexican wolves have been identified by the WMAT.

Based on this information, we expect that continuing the reintroduction of the Mexican wolf under the No Action alternative will result in no significant direct or indirect effects to land use on federal or non-federal land and would not require the development or implementation of additional mitigation measures to ensure the continuation of current land uses.

4.3 BIOLOGICAL RESOURCES

4.3.1 Potential Environmental Impacts and Proposed Mitigation Measures

This chapter compares the predicted environmental impacts in each of the four alternatives. Wolves will be present in the Mexican Wolf Experimental Area regardless of which of the four alternatives is selected, but the number of wolves present and area of occupancy may vary by alternative. We recognize that growth of the wolf population is highly variable and difficult to predict. Because other effects are based on the wolf population projections, we also recognize that the effects on the biological resources will be even more difficult to predict and that the environmental impacts are speculative. Actual outcomes will be dependent on future management decisions and circumstances that may or may not have been fully anticipated. Thus, we estimated the impacts using the best available information and previously collected biological and historical data. We can also mitigate or lessen impacts to some degree, based on how and when specific mitigation strategies described for each alternative are implemented.

Direct and indirect effects

Direct effects occur when there are no intermediary species between two interacting species. Indirect effects are mediated by an intermediate species, such as the indirect effect of wolves on plants when the presence of wolves reduces herbivore density (Hebblewhite and Smith 2010). Beyond the effects associated with trophic cascades perhaps the most important non-predation form of direct interaction is the role of competition (Estes et al. 2004). Competition occurs when one of two (or more) interacting species has negative effects on the other species. Scavenging is an important indirect interaction between species (Vucetich et al. 2004, Wilmers et al. 2003, Stahler et al. 2002).

Wolf numbers and distribution

Wolf distribution will likely be determined by available habitat and prey abundance. Wolf numbers and distribution are expected to increase through time in accordance with projections based upon the best available information and historic trends (see Appendix D). Future wolf distribution will probably be determined by variable prey abundance, the patchwork of human settlement, and livestock distribution. How quickly the wolf population grows and where wolves will be found will differ to some degree across the four alternatives and will likely depend on the location, frequency, and distribution of initial releases and translocation events.

Wolf-prey relationships

The impact on ungulate population dynamics can usually be gauged in relation to other environmental factors, such as weather, browse and forage, and the number and type of species present in the system.

For example, wolf predation may accelerate declines in ungulate populations already negatively affected by other stressors such as drought, or disease, and may even slow the rate of population recovery afterwards especially if there is more than one large predator limiting prey populations (Gasaway et al. 1983, Fuller 1990, Boertje et al. 1996, 2010). Where wolves are the dominant predator, wolf predation can be an additive mortality factor, and may limit the ability of a prey population to increase (Klein 1995, Boertje et al. 2009), or even cause localized extinction of prey (Mech and Karns 1977).

Prey populations vary through time, habitat, and in response to ever changing environmental factors. Prey selection by wolves is likely a combination of capture efficiency (abundance and availability) and success versus risk (Mech and Peterson 2003). The cause and effect relationships that make populations fluctuate are often not known and widely debated. Published literature on predator-prey interactions and wolf:ungulate ratios is highly varied in its conclusions about the ability of predators to influence prey populations or vice versa. For example, elk herds in the Northern Rockies which exist in the presence of a multi-predator system (wolves, grizzlies, cougars, coyotes) and are exposed to human harvest may be impacted by wolves at wolf:elk ratios of 4 wolves:1,000 elk to 6 wolves:1,000 elk (White and Garrot 2005, Hamlin and Cunningham 2009). Wolf to elk ratios of 9 wolves:1,000 elk to 35 wolves:1,000 elk in a multi-predator system were indicative of a population decline of elk with significant impacts to hunting levels (Decker et al. 1995, Ballard et al. 2001, White and Garrott 2005, Hamlin and Cunningham 2009, Becker et al. 2009, Betscha and Ripple 2010). However, other authors also caution that these same wolf:elk ratios may likely exhibit very different effects in different areas which have different climatic, hunting, and prey refugia characteristics (Vucetich et al. 2011, Hebblewhite 2013, Hamlin and Cunnigham 2005).

Predators and prey interact with one another within their unique habitats, through seasonal weather patterns, among an array of species and animal densities, and within different wildlife management frameworks. Each published report, therefore, must be interpreted within the context of the conditions prevailing at that time and should not be directly extrapolated to different locations or ecological systems (National Research Council 1997).

Predation may influence prey populations through changes in recruitment of young into the adult population, adult mortality, or a combination of both (Gasaway et al. 1992, Ballard et al. 1997, National Research Council 1997, Mackie et al. 1998, Kunkel and Pletscher 1999, Ballard et al. 2001). Research also suggests that increased adult female mortality from other sources, such as hunter harvest or elevated overwinter mortality may create conditions in which predation limits ungulate populations or slows population growth (Kunkel and Pletscher 1999, White and Garrott 2005). Identifying the factors that drive changes in prey populations and predator-prey interactions is extremely difficult. More than one factor is usually involved, and multiple factors may interact with one another to further complicate efforts to understand their significance.

Recent literature (Vucetich and Peterson 2004, Hebblewhite and Smith 2010) suggests that wolf-ungulate ecosystems may be regulated by a “top–down” (predator driven) process rather than a “bottom-up” (food limited) process. A “top-down” process of regulation suggests that the carnivores who occupy the highest trophic levels have significant influences on species at the next lower level (their prey) either through direct or indirect interactions (Ripple et al. 2014). Trophic cascades can occur when trophic levels are limited by the next level up. For instance, when a wolf population is low, aspen regeneration will be low because heavy browsing of aspen vegetation will occur due to elk abundance. A “bottom – up” approach (Strong 1992) suggests ecosystems are driven by resource abundance and weather with no significant influence from carnivore predation, as predation would be considered compensatory for mortality that would have occurred in the population otherwise.

Wolf Occupancy and the Human Environment

Wolves locate their home ranges in areas with adequate prey and low levels of human interference (Mladenoff et al. 1995). Human-caused mortality often comprises 80–95% of total wolf mortality (Fuller 1989). Roads, by increasing human access, negatively affect wolf populations at local, landscape, and regional scales (Fuller 1989; Mladenoff et al. 1995, Wydeven et al 2001). Although wolves are highly-adaptable prey generalists, wild ungulates such as elk and deer make up the bulk of the wolf's diet (Fuller 1989). Generally, a linear correlation between wolf density and prey abundance can be found (Keith 1983) but this correlation cannot be assumed to occur for every wolf-prey relationship, particularly in complex, multi-prey systems (Mech and Peterson 2003). However, Fuller (1989) attributes up to 72% of the variation in wolf density to differences in prey density in areas where human-caused mortality is low. Elk have comprised the bulk (80.3%) of the biomass in the diet of wolves reintroduced to the BRWRA (Merkle et al. 2009). Our experience in the BRWRA has confirmed these studies and shown that wolves are most successful in establishing viable pack territories in areas that have a relatively abundant prey base of elk.

4.3.2 Alternative One

Vegetation

The structure of vegetation communities and the plant species composition in each of the 3 zones within this alternative have been modified over the years in varying degrees by multiple factors including; changed fire regimes, introduction of non-native invasive plant species, introduction of livestock, intentional conversion, removal of apex predators, disturbance, and excessive foraging from livestock and wildlife (Watkins et al. 2007). The natural dispersal of the wolf, recolonization of portions of its historical range, and resumption of its role as an apex predator, would be but one factor in a complex system of effects on vegetation structure and composition. Within each zone, disturbance and modification of vegetation communities have occurred from many factors unrelated to predator-prey dynamics. Mech (2012) suggests that even if ungulate and other prey population, density and behavior were affected by recolonizing wolves they would be indistinguishable from other influences, including anthropogenic and climate related changes to the area.

Although large–scale, high intensity fires, such as the Wallow Fire in 2011, which burned over 540,000 acres, may not result in the landscape heterogeneity required to support robust elk and deer populations in the short-term, natural succession combined with active forest restoration designed to create a mosaic of uneven-aged stands will ultimately benefit the resident ungulate populations in the future.

In Arizona and New Mexico, aspen declines of 96% and 88%, respectively, were observed (Beschta and Ripple 2010a). Reduced fire frequency, conifer invasion, disease, changing climate, and intensive browsing by large herbivores are all factors that can contribute to the loss of aspen (DeByle and Winokur 1985; Worrall et al. 2007). Deer, as well as elk, can damage aspen by persistently browsing new sprouts and by rubbing saplings or trees with antlers, but DeByle and Winokur (1985) indicate that elk generally have a greater impact. Barking and rubbing can increase the susceptibility of aspen to the entry of pathogenic fungi, which can cause stem cankers and decay that contribute to the death of trees (Beschta and Ripple 2010a).

Undisturbed browsing by large herbivores in the absence of native predators is recognized as an important factor affecting the biodiversity and native plant communities of temperate ecosystems (Ripple et al. 2010). Following the removal of gray wolves from Yellowstone, increased browsing by Rocky Mountain elk suppressed the recruitment of aspen, willows (*Salix spp*.), cottonwoods (*Populus spp*.), and various species of shrubs in the park's northern winter ranges (Ripple and Larsen 2000, Barmore 2003, Ripple and Beschta 2004, Beschta 2005). During the 1988 fire season, approximately 793,000 acres (about 36%) of Yellowstone National Park's 2,221,800 acres were burned. Aspen, cottonwoods and willows were damaged by the fires and subsequent regeneration occurred naturally. About one-third of the aspen in the northern range burned in the 1988 fires—but the aspen stands were not destroyed. Fire stimulated the growth of suckers from the aspen's underground root system and left behind bare mineral soil that provided good conditions for aspen seedlings. A reduction in elk due to predation, and the movement of elk out of certain portions of the Park also likely contributed to the vegetative restoration. Within a few years following the reintroduction of gray wolves to the Greater Yellowstone Area (GYA) in the mid-1990's, decreased browsing pressure and a resultant increase in the height of young aspen, cottonwood, and willow growth were measured (Beschta et al. 2010).

When elk browsing is reduced or precluded, aspen stands can successfully regenerate (Kaufman et al. 2010). Several studies have shown that wolves can cause trophic cascades (McLaren and Peterson 1994), and that wolf restoration is likely to benefit biodiversity (Hebblewhite et al. 2005), especially in areas where ungulate prey are overabundant. Additional studies in the GYA have reported that wolves may be benefitting aspen by creating a behaviorally-mediated trophic cascade (Abrams 1984, Fortin et al. 2005) where wolves change the behavior of elk. They hypothesized that elk were avoiding areas where wolves were likely to be present, thereby indirectly causing reductions in herbivore impacts to plants. Browsing pressure along riparian corridors was being reduced since elk were avoiding where wolves were known to be present.

Since wolf restoration in Yellowstone, studies have reported that elk have changed their foraging behavior (Creel et al. 2005, Laundre et al. 2001, Liley and Creel 2008), however there is still considerable debate regarding whether these changes in habitat use are attributable to behaviorally induced trophic cascades or due to changes in plant communities as a result of decreased elk numbers. Kaufman et al. (2010) suggest that the risk of wolf predation alone is unlikely to alter the degree to which aspen are limited by elk herbivory and that recorded cascades are the result of wolf-induced reductions in prey density, not changes in prey behavior. Johnston et al (2011) suggests that previously browsed willow stands had greater access to ground water and therefore grew taller and escaped elk browsing.

Mech (2012) challenges the cascading effects attributed to wolves in earlier studies of wolf restoration and questions whether the findings of those studies conducted in national parks are relevant to areas where overriding anthropogenic influences on prey, vegetation, and other parts of the food web are present. Winnie (2012, 2014) was unable to find evidence of a behaviorally mediated trophic cascade in an area of Yellowstone with a high wolf predation risk concluding that aspen recruitment did not vary significantly compared to other areas with a lower risk, and that the hypothesis may lack predictive power. Beschta et al (2014) cited complications with the analysis of Winnie (2014). Beschta and Ripple (2010) examined the possible occurrence of a trophic cascade involving Mexican wolves, Rocky Mountain elk, and aspen within the BRWRA. The study area was located in mixed-conifer forests along the southern portion of the Springerville District, Apache National Forest. Although Mexican wolves have been present in the BRWRA since their reintroduction in 1998, Beschta and Ripple (2010) were unable to document a trophic cascade (i.e., improved aspen recruitment). This result may indicate that Mexican wolves have not attained an ecologically effective density and Beschta and Ripple (2010) conclude that: "unless wolf densities increase, it is possible that the potential ecological benefits of these apex predators in the mixed-conifer forests of east-central Arizona will not be achieved."

Wolves and other top terrestrial predators will likely improve soil nutrients, soil microbes, and plant quality by the increased deposition and distribution of prey carcasses over the landscape (Bump et al. 2009). There are many invertebrate scavengers. For example, 23,365 beetles of 445 different species were found in just two field seasons in Yellowstone NP using wolf-killed carrion (Sikes 1994). Indirect beneficial effects of wolf predation on flora will likely occur. Wolves generate a consistent volume of carrion year around resulting in carrion that is spatially and temporally more available to scavengers in wolf occupied areas (Wilmers et al. 2003, Hebblewhite and Smith 2010). In areas where wolves are absent, carrion abundance was significantly higher in late winter/early spring (due to wintertime die off of weak and stressed animals) and in the fall due to human hunting (Wilmers et al. 2003). Because of milder winters, fewer winter-killed ungulates are observed in the Arizona/New Mexico higher elevation habitats and "sky island" mountain ranges of southern Arizona/New Mexico than in the northern Rocky Mountains. This could elevate the importance of the use of wolf-killed carcasses by scavengers because it is unlikely that late winter/early spring pulses will occur in the proposed management zones 1, 2 and 3.

The rate and extent that wolves might disperse into the three proposed management zones is unknown, however under the phased management approach in Alternative One, wolf densities in Scenario A in years 1 through 11 would be highest, and therefore the associated impacts would be more concentrated within a smaller area defined by Phase 1 compared to the larger area as defined by Phase 3. Over the broader landscape of each proposed management zone we do not expect significant reductions in ungulate population and density from the re-establishment of wolf packs in areas of suitable habitat with adequate wild ungulate prey base. While it is possible that at some future point in time wolves in some areas may achieve the ecologically effective density needed to initiate a trophic cascade in localized areas, we assess the possibility of trophic cascades that might affect vegetation over the broader landscape of each proposed management zone as unlikely.

We predict no significant direct or indirect adverse impact to vegetation from implementation of the phased approach of Alternative 1 in zones 1, 2, and 3 for the Proposed Action because of the likely overriding impacts of anthropogenic effects across the majority of our area and lack of predicted impacts to ungulate populations of a sufficient intensity and scale to initiate a trophic cascade (Mech 2012, Kaufman et al. 2010).

Ungulates

Ungulates are the primary food of wolves throughout their geographic range. Wolves tend to concentrate on species that are easier to capture or offer greater reward for the amount of capture effort expended, rather than on species that are most common. Diet can vary greatly among locations in the same region or even among packs living in the same vicinity, or in response to spatial differences in prey populations, seasonality, weather conditions, the presence of other predators, levels of human harvest, and other factors (e.g., Kunkel et al. 2004, Smith et al. 2004). In the central and northern Rocky Mountains of the United States and Canada, wolves commonly rely on elk as their primary prey, but deer and moose are more important in some areas.

Wolves are selective hunters and usually choose more vulnerable and less fit prey. Young-of-the-year, especially in larger prey like elk and moose (Kunkel and Pletscher 1999, Boertje et al. 2009), older animals, and diseased and injured animals are taken in greater proportion than healthy, prime-aged individuals (Mech 1970, 2007, Kunkel et al. 1999, Mech and Peterson 2003, Smith et al. 2004, Sand et al. 2008, Hamlin and Cunningham 2009). Hunting success of wolves can be influenced by many factors, including pack size, terrain, habitat features, snow and other weather conditions, time of day, prey species, age and condition of prey, season, and experience (Mech and Peterson 2003, Hebblewhite 2005, Kauffman et al. 2007).

The direct impacts of wolves on prey abundance have been, and continue to be, widely debated (see Boutin 1992, Vucetich et al. 2005). Wolf-prey systems are inherently complex and simple assertions or conclusions about wolf-prey relationships and interactions ignore the complexity and unique features of real-world ecosystems in which a wide range of wolf-prey systems function. For example, Garrott et al. (2005) states that the effects of wolf predation on ungulate populations in the Greater Yellowstone ecosystem continues to remain unclear, and cautions resource managers against making generalizations based upon a single study. The effects of wolves on the Northern Yellowstone elk population have been scientifically debated with some (Eberhardt et al. 2003, White and Garrott 2005, Hamlin and Cunningham 2009) stating higher wolf impacts than others (Smith et al. 2003 and 2004, Vucetich et al. 2005).

A number of studies indicate that wolf predation can limit ungulate prey populations. Population-level effects result primarily through predation on young-of-the-year and are frequently enhanced when occurring in combination with other predators (e.g., bears, mountain lions, coyotes; Mech and Peterson 2003, Larsen et al. 1989, Barber-Meyer et al. 2008, Boertje et al. 2009). Along with the direct effect of predation, elk declines in the greater Yellowstone ecosystem may result partially from the threat of wolf predation rather than actual wolf predation (Creel et al. 2009). In this case, female elk may respond to the presence of wolves by spending less time feeding and more time travelling to safer habitats of poorer nutritional quality, resulting in reduced nutrition and lowered calf production (but see Hamlin et al. 2009).

Wolf predation may have indirect benefits on ungulates as well. Wolves can suppress disease emergence in ungulates, or possibly limit prevalence, in part by reducing density and group sizes of elk and deer thereby reducing or eliminating the spread of brucellosis and chronic wasting disease (Hobbs 2006, Wild et al. 2011). Wolves scavenge carcasses, such as aborted elk calves. By consuming them, wolves may reduce the spread of Brucellosis to other elk. Creel and Winnie (2005) state that wolves may cause elk to congregate in smaller groups. This behavior could potentially slow the spread of ungulate diseases that persist among high density populations of ungulates.

In the absence of predation, prey populations increase to the carrying capacity of their environment. At carrying capacity prey population density is high, and the population growth rate is limited by resource scarcity (i.e. lack of forage) resulting in poor nutrition. Harvesting of prey, whether by humans, wolves, or other predators reduces populations to below carrying capacity, allowing for a positive annual increase to the population. Generally, a linear correlation between wolf density and prey abundance can be found (Keith 1981, Fuller 1989, Fuller et al. 2003, McRoberts and Mech 2014, but see Cariappa et al. 2011 and Cubaynes et al. 2014 for changes in this relationship at high wolf and ungulate densities) but this correlation cannot be assumed to occur for every wolf-prey relationship, particularly in complex, multi-prey systems (Mech and Peterson 2003).

Predation rates are driven by the number of wolves present and their per capita kill rate. At low prey densities, the total kill is usually small because wolves are scarce. Theoretically, as prey density increases, the number killed by wolves increases disproportionately faster. In this manner wolf predation may be said to limit, not regulate prey populations (Mech and Peterson 2003). For some prey populations at carrying capacity, predation may be compensatory (the mortality would occur due to some other cause if not predation) rather than additive (the mortality would be additive to base-line mortality) and would not have an effect on a population level. However, if populations are small and below carrying capacity, predation can become additive mortality and may influence population levels.

Eberhardt et al. (2007) states that predation by wolves likely has a much lower overall impact on ungulate populations than does antlerless harvest by hunters. Wolves primarily prey on young of the year and older individuals beyond their prime, both of which have lower reproductive value, whereas antlerless removals by hunters are concentrated on adult females of prime age (Wright et al. 2006). Thus, wolf predation may have considerably less of an effect on reproductive rates and growth of populations. Eberhardt et al. (2007) also remarked that conservative harvests of females are needed to maintain ungulate populations exposed to hunting and predation by multiple species of large carnivores at or near carrying capacity. However, because of the wide variance in calf survival versus female survival, population growth may be better explained by calf survival measurements than female survival (Raithel et al. 2007). Thus, despite selection of calves by wolves relative to hunters (Wright et al. 2006), this predation may still drive calf survival and thus the population growth of an elk herd.

Potential native prey of Mexican wolves include elk, white-tailed and mule deer, and to a lesser extent, pronghorn (*Antilocapra americana*), javelina (*Tayassu tajacu*), and Rocky Mountain bighorn sheep (*Ovis canadensis*) (Parsons 1996). All observations of reintroduced Mexican wolves to date, however, suggest that elk is their preferred prey species and constitutes the majority of their diet (Paquet et al. 2001, AMOC and IFT 2005, Reed et al. 2006, Merkle et al. 2009).

Current and predicted wolf impacts to ungulates

The 1996 FEIS concluded that, "while uncertainty exists, (reintroduced) wolves likely will not severely impact prey populations" in the BRWRA (USFWS 1996).

The Biological Assessment and Evaluation (BAE) completed by the USDA Forest Service in 2007 for the use of release and translocation sites in the Apache-Sitgreaves National Forests determined that while "wolves prey on elk, deer, and occasionally on small mammals such as squirrels …….due to the limited scope of the project, there would be insignificant and discountable impacts to these species". Therefore, the Forest Service concluded "there would be no change in Forest-wide population trends or habitat trends due to this project" (USDA Forest Service 2007).

Both the AGFD and the NMDGF have determined that current levels of predation by wolves on elk within the BRWRA have not measurably decreased the overall elk population of the BRWRA. A report published in October of 2008 included the following: "AGFD has not detected any significant reduction in deer or elk population levels since wolves have been reintroduced. Recent elk surveys indicate that current calf recruitment levels are good, i.e., 39 calves for every 100 cows surveyed in Game Management Units (GMU) 1 and 27" (AMOC and IFT 2008). A white paper published by AGFD in 2012 included the following "An analysis comparing elk calf recruitment in Game Management Units (GMU) 1 and 27 in the BRWRA before (pre-1998) and after Mexican wolves were established in Arizona has not shown a negative impact on the number of elk calves that survive though early fall time periods. Likewise, an analysis comparing mule deer fawn recruitment in GMU 1 and 27 in the BRWRA before (pre-1998) and after Mexican wolves were established in Arizona has not shown a negative impact on the number of fawns that survive though early winter periods" (AGFD 2013). Cow:calf and doe:fawn ratios could be affected by both a decline in the number of cows or does as well as the level of reproduction, such that reproduction is remaining the same on a per animal basis but the absolute number of cows and does are decreasing. However, decline in other measurements (hunter success, number of tags, population counts) would be predicted to occur if this was the case. Neither AGFD nor NMDGF have observed these trends (AGFD 2013, NMDGF unpublished data).

A recent tribal perspectives report (2014) states that there have been no significant impacts to overall big game populations on the FAIR: "no significant impacts to overall big game population numbers (per yearly surveys, animals have been moved by wolves, but also rotate back to areas)" (MWRT Tribal Subgroup 2014).

At Statewide scales, wolves are expected to have little or no effect on the abundance of elk and deer across most of Arizona and New Mexico where elk and deer abundance is stable, or above population objectives. Predation on adult pronghorn is unlikely as pronghorn are an open grassland and prairie species, and have the ability to outrun wolves on flat open terrain. However, in the Trans-Pecos region of Texas, coyotes have been observed herding pronghorn to fences to facilitate capture. While there is a potential for wolves to kill pronghorn in this manner, wolves are unlikely to occupy the same grassland habitat as pronghorn throughout most areas of the MWEPA.

The abundance of elk, deer, and other ungulates could decline in localized areas where wolves become numerous. The presence of wolves could alter the habitat use, and hence local distributions of elk, deer, and pronghorn in some areas as they attempt to avoid direct interactions with wolves. As with other predators, wolf predation has the potential to threaten some small populations of prey. Examples of such populations potentially could include certain herds of reintroduced desert bighorn sheep and pronghorn in southern Arizona.

Alternative One proposes changes in the management of the experimental population of Mexican wolves that would allow, under a phased management approach, the experimental population to achieve an objective of 300 to 325 wolves. Under Scenario A and B, wolf occupancy would gradually expand into the northwestern portion of the MWEPA. In Scenario A, wolves would remain in Phase 1 for years 1-11, and wolf densities would be highest (1.92 – 4.99 wolves/ km^2) within the areas of suitable habitat defined by Phase 1 because wolves would be distributed in a smaller area compared to Scenario B. In Scenario B, Phase 2 would be implemented for years 6-8, and Phase 3 for years 9-11, which would result in the lowest wolf densities (1.92 – 3.89 wolves/ km^2) in suitable habitat during the first 11 years because wolves would occupy the largest area possible under the phased approach. We predict that wolf predation on ungulates may be higher in Scenario A than in Scenario B, however we predict the overall impact of this alternative to ungulate populations will not be significant as wolf population growth would be managed at 300 to 325 in the entire MWEPA. Wolf predation may have a less than a significant short-term direct effect on small, distinct, or isolated populations of ungulates which often have a limited capacity to increase. Based on our experience in the BRWRA and, because over the broader landscapes of each proposed management zone we expect natural dispersal to lead to the re-establishment of wolf packs primarily in areas of suitable habitat and adequate wild ungulate prey base, we predict less than significant direct and indirect adverse impacts on wild ungulate prey species from implementation of either Scenario A or B in Alternative One in Zones 1 and 2 because of the low wolf:elk ratios and proposed language in the Revised 10(j) Rule which will define an unacceptable impact to a wild ungulate herd (see *Mitigation of Impacts section below*). We predict no significant direct and indirect adverse impacts on wild ungulate prey species from implementation of Alternative One in Zone 3 because of the limited availability of wolf habitat and prey compared to Zones 1 and 2.

Mitigation of effects

During the period (up to 12 years from the effective date of the final 10(j) rule) that the phased management approach proposed in this alternative is in effect, the initial release and translocation of wolves and their natural dispersal and occupancy in Arizona west of Highway 87 in Zones 1 and 2 would be limited. We expect that these limitations will lessen the impacts of wolf predation on ungulates. However, because of the uncertainty related to wolf:elk ratios and the climatic, hunting, and prey refugia characteristics in the Southwest (Vucetich et al. 2011, Hebblewhite 2013, Hamlin and Cunnigham 2005), we will use a conservative approach to mitigating potential impacts to ungulate populations. In particular, we recognize that wolf:elk ratios less than 3:1000 have not shown an impact on elk populations in the southwest under current hunting regulations (Ripple and Betscha 2009, Chapter 3), however, higher ratios (4:1000 to 6:1000) may impact elk populations if conditions are similar to the Northern Rockies (White and Garrott 2005, Hamlin and Cunningham 2009). Under this alternative, we predict at year 13, a wolf:elk ratio of 315 wolves to approximately 80,811 elk or 3.9 wolves:1000 elk. This ratio is below levels where impacts have been proposed to start occurring in the Northern Rockies (Hamlin and Cunningham 2009). However, impacts will likely occur at smaller spatial scales than the entire elk herd south of Interstate-40. Thus, mitigation measures proposed below are designed to address specific areas and ungulate herds rather than general population levels.

The following language is a component of the proposed rule associated with this alternative:

"Unacceptable impact to a wild ungulate herd shall 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."

(vi) Take in response to impacts to a wild ungulate herd. If Arizona or New Mexico game and fish agency determines, based on ungulate management goals, that Mexican wolf predation is having an unacceptable impact to a wild ungulate herd, 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) Arizona or New Mexico game and fish agency must prepare a science-based document that:

(1) Describes what data indicate that the ungulate herd is below management objectives, what data indicate that the impact on the ungulate herd is influenced by Mexican wolf predation, why Mexican wolf removal is a warranted solution to help restore the 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 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 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 impacted 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."

Once mitigation measures are implemented, we predict no significant direct and indirect adverse impacts on wild ungulate prey species from implementation of Alternative One in Zones 1, 2, and 3.

Other Wildlife Species Including Special Status Species and Threatened and Endangered Species

The relationships between carnivores and other species, and the dynamic ecosystems in which they live could be the most poorly understood and controversial dimension of carnivore ecology (Estes 1996). Despite many published studies on gray wolves, there is limited evidence of the precise nature, degree, and mechanisms by which wolves affect ecosystems.

Wolves kill ungulates, but the effects on ungulate populations are varied. Scavenging species, such as coyotes, common ravens, and eagles feed on wolf kills. A wide variety of scavengers and other carnivores benefit from carrion being readily available year round, rather than just a one-time pulse in the early spring because of winterkill (Stahler et al. 2001). Wolves may directly or indirectly compete for food with other carnivores (e.g. mountain lion) by selecting similar prey, or by stealing kills (Kunkel et al. 1999, Arjo et al. 2002). Wolves sometimes kill other carnivores, such as mountain lions, coyotes, or grizzly bear cubs (White and Boyd 1989, Boyd and Neale 1992, Arjo 1998, Crabtree and Sheldon 1999, Arjo and Pletscher 1999, Hebblewhite and Smith 2010).

Case studies exploring the community impacts of wolves in Banff National Park and Yellowstone National Park found "evidence for the pervasive effects of wolves via direct and indirect pathways" (Hebblewhite and Smith 2010). Direct effects include competition with other large carnivores. This competition can be "exploitative", where two species consume the same resources, or "interference", where two species on the same trophic level kill, but do not consume each other. Direct effects also include the relationship between predator and prey. Indirect effects include the interactions between wolves and scavengers that utilize wolf kills (Hebblewhite and Smith 2010).

How carnivores interact with wolves varies depending on the extent of dietary overlap, habitat, environmental conditions, and other factors. In New Mexico and Arizona, wolves share habitat with a number of other carnivores, including coyotes, mountain lions, black bears, bobcats, swift fox, red foxes, gray fox, and weasels. Direct interactions of other predator species is likely to increase as wolves begin to reoccupy portions of their historical range in the Mexican Wolf Experimental Population area (MWEPA).

Information regarding the interactions between other carnivores and wolves is primarily observational and largely speculative when attempting to make predictions at the population or community level. Because wolves are wide-ranging and many carnivores are secretive in nature, collecting data on interactions is difficult. Observations to date suggest that wolves can reduce, or in rare cases eliminate, certain carnivores (such as coyotes) locally, but no evidence of long-term spatial partitioning of resources within an area has yet been detected (Ballard et al. 2003).

Coyotes

Interactions between wolves and coyotes have been discussed in the scientific literature more often than for other carnivores. Reestablishment of wolves has led to reductions in coyotes in some areas (e.g., Yellowstone and Grand Teton National Parks), but not at others (Petersen et al. 1994, Ballard et al. 2003). Extirpation of coyotes by wolves can occur rarely (e.g., at Isle Royale National Park), but probably only under limited ecological circumstances, such as where immigration is prevented. Studies at Grand Teton and Yellowstone National Parks have detected declines in coyote densities of 33% and 39%, respectively, in areas reoccupied by wolves and indicate competition between the two species (Berger and Gese 2007). Localized or short-term decreases in coyote abundance can be even higher, such as a 50% decline in the Lamar Valley population of Yellowstone from 1996 to 1998 (Crabtree and Sheldon 1999, Hebblewhite and Smith 2010). In the Yellowstone National Park case study described by Hebblewhite and Smith (2010), exploitative competition did not seem to be occurring between wolves and coyotes. However, interference competition from the reintroduction of wolves to the ecosystem resulted in a 50% reduction of the coyote population caused by wolf predation (Crabtree and Sheldon 1999). This reduction was primarily from wolves killing coyotes scavenging at wolf kill carcasses (Crabtree and Sheldon 1999, Ballard et al. 2003).

Resident coyote home ranges often overlap extensively with those of wolves, suggesting that coyotes may in fact derive some benefit from wolves by having a year-round source of ungulate carcasses on which to scavenge (Switalski 2003, Berger and Gese 2007, Merkle et al. 2009a). A study of Mexican wolf and coyote diets in the BRWRA shows that wolves and coyotes have similar diets consisting mainly of elk

(Carrera et al. 2008). It is unknown whether coyotes are scavenging elk carcasses from wolf kills or preying on elk directly, although both behaviors are documented in other areas. Carrera et al. (2008) hypothesize that this shared source of prey may cause competition between wolves and coyotes that will result in wolves killing coyotes. Rinkovich (2012) identified a negative correlation between the numbers of wolves and coyotes killed in Arizona between 1917 and 1964 and suggested a possible mesopredator release of coyotes with the extirpation of the wolf in Arizona. Bednarz (1988) also suggests that prior to wolf extirpation, Mexican wolves excluded coyotes from many areas. Following Mexican wolf extermination, coyotes most likely expanded their range into the mid-elevation forested mountain terrain preferred by wolves. Bednarz (1988) predicts a reduction in the coyote population in areas of Mexican wolf reintroduction.

Bears

Most wolf-grizzly bear interactions also involve fighting and chasing, which often take place at kill sites (Ballard et al. 2003). Each species is occasionally recorded killing the other (e.g., Jimenez et al. 2008, Hebblewhite and Smith 2010). Because grizzlies readily usurp ungulate kills made by wolves (e.g., Hebblewhite and Smith 2010), Servheen and Knight (1993) speculated that the presence of wolves might be beneficial to threatened populations of grizzlies by supplementing their diet with greater amounts of protein through increased availability of ungulate carcasses. This may be especially true following mild winters, when ungulate carrion is normally far less available.

Most reported encounters between wolves and black bears involved fighting or chasing one another, or wolves killing black bears. In a smaller number of interactions, wolves displaced black bears from kills (IFT unpublished data). Wolves will seek out and kill black bears in their dens but often do not consume them, suggesting that interference competition exists between the two species. Ballard et al (2003) reported that black bears won 15% of interactions with wolves despite being 2 to 3 times heavier (Garshelis 2009; Sillero-Zubiri 2009). Reported outcomes include wolves displacing black bears from kills (Gehring 1993) and wolves killing both young and adult black bears (Rogers and Mech 1981; Horejsi et al. 1984; Paquet and Carbyn 1986). However, it has been suggested that these outcomes may be a result of wolves outnumbering black bears, therefore having a competitive advantage. In several reported observations of a lone wolf interacting with a black bear (Fremmerlid and Latham 2009, Joslin 1966; Rogers and Mech 1981) the black bear had the competitive advantage.

Cougars

Few observations of direct wolf-cougar interactions have been reported, but the two species do occasionally kill each other. Cougars have been noted moving away from kills to avoid wolf contact (Akenson et al. 2005) and in general may avoid areas recently used by wolves (Kortello et al. 2007). Cougars in Banff NP exhibited low annual survival and poor body condition during the period of wolf reestablishment, indicating that cougars were negatively affected by wolf recolonization (Hebblewhite and Smith 2010). Although wolves can usurp mountain lion kills and future competition for prey “cannot be ruled out”, exploitative competition between wolves and mountain lions appears to be minimal because mountain lions and wolves use prey and habitat differently (Hebblewhite and Smith 2010). In the southwest, Bednarz (1988) hypothesizes that mountain lion ranges expanded after removal of the Mexican wolf and that “as with the coyote, any reestablishment of the wolf probably will decrease the amount of area usable by lions”. Although one Mexican wolf death from a mountain lion attack has been recorded (AMOC and IFT 2005), Bednarz (1988) expects that because of the solitary nature of mountain lions they would be “at a severe disadvantage during any confrontation with large social predators such as Mexican wolves.” Mountain lion or coyote mortality caused by Mexican wolves has not been documented in the BRWRA. However, neither of these predators have been intensively studied in the BRWRA either prior to, or after, reintroduction.

Other carnivores

Wolves can affect some smaller carnivores, such as red foxes in the same ways described above for bears and coyotes (Ballard et al. 2003). Increased availability of wolf-killed carcasses may benefit these species by providing more food for scavenging, particularly during the winter months. However, wolves sometimes kill some of these species during direct interactions. In areas where coyote abundance is reduced by wolves, predators such as red fox and bobcats may benefit from reduced competition with coyotes (Mech and Boitani 2003b). Additionally, some prey may increase, which has the potential to enhance populations of other medium-sized and small carnivores (Buskirk 1999).

Scavengers

Wolves can be mediators of food supply to scavengers. In Yellowstone NP, 12 different scavengers (similar to those found in Banff NP, Canada) were observed using carcasses killed by wolves. Five were present at almost every kill: coyotes, ravens, magpies (*Pica hudsonia)*, and golden (*Aquila chrysaetos*) and bald (*Haliaeetus leucocephalus*) eagles (Wilmers et al. 2003). Stahler et al. (2002) recorded an average 28 ravens per kill with as many as 135 present on some carcasses. Besides avian scavengers, many mammals also scavenge wolf kills. Turkey vultures, ravens and wintering populations of bald and golden eagles in the southwest have been consistently observed on carcasses. Based upon on our field observations of coyotes, black bears, ravens, turkey vultures, and bald and golden eagles scavenging on Mexican wolf-killed ungulates, we expect some increased level of beneficial direct and indirect effects on these species to occur from a larger population of wolves. There is limited research available that has investigated inter-species interactions in the BRWRA, either pre or post wolf reintroduction. Therefore, the magnitude of both the potential direct effects, such as a reduction of coyote numbers through interference competition, and the potential indirect effects, such as the production of carrion used by multiple vertebrate and invertebrate scavenger species are unknown. Although the magnitude of the potential effects is unknown, these interactions can be viewed as beneficial ecosystem effects.

Other non-ungulate prey species

While data on the historical use of wild prey by free-ranging Mexican wolves is limited, it has been reported that in Mexico wolves preyed primarily on Coues white-tailed deer with some use of javelina, wild turkey, hares, rabbits, rodents, and 17 fruits (Leopold 1959, McBride 1980, Brown 1988). Elk have comprised the bulk (80.3%) of the biomass in the diet of the Mexican wolves reintroduced to the BRWRA with non-ungulate wild prey species (squirrels, other rodents and lagomorphs) making up less than 4% (Merkle et al. 2009). Wolves can be expected to opportunistically consume non-ungulate wild prey species such as small rodents, lagomorphs, and other mammals but, based on the research of Merkle et al. (2009) we expect these species to comprise, at most, only a supplemental portion of the wolf diet in areas where wild ungulate prey is available.

The rate and extent that wolves might disperse into the three proposed management zones is unknown, and the time that it might take for self-sustaining populations to be re-established is speculative. However, we predict that at some future point, wolves, in some small areas, may achieve the ecologically effective density needed to produce observable community impacts on other wildlife species (predators, non-ungulate wild prey species, and scavengers). Over the broader landscape of each proposed management zone we expect that natural dispersal will lead to the re-establishment of wolf packs primarily in areas of suitable habitat and adequate wild ungulate prey base.

Impacts

It is doubtful that wolves would affect the overall abundance or distribution of other carnivore species in Arizona or New Mexico. The presence of wolves could alter the local distributions and behaviors of some carnivores as they attempt to avoid direct interactions with wolves or as they respond to changes in food availability as influenced by wolves. Such changes could favor some carnivore species over others. Wolves would also be likely to occasionally kill individuals of some species. Wolves could reduce coyote abundance in some locations, although the extent that this would occur is unknown. In some locations, black bears, bobcat, bald and golden eagles, ravens, turkey vultures, and weasels might benefit from the increased availability of carrion. Therefore, under Alternative One, we predict no significant direct or indirect adverse impacts to predators, scavengers, or non-ungulate wild prey from implementation of Alternative One for Zones 1, 2, and 3 of the Proposed Action. We expect less than significant beneficial effects to scavengers.

Federally Listed Threatened and Endangered Species

A Conference/Biological Opinion (Appendix G) for the proposed revision to the regulations for the nonessential experimental population of the Mexican wolf, issuance of a section 10(a)(1)(A) research and recovery permit that authorizes activities for the management of the Mexican wolf within Arizona, New Mexico, and to a far lesser extent California, Colorado, Nevada, Texas, and Utah; issuance of a section 10(a)(1)(A) research and recovery permit for gray wolf in Arizona and New Mexico, and funding provided to the Mexican Wolf Recovery Program for the purpose of implementing the program is located in Appendix G. The Conference/Biological Opinion addresses the impacts to the federally listed species that may be affected by the proposed actions: Mexican wolf, gray wolf (*C. lupus*), jaguar (*Panthera onca*), ocelot (*Leopardus pardalis*), California condor (*Gymnogyps californianus*), and Canada lynx (*Lynx Canadensis*). The Conference/Biological Opinion concluded that the actions were not likely to jeopardize gray wolf, jaguars, ocelots, California condors, or Canada lynx. Indirect effects to these species may include incidental injury or death during the implementation of the Mexican wolf project.

The primary activity that could harm or harass jaguars, ocelots, California condors, or Canada lynx is the use of leg-hold trapping. However, given the limited overlap of jaguar and wolf distribution in New Mexico and Arizona, it is unlikely that incidental capture of jaguars will occur. Similarly, ocelots are in extremely low numbers along the U.S.-Mexico border and because their habitat of choice is dense underbrush where wolf trapping would be unlikely to occur, the chance of one being caught in a trap intended for a wolf is extremely low. Although condors can travel long distances, the population of condors exists in northern Arizona and southern Utah. Only if wolf trapping occurred near these areas would the potential be high for a condor to be incidentally captured in a leg-hold trap. Similarly, lynx occur only at the northern periphery of the area where use of leg-hold traps would occur only infrequently. For these reasons we predict no significant direct or indirect adverse impacts to these federally listed species, aside from Mexican wolves, from implementation of Alternative 1 in zones 1, 2, or 3 for the Proposed Action.

Gray Wolves

Gray wolves do not currently inhabit the project study area. However, under a revised and reissued section 10(a)(1)(A) research and recovery permit, we would authorize the management of gray wolves that disperse from the Northern Rocky Mountain population into Arizona or New Mexico. There may be negative effects (injury, death from capturing, collaring, drawing blood, affixing radio collars) to an individual gray wolf, but we would gain valuable information on the dispersal and habitat use of the animal. Gray wolves may be harassed as a result of capture and management, and up to one gray wolf may be killed or severely injured as a result of capture and management actions. The likelihood of a gray wolf dispersing into the MWEPA is very low, therefore we predict no direct or indirect adverse impact to gray wolves.

Mexican Wolves

Under Alternative One, wolf occupancy in the MWEPA would be influenced by a combination of initial releases (Zone 1), translocations (Zones 1 and 2), natural reproduction and dispersal events (Zones 1, 2, and 3), as well as management removals and mortalities in accordance with the projections provided in Appendix D. At the beginning of the project time period (year 1), we would implement a phased approach in Arizona to provide a gradual expansion of wolf occupancy west of Highway 87, such that wolves would be moving into and occupying contiguous habitat adjacent to occupied areas. In this Alternative, initial release sites in the Tonto, Pleasant Valley, and Payson Ranger Districts of the Tonto National Forest, the Sitgreaves National Forest, the Magdalena Ranger District of the Cibola National Forest, and the Gila National Forest, in addition to the Apache National Forest, would be available for us to choose from in accordance with the phased management approach. Depending on our management agreements with the White Mountain Apache Tribe, we may also be able to conduct initial releases on FAIR. We may also develop agreements with other private landowners (with the concurrence of the respective state wildlife agency) and tribes in Zone 2 for release and management of wolves (see Appendix D for more information). As described in Chapter 1, we will strive to supplement the experimental population with at least 2 effective migrants per generation to improve the genetic composition of the population (Carroll et al. 2014). We expect to achieve this effective migration into the MWEPA utilizing initial release and cross-fostering of pups, assuming each action is conducted with genetically appropriate animals. Given our success rate with initial releases (21 percent), we expect that we will need to release a pack of two adults and several offspring to achieve one effective migrant. We may conduct initial releases for other management purposes than addressing genetic concerns, such as replacing animals removed for nuisance behavior or depredations. We do not provide a schedule of releases at this time; rather, determination of the timing and location for initial releases will be developed with our partners and in communication with the local communities as the circumstances warrant over time, as also described in Appendix D. We expect that we can decrease the number of effective migrants (and therefore the number of initial releases conducted for genetic purposes) from 2 migrants per generation to 1 per generation when the population reaches around 250 animals, as a population of this size will be less reliant on effective migration for persistence than when it is smaller than 250. When we achieve our population objective of 300-325 Mexican wolves in the MWEPA, we may continue to conduct occasional initial releases to address genetic concerns or for other management purposes, but we would expect to conduct fewer initial releases over time as the population stabilizes around 300 wolves.

In Alternative One, we include two new provisions for take on non-Federal land that the 1998 Final Rule does not include (see proposed rule (7)(iv)). One provision expands the previous take authorized for Mexican wolves that are in the act of biting, killing, or wounding domestic animals (includes both livestock and non-feral dogs) on non-Federal lands (includes private, state, and tribal trust lands). The 1998 Final Rule only provided for this take for wolves that were in the act of biting, wounding or killing livestock on private lands. We estimate an average take of approximately 2 wolves per year (see Appendix D) under this provision. We account for this estimated mortality by projecting an average 10% annual growth rate in this alternative, rather than the baseline growth rate of 11%.

Under the second take provision, at 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. Thus, the permit will not authorize any take beyond that which the Service is already attempting to conduct.

Based on our experience in the BRWRA, we expect natural dispersal to lead to the re-establishment of wolf packs primarily in areas of suitable habitat and adequate wild ungulate prey base over the broader landscapes of the MWEPA. The Mexican wolf experimental population has demonstrated wild-born wolves naturally forming new packs, establishing home ranges, and reproducing.

The projection for the wolf population at a 10 percent annual growth rate will be 315 wolves in year 13 (See Appendix D). Based on an initial release success rate of about 21%, we expect that if 10 wolves are released each wolf generation (every 4 years), we will achieve 2 effective migrants every 4 years, which Carroll et al. (2013) suggests will improve the genetic composition of the population. Higher levels of genetic variation within the experimental population are important to minimize the risk of inbreeding and support individual fitness and ecological and evolutionary processes to ensure persistence of the population, particularly until the population reaches a size of at least 250. There is evidence of inbreeding depression in the experimental population (Fredrickson et al. 2007) and without management action to improve its genetic composition, inbreeding will accumulate and heterozygosity and alleles will be lost faster than in the captive population.

The availability of additional suitable, unoccupied wolf habitat will increase the opportunities for successful initial releases in Zone 1, as well as translocations, natural dispersal and recolonization in Zones 1 and 2. A greater number of successful initial releases would lead to an increase in the number of effective migrants per generation into the experimental population from the captive population. An increase in the number of effective migrants per generation will improve and maintain adequate genetic variation in the experimental population. Natural dispersal and colonization of new areas would be expected to contribute to achieving the numerical growth and range expansion that is needed to improve the persistence of the experimental population. Under a revised and reissued section 10(a)(1)(A) research and recovery permit, we would authorize removal of Mexican wolves that can be identified as coming from the experimental population that disperse to establish territories outside of the MWEPA. These wolves would be translocated to areas of suitable habitat within proposed management Zones 1 or 2 of the MWEPA, transferred to the reintroduction project in Mexico, or maintained in captivity. The reintroduction of the experimental population of Mexican wolves is focused on the area in Arizona and New Mexico south of I-40. Returning wolves to the areas south of I-40 will ensure that these animals continue to contribute to achieving the population growth and distribution needed to improve the likelihood of persistence of the Mexican wolf experimental population.

There may be negative effects (injury, death from capturing and returning Mexican wolves to the MWEPA), but the overall effects on the survival and recovery of this species in the wild are beneficial. Mexican gray wolves may be harassed as a result of capture and management, and up to three Mexican gray wolves may be killed or injured as a result of capture and management actions. The adverse effects of capture and translocation are outweighed by the beneficial effects on the species' survival and recovery by allowing the Service to focus efforts on establishing a population south of Interstate 40 within the MWEPA.

We predict the number of wolves that may disperse outside the MWEPA will be less than the number of wolves that have dispersed outside of the BRWRA. Between 1998 and 2013, we captured and removed 47 wolves that dispersed outside of the BRWRA boundaries. Currently, wolf packs occupy areas in close proximity to the BRWRA border as a result of spatial constraints from the expanding population. The perimeter of the BRWRA (753 mi/1212 km) is located almost entirely adjacent to suitable wolf habitat while only 16.6 percent (233 mi of 1399 mi/ 375 km of 2252 km) of the MWEPA boundary (not including the portion adjacent to Mexico because we will not return wolves that disperse into Mexico) is located adjacent to suitable wolf habitat. The northern border of the MWEPA is located along Interstate 40, and will likely serve as a semi-reflective border to movement and dispersal of wolves.

We do not anticipate a high number of boundary violations of the MWEPA in the immediate future as the core population is located a considerable distance from these borders. Because we anticipate that there will be few wolves leaving the MWEPA, there will be less management involving wolves (trapping, helicopter darting/capture and removals) that disperse from the MWEPA than has occurred for Mexican wolves that disperse from the BRWRA.

Based on the combined elements of the proposed action, under Alternative One we predict a significant beneficial effect to the Mexican wolf experimental population and the listed entity from the proposed action.

4.3.3 Alternative Two

Alternative Two mirrors Alternative One in all provisions except for: (1) the geographic area of Zone One would not be expanded; (2) the phased approach to management would not be used; and (3) we would not establish a population objective.

Alternative Two impacts are the same as those identified in Alternative One except in the specific sections identified below.

Wild Ungulate Prey Species

Under this alternative, versus Alternative One, we would expect 534 wolves (See Appendix D) and the corresponding wolf:elk ratio south of Interstate 40 after year 19 to be 6.68 wolves:1000 elk based on an estimated 79,933 elk in the region. Impacts to wild ungulate prey species are expected to be higher under Alternative Two than Alternative One due to the higher number and density of wolves under Alternative Two.

Based on our experience in the BRWRA and, because over the broader landscapes of each proposed management zone we expect natural dispersal to lead to the re-establishment of wolf packs primarily in areas of suitable habitat and adequate wild ungulate prey base, we predict less than significant direct and indirect adverse impacts on wild ungulate prey species in Alternative Two in Zones 1 and 2 because of proposed language in the Revised 10(j) Rule which will define an unacceptable impact to a wild ungulate herd (see *Mitigation of effects section below*). We predict no significant direct and indirect adverse impacts on wild ungulate prey species from implementation of Alternative Two in Zone 3 because of the limited availability of wolf habitat and prey compared to Zones 1 and 2.

Mitigation of effects

Under this alternative, we predict at year 19 (and beyond), a wolf:elk ratio of 6.68 wolves:1000 elk. This ratio is above levels where impacts have been proposed to start occurring in the Northern Rockies (Hamlin and Cunningham 2009). However, several conditions are known or hypothesized to differ between the Northern Rockies and the Southwest (i.e., presence of grizzly bears, snow conditions, availability of water for ungulates). Thus, the relationship with wolf:elk ratios and the impacts to ungulates is unknown in the Southwest. Regardless, predicted impacts will likely occur at smaller spatial scales than the entire elk herd south of Interstate-40. Thus, mitigation measures proposed below are designed to address specific areas and ungulate herds rather than general population levels. We expect that these mitigation measures would be used more routinely under Alternative Two relative to Alternative One because of the higher wolf:elk ratio.

The following language is a component of the proposed rule associated with this alternative:

“Unacceptable impact to a wild ungulate herd shall 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.

(vi) Take in response to impacts to a wild ungulate herd. If Arizona or New Mexico game and fish agency determines, based on ungulate management goals, that Mexican wolf predation is having an unacceptable impact to a wild ungulate herd, 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) Arizona or New Mexico game and fish agency must prepare a science-based document that:

(1) Describes what data indicate that the ungulate herd is below management objectives, what data indicate that the impact on the ungulate herd is influenced by Mexican wolf predation, why Mexican wolf removal is a warranted solution to help restore the 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 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 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 impacted 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."

Once mitigation measures are implemented, we predict no significant direct and indirect adverse impacts on wild ungulate prey species from implementation of Alternative One in Zones 1, 2, and 3.

Other Wildlife Species Including Special Status and Threatened and Endangered Species

Mexican Wolves

Under Alternative Two, wolf occupancy in the MWEPA would be influenced by a combination of initial releases (Zone 1), translocations (Zones 1 and 2), natural reproduction and dispersal events (Zones 1, 2, and 3), as well as management removals and mortalities. This alternative mirrors Alternative One in all provisions except for the geographic designation of Zone 1: in this Alternative, all of the Tonto, Sitgreaves, and Cibola National Forests would be in Zone 2. Under Alternative Two the area proposed for the initial release of wolves in the proposed management Zone 1 would be smaller (limited to the Gila and Apache National Forests) than under Alternative One. We would therefore be limited to conducting initial releases in the Gila National Forest and the entire Apache National Forest. As described in Chapter 1, we will strive to supplement the experimental population with at least 2 effective migrants per generation to improve the genetic composition of the population (Carroll et al. 2014). We expect to achieve this effective migration into the MWEPA utilizing initial release and cross-fostering of pups, assuming each action is conducted with genetically appropriate animals.

We assume a 10 percent annual average population growth over 19 years in Alternative Two, for a population estimate of approximately 534 wolves in year 19 (see Appendix D), at which time the population would be limited by habitat constraints set at a density of approximately 8 wolves per 1000 km^2. Based on an initial release success rate of about 21%, we expect that if 10 wolves are released each wolf generation (every 4 years), we would achieve 2 effective migrants in each generation. We would expect to provide at least 2 effective migrants via initial releases to the population in years 1-4 and 5-8, and 1-2 effective migrants in subsequent generations (through year 20, or 5 generations). With a naturally growing population and limited initial release sites, we are unsure if any release sites would be available for future generations. Therefore, we would be unable to achieve the level of effective migration we are seeking from conducting initial releases, unless we were to translocate wolves out of occupied habitat to allow for additional initial releases. In this situation, we could attempt to improve the genetics of the population through cross-fostering of pups; however, as this is a new technique, we have limited information on our ability to successfully integrate cross-fostered wolves into the population. Therefore, we have greater uncertainty under Alternative Two than under Alternative One (or Three) that we would achieve the level of effective migration we believe is necessary to improve the genetic composition of the experimental population. However, the availability of unoccupied wolf habitat will increase the opportunities for natural dispersal and colonization of new areas which would be expected to contribute to achieving the numerical growth and range expansion that is needed to improve the probability of persistence of the experimental population. Therefore, under Alternative Two, we predict a significant beneficial effect to the experimental population of the Mexican wolf and the listed entity from the proposed action.

4.3.4 Alternative Three

This alternative mirrors Alternative One in all provisions (and therefore initial occupancy descriptions) except that: (1) the two take provisions discussed under Alternative One would not be authorized, (2) the modified definition of unacceptable impacts to wild ungulates would not be included, (3) the phased approach to management would not be used, and (4) we would not establish a population objective.

Alternative Three impacts are the same as those identified in Alternative One except in the specific sections identified below.

Wild Ungulate Prey Species

Under this alternative, versus Alternative One, we would expect the experimental population to grow to 534 wolves (See Appendix D) and the corresponding wolf:elk ratio south of Interstate 40 to be 6.68 wolves:1000 elk based on an estimated 79,933 elk in the region. Impacts to wild ungulate prey species are expected to be higher under Alternative Three than Alternative One or Two due to the higher number and density of wolves in suitable habitat under Alternative Three relative to Alternative One, and the different mitigation measures available under Alternative Three relative to the mitigation in Alternative One and Two (*see Mitigation of effects section below*). Based on our experience in the BRWRA and, because over the broader landscapes of each proposed management zone we expect natural dispersal to lead to the re-establishment of wolf packs primarily in areas of suitable habitat and adequate wild ungulate prey base, we predict less than significant direct and indirect adverse impacts on wild ungulate prey species in Alternative Three in Zones 1 and 2; we do not believe that the mitigation associated with this alternative will reduce this impact to no significant impact (see *Mitigation of effects section below*). We predict no significant direct and indirect adverse impacts on wild ungulate prey species from implementation of Alternative Two in Zone 3 because of the limited availability of wolf habitat and prey compared to Zones 1 and 2.

Mitigation of effects

Under this alternative, we predict at year 17 (and beyond), a wolf:elk ratio of 6.68 wolves:1000 elk. This ratio is above levels where impacts have been proposed to start occurring in the Northern Rockies (Hamlin and Cunningham 2009). However, several conditions are known or hypothesized to differ between the Northern Rockies and the Southwest (i.e., presence of grizzly bears, snow conditions, availability of water for ungulates). Thus, the relationship with wolf:elk ratios and the impacts to ungulates is unknown in the southwest. Regardless, predicted impacts will likely occur at smaller spatial scales than the entire elk herd south of Interstate-40. Thus, mitigation measures proposed below are designed to address specific areas and ungulate herds rather than general population levels. The following language is a component of the 1998 Final 10(j) rule associated with this alternative: *"Impact on game populations in ways which may inhibit further wolf recovery. The Service encourages states and tribes to define unacceptable impacts from wolf predation on game populations in Service-approved management plans. Until such time the term will mean the following—2 consecutive years with a cumulative 35 percent decrease in population or hunter harvest estimates for a particular species of ungulate in a game management unit or distinct herd segment compared to the pre-wolf 5- year average (unit or herd must contain average of greater than 100 animals). If wolf predation is shown to be a primary cause of ungulate population declines (greater than 50 percent of documented adult or young mortality), then wolves may be moved to reduce ungulate mortality rates and assist in herd recovery, but only in conjunction with application of other common, professionally acceptable, wildlife management techniques."*

Because of the level of impact (35% in the 1998 Final 10(j) rule vs. 15% decline in the proposed rule) and the requirements (greater than 50 percent documented adult or motality would be wolf predation), we expect that this mitigation measure would rarely be utilized prior to significant impacts to ungulates. However, we are unsure how frequently a ratio of 6.68 wolves:1000 elk would create elk population declines or require mitigation. Thus, the maintainence of less than significant direct and indirect impacts regardless of mitigation appears appropriate for Zones 1 and 2. Similarly, we maintain a no significant impact impact in Zone 3 regardless of mitigation.

Mexican Wolves

Under Alternative Three, wolf occupancy in the MWEPA would be influenced by a combination of initial releases (Zone 1), translocations (Zones 1 and 2), natural reproduction and dispersal events (Zones 1, 2, and 3), as well as management of removals and mortalities. At the beginning of the project time period (year 1), wolves will occupy the Gila and Apache National Forests in Zone 1. In this Alternative, initial release sites in the Tonto, Pleasant Valley, and Payson Ranger Districts of the Tonto National Forest, the Sitgreaves National Forest, the Magdalena Ranger District of the Cibola National Forest, and the Gila National Forest, in addition to the Apache National Forest, would be available for wolf dispersal and occupancy and future releases and translocations.

This alternative mirrors Alternative One in all provisions (and therefore initial occupancy descriptions) except that: (1) the two take provisions discussed under Alternative One would not be authorized, (2) the modified definition of unacceptable impacts to wild ungulates would not be included, (3) the phased approach to management would not be used, and (4) we would not establish a population objective.

We expect the wolf population to grow slightly more rapidly towards the limit of habitat constraints at a density of 8.0 wolves per 1000 km^2 in suitable wolf habitat. Therefore we would project an 11% annual average population growth until the density reached 8 wolves per 1000 km^2 (see Appendix D). This would result in wolves reaching a population of 534 in year 17, rather than year 19 as in Alternative Two. Alternative Three also has more areas to conduct initial releases than Alternative Two, which should allow for more certainty in attaining goals for effective migrants. However, Alternative One is similar in terms of areas for initial releases, particularly under Scenario B. Therefore, under Alternative Three, we predict a significant beneficial effect to the experimental population of the Mexican wolf and the listed entity from the proposed action.

4.3.5 Alternative Four

Under Alternative Four, the No Action Alternative, the 3 proposed management zones would not be implemented. Therefore, under the No Action Alternative, fewer dispersing wolves will survive and re-colonizing wolves will not have an opportunity to establish self-sustaining populations outside of the BRWRA. As a result, the wolf population would not expand outside the BRWRA, and the population would possibly reach a cap of 178 individuals in year 7 (see Appendix D).

Vegetation

Under Alternative Four, wolves would not be expected to significantly affect populations of elk, deer, and other ungulates, or their browsing pressure on vegetation, over the broader landscape of the MWEPA. In the BRWRA, based on our prediction of less than significant adverse impacts to wild ungulate prey species (see below), we do not expect significant direct or indirect impacts on the vegetation from Alternative Four.

Wild Ungulate Prey Species

Mexican wolves are expected to have little or no effect on the elk, deer, and bighorn sheep populations at their current densities, but could have a greater impact as densities increase over time. Mexican wolves would not be expected to significantly affect the ungulate populations over the broader landscape of the MWEPA due to wolves only being present in the BRWRA. At some future point, localized impacts to the ungulate population within the BRWRA could be greater than any of the other alternatives due to an increased density of wolves in a smaller area. Based on a population of 178 Mexican wolves and approximately 31,276 elk, we would expect a wolf:elk ratio of 5.75 wolves:1000 elk when wolves reached the density of 8 wolves per 1000 km^2 after year 7. Thus, while we do not expect significant direct or indirect impacts on wild ungulate prey species within the MWEPA from Alternative Four, we do recognize the potential for less than significant impacts to localized ungulate herds within the BRWRA. In addition, the mitigation measures for managing ungulate impacts would follow the language in the 1998 Final Rule (as described in Alternative Three).

Mitigation measures may need to be implemented within the BRWRA at some point in the future as the wolf population expands inside the BRWRA. Under the 1998 Final rule, (17.84(k)(15)) if Mexican wolf predation is shown to be a primary cause of ungulate population declines, then wolves may be translocated to reduce ungulate mortality rates and assist in herd recovery, but only in conjunction with application of other common, professionally acceptable, wildlife management techniques. This provision may be difficult to implement because unoccupied suitable habitat may not be available for translocations. With the potential to implement the mitigation measures from the 1998 Final Rule, which are less responsive to impacts to wild ungulates than the proposed rule, we predict less than significant direct and indirect adverse impacts on wild ungulate prey species from implementation of Alternative Four in the BRWRA.

Other Wildlife Species Including Special Status and Threatened and Endangered Species

Under Alternative Four, the 3 proposed management zones would not be implemented. Therefore, under the No Action Alternative, fewer dispersing wolves will survive and recolonizing wolves will not have an opportunity to establish self-sustaining populations outside of the BRWRA.

As a result, the wolf population would not expand outside the BRWRA, and population growth would remain similar to what we observed between 2008-2013, with the population likely reaching a cap of 178 individuals in year 7 (see Appendix D). Under the No Action Alternative, fewer dispersing wolves will survive and re-colonizing wolves will have a lower chance of successfully establishing self-sustaining populations in areas of suitable habitat. As a result, the potential indirect benefits to other wildlife species (scavengers) from the natural re-establishment of wolf packs would not be realized for the MWEPA.

Predators (cougars, black bears, coyotes) within the entire MWEPA would likely benefit from less competition for the same prey source in the absence of an expanding wolf population. The increase in Mexican wolf density in the BRWRA would not be expected to significantly affect the observable community impacts on other wildlife species (predators, scavengers and non-ungulate wild prey species) in the MWEPA, but may result in a less than significant direct and indirect adverse impact within the smaller BRWRA

Federally Listed Threatened and Endangered Species

Evaluation of the impact to federally listed threatened and endangered species would not change from Alternative One, although the area of impact would be substantially smaller (only within the BRWRA, except for the capture of wolves that establish territories wholly outside of the boundaries of the BRWRA)

Mexican Wolves

In Alternative Four, (the no action alternative) population growth is expected to remain similar to what has been observed in the wild wolf population between 2008-2013, until such time as most suitable habitat is filled, and the population becomes limited by availability of resources. The limiting factors may be decreased reproductive success in the population resulting from a reduced ability to conduct initial releases (Fredrickson et al. 2007) and decreased natural dispersal and population growth outside of the BRWRA. Because wolf numbers may continue to increase, the wolf population will be subjected to higher instances of management actions (capture and translocation back into the BRWRA) due to boundary violations as wolves search for unoccupied habitat outside the BRWRA.

While we predict an initial population growth rate of 10 percent for the wolf population under Alternative Four, the amount of available suitable habitat will likely become occupied by year 7 of the project. Based on a range of densities of 3.5 to 11.3 wolves per 1000 km^2 (Appendix D), we estimate that a wolf population density of approximately 8.0 wolves per 1000 km^2 would fill most of the suitable habitat within the BRWRA. This higher density is estimated because wolves will continue to fill the BRWRA and FAIR, which currently has a density of around 4.5 wolves per 1000 km^2. Wolf density may continue to rise because more patches of suitable, albeit more marginal, habitat are occupied across the BRWRA before growth is limited due to lack of available habitat and our requirements to remove wolves that stray outside of the BRWRA (see Appendix D).

Under Alternative Four, it is unlikely that we would be able to conduct initial releases to achieve 2 effective migrants per generation for the next 5 generations (20 years) because of spatial constraints within the Primary Recovery Zone. It is unlikely that we would meet our genetic goals under this alternative, and, as the population grows, the lack of genetic variation in the population will become more pronounced and the likelihood of inbreeding will increase (Fredrickson et al. 2007, Siminski and Spevak 2013). One option for reducing the risk of inbreeding in the population may be to remove wolves that have genes that are overrepresented in the population or show evidence of inbreeding and replace them with genetically desirable wolves. This would not be a long-term solution, however, as population size would be constrained under this Alternative, which would ultimately constrain the genetic composition of the wild population.

Therefore, under Alternative Four, we predict a significant direct adverse effect to the experimental population of the Mexican wolf and the listed entity from the No Action Alternative. Further, the regulatory constraints imposed by the designation of Primary and Secondary Recovery Zones within the BRWRA will continue to impede our ability to conduct initial releases or cross-fostering of Mexican wolves.

4.4 ECONOMIC RESOURCES

4.4.1 Ranching Activities/Livestock Production

Mexican wolf presence in the vicinity of grazing cattle can lead to both direct and indirect effects on the affected ranch. Directly, ranches may suffer the lost value of depredated cattle. Indirectly, wolves in the area may lead to other effects affecting profitability. Table 4-1 highlights the types of economic effects that ranching establishments may be exposed to when Mexican wolves are present in the vicinity. Direct effects include foregone calf or cow sales at auctions due to depredations. Indirect effects include stress impacts on herds and associated impacts on weight gains and increased ranch operation costs for surveillance and oversight of the herd. These effects were all discussed in the Five-Year Review (IEc 2005). Ranchers have also expressed concern that a persistent presence of wolves may negatively impact their property and business values. This analysis considers the potential and scale for both the direct and indirect effects on ranches whose livestock is affected by the presence of Mexican wolves. Each of these effects is discussed in greater detail below.

Table 4-1. Potential Economic Effects of Mexican Wolves on Ranching Establishments

Direct Effects:
1. Lost value of depredated cattle
Indirect Effects:
1. Non-lethal physiological impacts on ranch animals
2. Change in forage use
3. Need for additional labor
4. Increased expenditures on supplies
5. Positive impacts
Property Value Impacts:
1. Ranchers have expressed concerns that disproportionately affected ranches may go out of business due to wolf depredation impacts
2. Ranchers have expressed concern that the market value of their ranches may be reduced due to wolf impacts.

Source: IEc, 2005 p. 3-1.

Direct Effects

Table 4-2 displays confirmed annual depredation, confirmed wolf-killed cattle, and the estimate of the number of cattle killed per 100 wolves within the Mexican wolf Blue Range Wolf Recovery Area. The average number of confirmed wolf-caused cattle depredations over 14 years is 12.3 cattle per year, and the rate of confirmed wolf-killed cattle projected per 100 wolves averaged 28.4 for the period (0.254

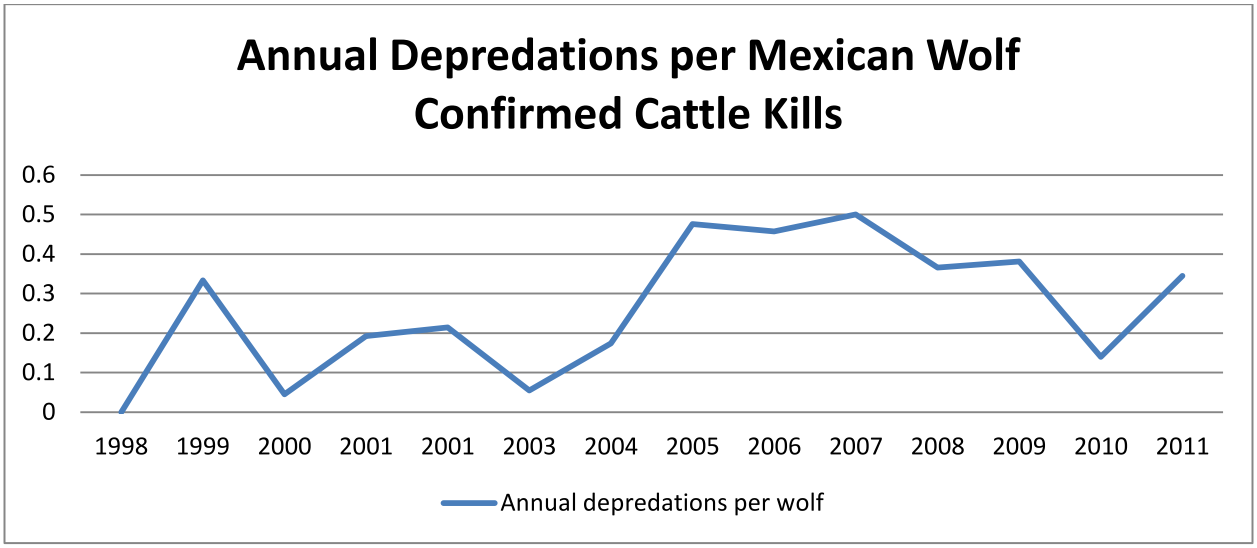
cattle killed per wolf). Historical confirmed depredations per wolf are illustrated in Figure 4-1. Depredations per wolf ranged from a low of 0.045 in 2000 to a high of 0.5 in 2007. Because the Mexican wolf population has yet to reach 100 wolves, the highest number of confirmed cattle killed by Mexican wolves was 27 in 2006. In that year, there were 59 wolves in the BRWRA.

The Service recently reviewed the USDA-Wildlife data base for depredated cattle to better understand the type of cattle being depredated by Mexican wolves. Based on a review of the data between the years 1998 and 2012 there were 204 confirmed depredations. From this sample, 27 percent were cows, 68 percent were calves, two percent were bulls, and three percent were yearlings.

Table 4-2. Confirmed Mexican Wolf Cattle Depredations 1998 -2012.

Year	Minimum Wolf Population Count (Observed)	Confirmed Wolf Killed Cattle	Number of Cattle Killed per 100 Wolves
1998	5	0	0
1999	15	5	33.3
2000	22	1	4.5
2001	26	5	19.2
2001	42	9	21.4
2003	55	3	5.4
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	34.0
2012	75	18	24.0
Average	43.3	12.3	28.4

Source: Draft EA for the Direct Initial Release of Captive-Raised Mexican Wolves within the Secondary Recovery Zone of the Blue Range Wolf Recovery Area, January 3, 2013, Table 3-2 and US Forest Service estimates for authorized use in the Apache-Sitgreaves and Gila National Forests.



Source: Division of Economics, U.S. Fish and Wildlife Service.

Figure 4-1. Annual Depredations per Mexican Wolf Confirmed Cattle Kills.

Research suggests that for every confirmed kill identified by the Service there are additional kills that are unconfirmed. Unconfirmed kills are somewhat a natural by-product of how the industry operates. Cattle and calves are typically released onto large public forage areas during summertime months and are not individually monitored. Cattle can go missing for a number of reasons including depredations by other predators (NMSU Report 77), draught and starvation, and accidents. Consequently, it can be difficult to precisely determine the number of cattle killed or injured by Mexican wolves. Oakleaf et al. (2003) found that on a large allotment in central Idaho that conditions associated with the allotment lead to a low detection rate for depredated cattle. They concluded that compensation programs in the area could be underpaying ranchers up to a factor of one-eighth due to undetected depredations from wolves. In other words, only one out of every eight cattle killed by wolves was discovered and confirmed. Based partly on this research, compensation programs in the northwestern U.S. have adopted a compensation ratio of 7:1 (Steele 2013). For every confirmed kill, these programs assume that six other mortalities that could not be confirmed due to factors such as remote locations, limited means, limited personnel, and scavenging by other predators making detection difficult after a period of days. The Adobe Ranch was also the subject of a paper published by the New Mexico State University Range Improvement Task Force (Reestablishment of the Mexican Gray Wolf: The Economics of Depredation, report 80.) This report focused on calculating the full financial and economic impacts to the ranch based on the ranch's self-assessment of the number of livestock killed by wolves. The report estimates based on the assessment of the ranch that wolves were likely responsible for annual calf mortality of 1.1 percent in 2002 upwards to 18.9 percent in 2005. Because these estimates could not be verified and were not scientifically collected this analysis instead relies on the Breck study.

While several depredation studies have been conducted on gray wolf behavior, the Service is aware of only one published scientific study that looked at cattle mortality and detection rates in the Mexican wolf recovery area (Breck et al. 2011). This study radio-tagged calves at two different ranches on opposite sides of the BRWRA and monitored them throughout the season. The East Eagle ranch was monitored for 3.5 years and a total of 618 calves were tagged. The Adobe ranch was monitored for 1.5 years and a total of 312 calves were tagged. Study areas differed in grazing practices, density of predators (mountain lions, black bears, coyotes, and Mexican wolves), and amount of effort monitoring cattle. Approximately 6.5 percent of the East Eagle calves that were tagged died and predators (especially mountain lions) were responsible for 85 percent of the deaths. Predators were responsible for none of the cattle deaths on the Adobe ranch although the authors note that some untagged cattle were killed by wolves during the study period. The authors only report ratios for producer-detected deaths and do not report ratios for Mexican wolf depredations. On the East Eagle, the producer detected 77.5 percent of mortalities and on the Adobe ranch the producer detected 33 percent of mortalities. The study found that calves selected by predators were on average 25 days younger than their cohorts.

Table 4-3 summarizes the finding for various peer-reviewed studies looking at the number of total cattle losses to confirmed kills. The first three studies focused on the impact from gray wolves while the last study (Breck et al. 2011) looked specifically at the impact associated with Mexican wolves. The average estimate for total cattle losses (both confirmed and unconfirmed kills) for every confirmed kill is 5.1:1. In other words, for every confirmed kill there are most likely 4.1 cattle that were also killed out on the range but not identified. This estimate is less than that adopted in the 5 year review because the inclusion of the Breck study, which specifically investigated depredations associated with Mexican wolves as opposed to the others that investigated depredation patterns with the gray wolf, lowered the overall average ration of unconfirmed to confirmed depredations due to its low detection rate.

Table 4-3. Development of Medium Estimate: Ratios of Estimated Total Livestock Losses to Confirmed Kills.

Source	Ratio
Bjorge and Gunson (1985)[e]	6.7:1
Oakleaf et al. (2003)[f]	8:1[b]
Sommers et. al (2010)	6.3:1
Breck et al.[g] (2011)	1.3:1; 3:1[h]
Average Cattle Ratio	5.1:1

Notes:

[a] The ratios of estimated total cattle losses to confirmed kills are based upon published estimates, although some ranchers also estimate these ratios. According to one rancher in the study area, all yearling and cow losses have been confirmed but few calf kills have been confirmed as resulting from wolf attacks. Comparing one estimate of the number of cow, yearling, and calf losses with the number of confirmed kills, the ratio equals approximately 29:1. Source: D. Ely, Arizona rancher, personal communication, March 4 and 24, 2005.

[b] Oakleaf et al. (2003) may overestimate the ratio of estimated total losses to confirmed kills because their study focused on calves, which are often particularly difficult to recover because they are consumed more rapidly.

[h] Breck et al. sampled depredation events on two different cattle ranches in the BRWRA. On one ranch they found that 77.5% of all depredations were detected and that on the other ranch only 33% of depredations were discovered. One the first ranch, Mexican wolves were responsible for 3 out of 40 depredations and on the second ranch wolves were responsible for none of the 6 depredated cattle. Detection rates were influenced by habitat and terrain as well as producer monitoring efforts.

Sources:

[e] As cited in Idaho Office of Species Conservation (2004), Idaho Wolf Depredation Compensation Plan, accessed March 7, 2005, at http://www.accessidaho.org/species/wolf_plan_GS_feb_05.pdf.

[f] John K. Oakleaf et al. (2003), Effects of wolves on livestock calf survival and movements in central Idaho, Journal of Wildlife Management 67(2): 299-306.

Table 4-4 shows the total estimated number of cattle killed both confirmed and unconfirmed for the years 1998 through 2012 in the BRWRA based on the number of confirmed kills. The average number of cattle killed (both confirmed and unconfirmed) in any given year during this period is estimated to be 62.1 cattle based on an average of 43 wolves. In 2012, there were an estimated 75 wolves and a corresponding estimate of 91 depredations. This corresponds to a depredation rate of 1.2 cattle per wolf or 121 per every 100 wolves. Extrapolating this data to calculate the impact per 100 wolves suggests that on average there would be 131 depredations with a total current market value of $129,710 (2013 dollars). Over the years, depredations per 100 wolves ranged from a low of none, when they were first introduced to a high of 253 in 2007. The average annual estimated number of depredated cattle is 130.8 per 100 wolves or about 1.3 depredated cattle per wolf.

Table 4-4. Estimated Total Mexican Wolf Cattle Depredations in the Blue Range Wolf Recovery Area 1998 – 2012.

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	5	0	0	0.0	0.0	0.0	0.0
1999	15	5	33.3	20.3	135.3	25.3	168.7
2000	22	1	4.5	4.1	18.5	5.1	23.0
2001	26	5	19.2	20.3	78.1	25.3	97.3
2002	41	9	22.0	36.5	89.1	45.5	111.1
2003	55	3	5.5	12.2	22.1	15.2	27.6
2004	46	8	17.4	32.5	70.6	40.5	88.0
2005	42	20	47.6	81.2	193.3	101.2	241.0
2006	59	27	45.8	109.6	185.8	136.6	231.6
2007	52	26	50.0	105.6	203.0	131.6	253.0
2008	52	19	36.5	77.1	148.3	96.1	184.9
2009	42	16	38.1	65.0	154.7	81.0	192.8
2010	50	7	14.0	28.4	56.8	35.4	70.8
2011	67	20	29.9	81.2	121.2	101.2	151.0
2012	75	18	24.0	73.08	97.44	91.08	121.44
Average	43.3	12.3	25.9	49.8	105.0	62.1	130.8
Total		**184.0**		**747.0**		**931.0**	

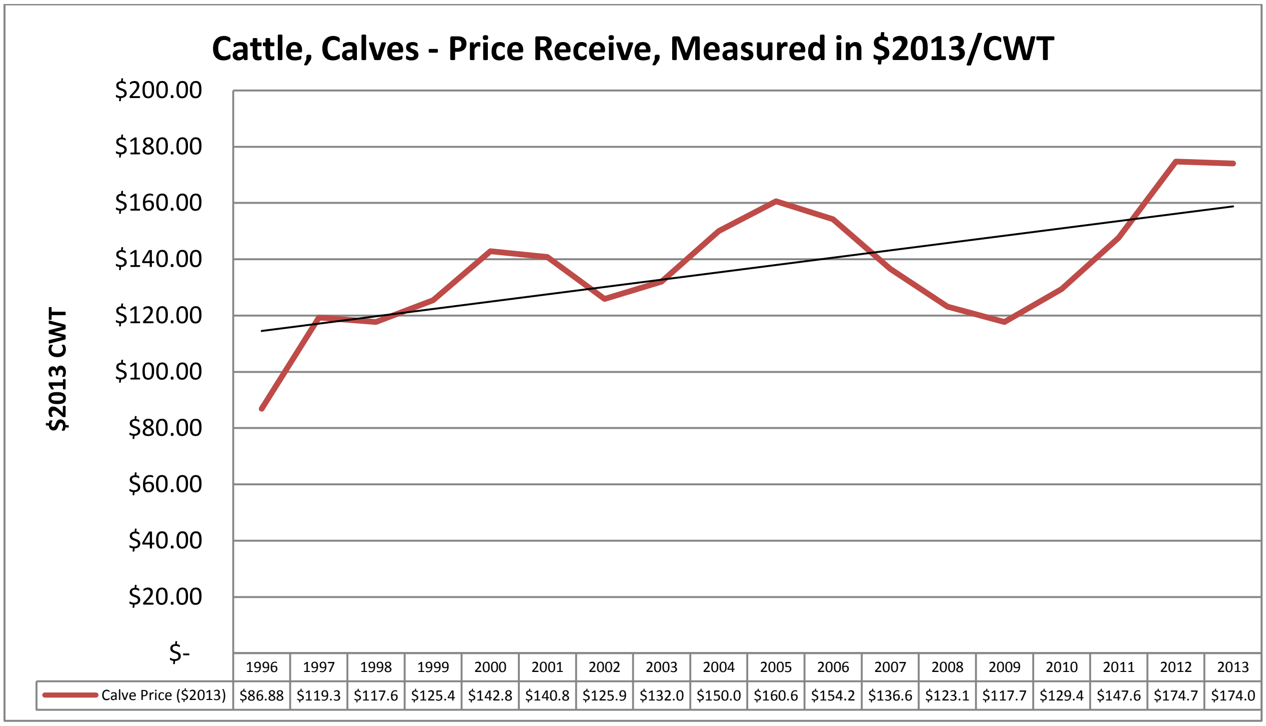
Source: AMOC and IFT 2005: TC-15; USFWS 2004; USFWS 2005; USFWS 2006; USFWS 2008; USFWS 2009, USFWS 2010a, USFWS 2011. Email from Jon Olson, April 1, 2014.
(1) Unconfirmed kills estimated to be 4.1 cows/calves killed for every confirmed kill.

Confirmed depredations recorded in the USDA-Wildlife Services database was reviewed to determine the type of cattle killed by Mexican wolves. Since 1998, 27 percent of the kills were classified as cows, 68 percent were classified as calves, two percent were classified as bulls and three percent were classified as yearlings.

Depredations represent a very small percentage of cattle estimated to range within the BRWRA. In 2012 there were 18 confirmed cattle depredations and an estimated 73 unconfirmed depredations for a total estimate of 91 cattle. These depredations were based on a population estimate of 75 Mexican wolves. Depredations in this year accounted for 0.1 percent of the regional inventory of estimated ranch cattle (Calculated as 91 total depredated cattle in the BRWRA divided by the 2012 estimate of ranch cattle in the five county BRWRA (97,686).

Market Value of Depredated Cattle

Figure 4-2 below shows how the average national market price received by ranches for calves fluctuates over time. Prices reported are in 2013 dollars. Nominal prices were adjusted using the Bureau of Labor Statistics Inflation Price Calculator. http://data.bls.gov/cgi-bin/cpicalc.pl. NASS no longer reports prices for individual states. The chart shows that although prices have trended upwards, in real terms since 1996, the market is cyclical. 1996 was the lowest year for prices ($86.88/cwt, $2013) followed by 2002 ($125.90/cwt, $2013) and 2009 ($117.72/cwt, $2013). Peak years include 2000 ($142.83/cwt, $2013), 2005 ($160.65/cwt, $2013), and 2012 ($174.73/cwt, $2013). Over this time period, the average price received was $136.24/cwt in 2013 dollars. Currently the market is at a very high price point.

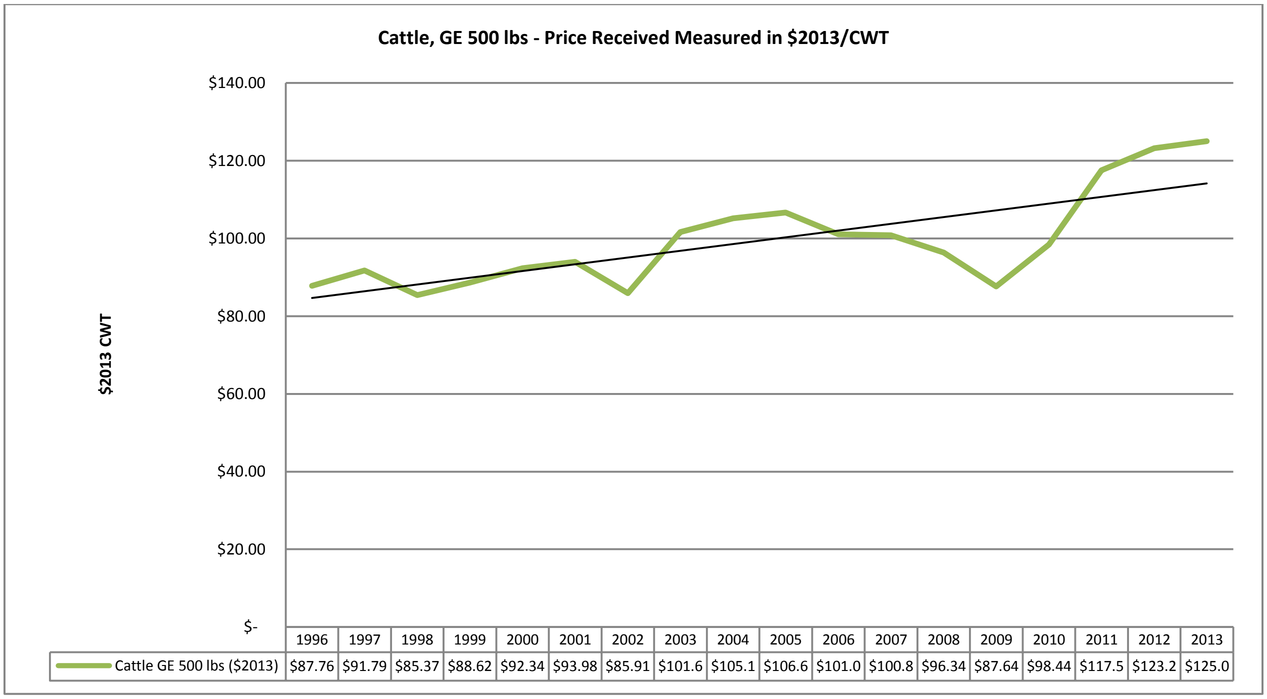


Source: National Agricultural Statistics Service, US Department of Agriculture.
http://www.nass.usda.gov/Statistics_by_Subject/index.php; accessed 10/21/2014.

Figure 4-2. Cattle, Calves – Price Received. Measures in $2012/CWT.

Calves are most typically born in the springtime and graze along with their mothers until they become weaned in the fall and sold at auction. Typical weight for a calf sold at auction is approximately 500 lbs. Steer calves may weigh slightly more and heifer calves slightly less but 500 lbs. is a typical auction weight for a healthy calf. Based on the 2013 average national price of $174/cwt, a 500 lb. calf would sell at auction for $870. In 2009, a low price year, an identical 500 lb. calf would sell for $589 at auction, about 30 percent less than current value. The average price received, in 2013 dollars between the period 1996 and 2013 in 2013 dollars was $136.63 per hundred weight.

A typical cow/calf operation will also sell a number of culled cows in any given year. Cows are culled from the herd and sold at market either because they are no longer productive in producing calves or because the rancher is downsizing the herd to reduce cost (e.g., drought effects on feeding cattle). The average price received for cattle greater than or equal to 500 lbs. is less than that received for cattle on a price per hundred weight (cwt) (Figure 4-3). Culled cattle are typically over 1,000 pounds in weight when sold at market and instead of being shipped to feeder lots like the majority of the calves sold are instead transported directly to slaughter facilities. Nonetheless, the price cycle for cattle mirrors that for calves. The year 2013 was a high price year for cattle, where on average the price received by ranchers was $125 per hundred pounds. Based on a presumed weight of 1,000 pounds, the culled cow would be valued at $1,250.



Source: National Agricultural Statistics Service, US Department of Agriculture.
http://www.nass.usda.gov/Statistics_by_Subject/index.php; accessed 10/21/2014.

Figure 4-3. Cattle, Greater than or Equal to 500 Pounds – Price measured in hundred weight.

Table 4-6 shows the estimated market value for the total number of estimated cattle depredations since 1998. The market valuation estimates are based on the calculation of a depredated cattle unit. Based on depredation data, as earlier discussed, approximately 68 percent of all depredated cattle are calves with the remainder cows, bulls, or yearlings. The value of a depredated cattle unit is defined as 68 percent of the 2013 market value of an average weight calf (500 lbs.) and 32 percent of the 2013 market value of an average weight culled cow (1,000 lbs.). As previously discussed, the 2013 market price for calves was $174/cwt and for cattle greater than 500 pounds, $125/cwt.

Because 2013 prices are historically high the estimates will overstate actual losses in low price years. Nonetheless the table gives a good sense of the value of cattle killed by wolves over time. The total estimated market value loss since 1998 is about $923,200 for 931 depredated cattle (confirmed and unconfirmed). On average there were about 62 depredations (confirmed and unconfirmed) by wolves in any given year, which given the number of wolves present equates to about 1.3 cattle killed for every wolf (or 130.8 depredations for every 100 wolves). Table 4-6 also shows the hypothetical 2013 market value for the estimated number of depredated cattle for each year under the operating assumption that there are 100 wolves in the BRWRA. Based on the observed rate of confirmed and unconfirmed depredations during the period 1998 through 2012 the presence of 100 wolves would result in a total market value loss of approximately $130,000 (2013 dollars) each year.

Table 4-6. Estimated Market Value for the Total Estimated Number of Depredated Cattle (Confirmed and Unconfirmed) 1998 – 2012, $2013.

Year	Total Estimated Kills	Mkt Value ($2013)	Total Estimated Kills per 100 Wolves	Mkt Value ($2013)
1998	0.0	$0	-	$0
1999	25.3	$25,087	168.7	$167,250
2000	5.1	$5,017	23.0	$22,807
2001	25.3	$25,087	97.3	$96,490
2001	45.5	$45,157	111.1	$110,140
2003	15.2	$15,052	27.6	$27,368
2004	40.5	$40,140	88.0	$87,261
2005	101.2	$100,350	241.0	$238,928
2006	136.6	$135,472	231.6	$229,614
2007	131.6	$130,455	253.0	$250,875
2008	96.1	$95,332	184.9	$183,332
2009	81.0	$80,280	192.8	$191,143
2010	35.4	$35,122	70.8	$70,245
2011	101.2	$100,350	151.0	$149,776
2012	91.1	$90,315	121.4	$120,420
Average	62.1	$61,548	130.8	$129,710
Total	931.0	$923,219	1,962.1	$1,945,649

Estimating Effects on Affected Ranches

It is often cited that the livestock industry is extremely cyclical and that returns on investment are seemingly lower than alternative investments (Fowler 1984). What then makes the ranching industry persist in the Southwest? It is a combination of factors including not only economic but also environmental and cultural factors. It stands to reason however, that for a ranching operation to persist in the long-term it must provide some sort of positive rate of return. Ranchers may be willing to accept lower rates of return than alternative options because of extraneous factors such as quality of life but if the operation cannot provide a long-run positive return the ranch would not be economically feasible. In response, ranchers often derive supplemental income from non-ranching activities. This may include holding a second job, relying on a spouse's non-farm income, or developing alternative economic activities on the ranch unrelated to livestock grazing such as hosting private hunts.

While the total depredation impact on the overall size of the herd grazing on in the BRWRA is minimal it is feasible that some ranches could be disproportionately affected by depredation events depending on the size of their ranch operations. The ranching industry can be characterized as operating in a perfectively competitive market. Each rancher produces more or less an indistinguishable product from one another (beef cattle) and sells their product on open markets. Ranchers are price takers to the extent that they are unable to significantly differentiate their product and charge a premium. Consequently, ranchers must monitor the markets carefully in order to produce enough cattle to maximize profits given their own unique cost of production factors to ensure the continuity of their operations. Firms operating under such market conditions ideally aim to produce and sell enough calves and cattle up to the point where the price received for one additional unit is equivalent to their marginal cost of production.

Currently Mexican wolves range only in the BRWRA. Of the five counties comprising the BRWRA, there were an estimated total of 2,300 (2,301) cattle ranches raising a total of nearly 100,000 (97,686) cattle in 2012. Over one-half of the herd (58.4 percent) is raised by five percent of the total number of ranches (119). Nearly 90 percent of the ranches raise a herd of fewer than 50 head. Because Mexican wolves are not evenly dispersed throughout the area nor are ranches uniform in scale, some ranches have experienced depredation events while neighboring ranches have not (Breck et al. 2011, Ashcroft 2009).

The Breck et al. (2011) study followed Mexican wolf depredation events on both the East Eagle Ranch and Adobe Ranch. The publication found that there were three wolf depredations on 618 calves studied on the East Eagle Ranch and zero wolf depredations on 312 calves studied on the Adobe Ranch. A study out of New Mexico State University looked at the experience of several ranches and reported that for those ranches that experienced depredations, Mexican wolves were likely responsible for between 1.1 percent of annual mortalities and 18.9 percent between the years 2000 through 2006 (Ashcroft 2009). While these ranches reported effects, many other ranches did not report any direct effects and were excluded from the case study as the primary purpose of the study was to estimate the economic effect of depredations only on affected ranches.

While the economic cost of wolf depredations has been a small percentage of the total value of the livestock operations, the impact to affected ranches could be more significant (Muhly 2009). Annual depredation events have not been uniformly distributed across the ranches operating in wolf territories. Rather, wolves seem to concentrate in particular areas and to the extent that livestock are targeted by the pack for depredations some ranch operations will be disproportionately affected. Several studies have investigated the sensitivity of ranch operations to depredation events (Ashcroft 2009, Steele, 2013, and Breck et al. 2011.) Recent studies have looked beyond just the financial impacts of confirmed and unconfirmed depredations to consider indirect effects such as weight loss associated with stress (Ramler et. al. 2014). This section of the analysis will consider the sensitivity for both depredations and herd weight loss on an affected ranch in order to generalize the effect on a ranch's profitability.

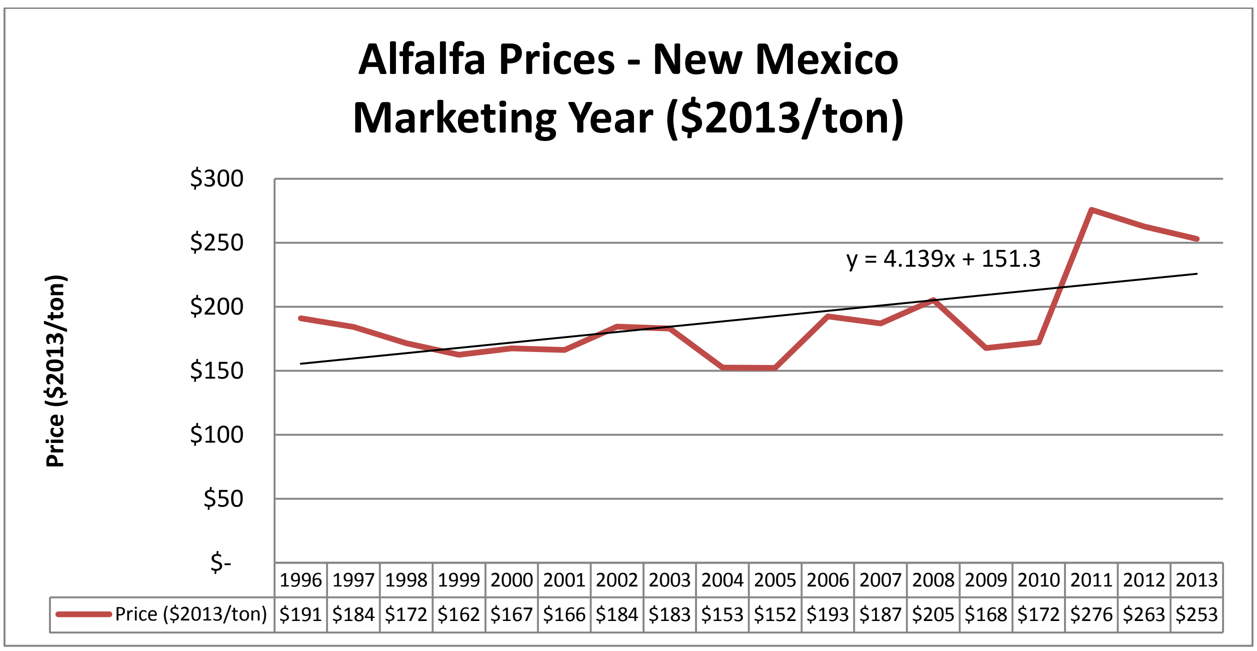
Many factors affect a ranch's profitability regardless of depredation events by wolves. Primarily, ranch operations are affected by market prices that they cannot control and that are difficult to predict as they have historically been very cyclical. Other risk conditions that cannot be controlled by ranchers include severe droughts that affect forage conditions, losses to predators other than wolves (e.g. coyotes, bears, bobcats, etc.), losses to nature (e.g., lightning strikes, flash floods, etc.), and the price of other necessary inputs such as supplemental feed and veterinarian prices. Given these risks and the difficulties involved in forecasting events it is not possible to precisely determine how individual ranches will be affected by wolves or depredations. Nonetheless, this section will consider how a typical ranch could be affected both directly and indirectly by wolves given a few simplifying assumptions for the purpose of illustrating the sensitivity of ranch operations to outlier events.

The New Mexico State University College of Agricultural, Consumer, and Environmental Sciences have been publishing cost and return estimates for farms and ranches since 2001 (ACES 2013, http://aces.nmsu.edu/cropcosts/). These reports illustrate the many different variables that a ranch operation has to account for in planning their annual budget. It is beyond the scope of this analysis to attempt to control for all of the various factors that can affect ranch budgets although it is noted that a few studies have attempted to do so particularly in regard to the effect that wolves have on operations (Steele, 2013, NMSU Report 80) (. Rather, the purpose of this section is to simply illustrate the sensitivity of ranching operations to depredations and other indirect effects.

To begin this simple analysis it is assumed that a ranch is a profit maximizing institution whereby profit is a function of revenue and expenses. Specifically, Profit = Revenue – Expense.

Given that ranching operations operate in markets that are highly, if not perfectly competitive, ranchers ideally attempt to equate the marginal cost of their operations to the market price for livestock (Marginal cost is defined as the incremental increase in total cost that results from a one unit increase in output). If the market price is greater than a rancher's average total cost then a profit is realized (Average Total Cost = Average Fixed Cost + Average Variable Cost.). However, if the price drops to a point on the marginal cost curve that lies below the average total cost then the rancher may still sell their cattle at market as long as the market price is greater than his average variable cost because the sales price would at least cover variable operating costs. If the price however drops below the average variable cost then the rancher would rationally choose not to sell any cattle at market if possible because to do so would mean that the cattle sold would not generate enough revenue to cover variable costs let alone recover any fixed costs (See McGuigan/Mopyer, Management Economics, Fifth Edition, Chapter 12 for further explanation). Consequently, to simplify the exercise of estimating the sensitivity of ranching operations to depredations this analysis will focus on short-run impacts as defined as: Short-Run Profit = Revenue – Variable Costs.

Primary factors currently affecting the market are rising auction prices, which increase revenues and rising supplemental feed prices, which increase costs. Hay/alfalfa (supplemental feed) prices are high due to the persistence of drought conditions in Arizona and New Mexico. Figure 4-4 shows the trend for alfalfa prices in the State of New Mexico. Prices are reported for the marketing year and were obtained from the USDA's National Agricultural Statistics Service. Prices were adjusted to 2013 dollars using the national Consumer Price Index. Prices have ranged from a low of $152/ton in 2004 and 2005 to a high of $275/ton in 2011. The 2013 marketing price was $253 per ton. In real terms prices have been increasing by about four dollars a ton each year.



Source: National Agricultural Statistics Service. http://quickstats.nass.usda.gov/results/AE86E639-DD40-3FC1-B763-94DD4D928EC8. Accessed 10/27/14.

Figure 4-4. National Hay Harvest and Prices ($2013) 1996 – 2012.

This simplistic overview adopts many of the elements from the New Mexico State University's 2013 Cost and Return Estimates for Ranches (ACES 2013, http://aces.nmsu.edu/cropcosts/). The ranch budgets published by NMSU cover different geographical portions of the state and are broken down into three model ranch sizes, small, medium, and large. For the purposes of this sensitivity analysis the southwest ranch profiles were used. Table 4-7 below highlights key model assumptions that went into this sensitivity profile.

Table 4-7. Model Ranch Baseline Operation Assumptions.

Model Ranch Operations Assumptions			
	Small	Medium	Large
Breed Herd Size	52	150	263
Replacement Heifers Kept	8	23	39
Cow to Bull ratio	15	15	15
Calf Crop Percent	85%	85%	85%
Cull Rate	15%	15%	15%
Steer Calf Weight	500	500	500
Heifer Calf Weight	475	475	475
Cow Weight	900	900	900
Steer Weight	1,000	1,000	1,000
Calf Price ($/cwt)	$ 174.00	$ 174.00	$ 174.00
Cow Price ($/cwt)	$ 125.00	$ 125.00	$ 125.00

Feed Expense Assumptions:

<u>Federal Leases</u>

- Permit cost is $1.35 per Animal Unit Month
- Cattle are grazed on Federal Lands eight months of the year

<u>Hay/Alfalfa</u>

- Cattle on average require one-half ton of hay per month when not grazing on Federal lands
- Price of Alfalfa is $253 per ton based on USDA Market News Weekly New Mexico Hay Summary

<u>Salt and Mineral</u>

- Cattle require on average 0.1 lbs per day
- 50 lbs of salt cost five dollars ($5)

Source: NMSU Ranch Budgets, USFWS Division of Economics

Table 4-8 shows the results of the simplistic pro-forma analysis under simple, baseline assumptions (i.e., no wolf effects). The analysis shows that based on current market prices and feed costs the typical small ranch must sell 41 of its 44 cattle in order to cover its variable operating costs. Medium ranches must sell 105 of their cattle and large ranches must sell 197 cattle just to break even with the variable cost of production. This leaves the small ranch with three cattle, the medium ranch with 23 cattle and the large ranch with 28 cattle to sell at market to earn profits above variable costs for the year.

Table 4-8. Model Ranch Analysis Results.

		Small	Medium	Large
Revenues	Steer Calves	$ 19,227.00	$ 55,680.00	$ 97,244.25
	Heifer Calves	$ 11,653.65	$ 33,679.88	$ 60,148.54
	Cull Cows	$ 9,000.00	$ 25,875.00	$ 43,875.00
	Cull Bulls	$ -	$ 1,250.00	$ 2,500.00
Feed Expenses	Federal Lease	$ 561.60	$ 1,620	$ 2,840
	Hay/Alfalfa	$ 26,728	$ 77,100	$ 135,182
	Salt and Minerals	$ 189.80	$ 548	$ 960
Other Variable Cost	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	$ 39,880.65	$ 116,484.88	$ 203,767.79
	Total Cost (Variable)	$ 37,011.40	$ 95,743.50	$ 178,206.35
	Profit	$ 2,869.25	$ 20,741.38	$ 25,561.44
	Breakeven Cash Price ($/cwt)	$ 148.36	$ 131.05	$ 139.71
	Breakeven Cattle Sales	41	105	197
	Number of Cattle Representing Profit	3	23	28

Source: US FWS Division of Economics

Compensation Programs

When the Mexican wolf reintroduction program began, the Defenders of Wildlife (Defenders) established the Bailey Wildlife Wolf Compensation Trust to compensate ranchers who lost animals to Mexican wolves. The program paid ranchers for 100 percent of the market value of confirmed kills, 50 percent of the value for a probable kill, and 100 percent of the veterinary services to treat an injured animal or the decreased market value of the animal. This program was terminated on September 11, 2010 due to federal legislation that made available up to $1 million for wolf depredation compensation and nonlethal deterrence programs (Public Lands Management Act 2009). During the life of the Trust Fund, it paid out approximately $1.4 million to nearly 900 different livestock producers for over 1,300 cattle depredations and nearly 2,500 sheep (Defenders, 2009). These figures include payments made for both gray and Mexican wolves. For Mexican wolves specifically, the Fund paid out over $115,000 that covered 168 cattle, 10 sheep and 10 other incidents (Defenders, 2009). It was the policy of the Trust to pay 100 percent of the market value of confirmed kills and 50 percent market value for probable kills.

As the Bailey Trust wound down, the Service, in cooperation with the National Fish and Wildlife Foundation, established the Mexican Wolf/Livestock Interdiction Trust Fund (Trust Fund), which was founded on September 23, 2009. The objective of the Trust Fund is to generate long-term funding for prolonged financial support to livestock operators within the framework of cooperative conservation and recovery of Mexican wolf populations in the Southwest. Funding is given to initiatives that address management, monitoring, and proactive conservation needs for Mexican wolves as they relate to livestock protection, measures to avoid and minimize depredation, habitat protection, species protection, scientific research, conflict resolution, compensation for damage, education, and outreach activities. The Trust Fund is overseen by an 11-member council that has the authority to identify, recommend, and approve conservation activities, identify recipients, and approve the amount of the direct disbursement of Trust Funds to qualified recipients. It is also the policy of the Trust Fund to pay 100 percent of the market value of confirmed depredated cattle and 50 percent market value for probable kills.

Rancher Time Spent Applying for Compensation

For each compensation claim, ranchers were estimated to need approximately ten hours to identify the carcass, coordinate the inspection with wildlife agents, complete necessary paperwork, and correspond and negotiate with authorities until payment is received. This section estimates the time spent on confirmed cattle depredations within the BRWRA. While more losses may have occurred, this analysis assumes that these carcasses were never identified and, therefore, ranchers did not spend time applying for compensation claims. To the extent that ranchers spent time on claims that were not identified as confirmed this analysis would understate the total economic impact of the time associated with seeking compensation. The analysis values an hour of time at $33.65 in 2013 dollars, based on U.S. Department of Labor Statistics mean hourly wage rate for farmers, ranchers, and other agricultural managers.[1] The time spent preparing claims (ten hours total) is based on the five year review (IEc 2005) and the level of effort associated with preparing claims is expected to remain constant. Table 4-9 shows that ranchers spent a total of 1,840 hours at an economic cost of nearly $62,000 ($2013) preparing compensation claims from 1998 to 2012.

[1] Occupational Outlook Handbook. U.S. Department of Labor, Bureau of Labor Statistics. http://www.bls.gov/ooh/management/farmers-ranchers-and-other-agricultural-managers.htm Accessed 10/27/14.

Table 4-9. Economic Cost of Compensation Claim Preparation for Confirmed Cattle Depredations in the BRWRA. .

Year	Confirmed Cattle Depredations (fatal)	Preparation Hours	Hourly Rate ($2013)	Economic Cost ($203)
1998	0	0	$33.65	$ -
1999	5	50	$33.65	$ 1,683
2000	1	10	$33.65	$ 337
2001	5	50	$33.65	$ 1,683
2002	9	90	$33.65	$ 3,029
2003	3	30	$33.65	$ 1,010
2004	8	80	$33.65	$ 2,692
2005	20	200	$33.65	$ 6,731
2006	27	270	$33.65	$ 9,086
2007	26	260	$33.65	$ 8,750
2008	19	190	$33.65	$ 6,394
2009	16	160	$33.65	$ 5,385
2010	7	70	$33.65	$ 2,356
2011	20	200	$33.65	$ 6,731
2012	18	180	$33.65	$ 6,058
Total	184	1,840	$33.65	$ 61,922

Sources: US FWS Mexican Wolf Annual Progress Reports, IEc 2005, and US BLS

Physiological Impacts on Livestock

In addition to depredation, the presence of wolves in proximity to livestock may induce behavioral changes in livestock that result in physical effects. For example, livestock may lose weight because wolves force them off of suitable grazing habitat or away from water sources (Steele, 2013, NMSU Report 80). Livestock may try to protect themselves by staying close together in protected areas where they are more easily able to see approaching wolves and defend themselves and their calves. A consequence of such a behavioral change would likely be weight loss, especially if the wolves are allowed to persist in the area for a significant amount of time. The weight loss would be associated with the cattle's fear of roaming away from the herd to forage in areas away from the safety of the herd or even in nearby areas in mixed conifers or shrub lands that offer hiding places for predators. Decreased feeding, drinking, and increased agitation rates may also lower birthrates by reducing conception levels and causing miscarriages (NMSU Report 80).

One report from the Range Improvement Task Force out of New Mexico State University considered the effects of wolf depredations on the Adobe Ranch. The Adobe Ranch was selected as a case study because it suffered a relatively large number of depredations in 2007. Specifically, the study reports that in 2007 Ranch depredations included 13 confirmed kills, one probable, and four possible (NMSU Report 80). Adobe Ranch confirmed depredations in this year represented 46 percent of all confirmed depredations as reported to the Bailey Wildlife Foundation Wolf Compensation Trust in New Mexico. The report found that after controlling for forage production/precipitation that the average daily weight gain (ADG) for steer on the ranch for the years 2002 through 2006 was 0.08 lbs/day. This was considered to be average for the area when fall weaned calves are retained. In 2007, however, the ADG for steer was estimated to be -0.75 lbs/day, which resulted in a market loss of $108.83 per weaned steer. The authors note that while the case study is descriptive of how an individual ranch can be indirectly affected by wolves that the data cannot be extrapolated due to the fact that the data were not generated from a controlled study.

At least two other reports considered the effect of predations on calf production. Ramler et al. (2014) found that ranches that experienced a confirmed cattle depredation by wolves had a negative and statistically significant impact of approximately 22 pounds on the average calf weight across their herd. Assuming an average steer calf weight of 500 pounds at auction and a heifer calf weight of 475 pounds, a 22 pound loss represents a weight loss of between 4.4 and 4.6 percent. Another report estimated that predation pressure on cattle can decrease average calf weaning weights by 2 percent to 10 percent (Steele 2013). Again, these estimates were based on limited data.

Using a mid-point estimate of six percent weight loss for calves at the time of auction, Table 4-10 shows the impact on the baseline model for small, medium, and large ranches (Table 4-7) assuming that wolves were allowed to persist throughout the foraging year and thus stress the entire herd resulting in an average weight loss of six percent from expected baseline conditions at the time of sale. The table shows that under the 2013 market price ($174/cwt for calves and $125/cwt for cows and bulls) a six percent weight loss for calves, cows, and bulls would reduce profits by $2,393 for a small ranch, $6,989 for a medium sized ranch, and by $12,226 for a large sized ranch.

Table 4-10. Financial Effect of Six Percent Weight Loss on Model Ranch Herd at Time of Sale.

	Small	Medium	Large
Baseline Conditions			
Total Revenue	$ 39,881	$ 116,485	$ 203,768
Total Cost (Variable)	$ 37,011	$ 95,744	$ 178,206
Profit	$ 2,869	$ 20,741	$ 25,561
Alternate Conditions (six percent weight loss)			
Total Revenue	$ 37,488	$ 109,496	$ 191,542
Total Cost (Variable)	$ 37,011	$ 95,744	$ 178,206
Profit	$ 476	$ 13,752	$ 13,335
Expected Gain or Loss			
Total Revenue	$ (2,393)	$ (6,989)	$ (12,226)
Total Cost (Variable)	$ -	$ -	$ -
Profit	$ (2,393)	$ (6,989)	$ (12,226)

Source: US FWS Division of Economics, 2014

Change in Forage Use

Evidence suggests that the number of depredations is dependent on the proximity of livestock to wolf den and rendezvous sites. For this, or other reasons, ranchers may feel compelled to modify grazing practices in an attempt to avoid wolves. Rancher responses could include herding or hauling livestock to different portions of their grazing allotment or bringing livestock off the range. Federal grazing permits are issued with restrictions concerning when certain pastures can be grazed with how much livestock. These restrictions are reflections of range and forage conditions and not commonly adaptable to changes in depredation threats from predators.

While ranchers have described instances in which they have hauled livestock to different grazing areas or purchased additional land, estimates do not exist regarding the frequency or nature of these actions across the BRWRA. Therefore, this analysis is unable to quantify the economic impacts of modifying grazing activities in response to the reintroduction of Mexican wolves into the BRWRA.

Need for Additional Ranch Labor

Changes in ranch management techniques in order to avoid livestock depredation by wolves may require additional time on behalf of ranchers and their employees. Ranchers reported in the Five-year review that they often increased herd supervision when wolves are in the area. In addition, they spent time treating injured cattle, moving cattle to new grazing areas, checking cows for pregnancy that may have aborted due to wolves, and implementing new management techniques to avoid the predators. For example, one rancher volunteered to tag her cattle with radio transmitters in order to better track her livestock and depredation incidents as part of an independent study. While the USFWS compensated her for the material, the agency did not reimburse her for the time that she spent tagging the animals (Breck et al. 2011).

Ranchers also reported spending time when they applied for wolf compensation. The Five-Year review (IEc 2005) estimated that each compensation requires approximately ten hours for the rancher to locate the livestock carcass, wait for a wildlife agent to inspect the kill, complete the necessary paperwork, and conduct any further correspondences or negotiations to ensure that payment is received. The Defenders compensation program, however, only compensated ranchers for the value of the lost livestock; payments did not reimburse ranchers for the time spent to receive compensation.

Due to the additional time that ranchers and employees must spend on various activities when wolves are in proximity to cattle, they may have to reduce time spent on other activities such as ranch maintenance and improvement. For example, ranchers are concerned that they may not have time to repair fences, and cattle may escape. In some cases, ranchers have hired additional employees specifically for the purpose of supervising livestock when wolves are in the area. While the Defenders have ceased providing compensation payments for cattle Defenders and the Mexican wolf fund provides funds for proactive projects. Defenders continues to offer expertise and funds for such proactive programs as:

- Using guard dogs to alert herders and range riders of nearby wolves;
- Using porTable Dencing or fladry to secure livestock overnight;
- Using nonelethal hazing techniques (such as shining bright lights or firing loud starter pistols to frighten off wolves);
- Supporting good husbandry practices such as removing dead carcasses that may attract wolves; and
- Moving livestock to grazing pastures away from wolf dens to avoid conflicts.

In 2011 the Service formed the Mexican Wolf/Livestock Coexistence Council, which is composed of ranchers from Arizona and New Mexico, conservation groups, Native American tribes, and coalitions representing rural communities in the area. The Council works with ranchers to promote strategies for avoiding conflicts with Mexican wolves. Funds are available to ranchers through the Council to fund conflict avoidance measures and to provide general compensation to ranchers having to incur additional management activities due to the presence of wolves. In 2014 the Council budgeted $500,000 for this type of support (Mexican Wolf Coexistence Council 2014 Strategic Plan).

This analysis recognizes that the reintroduction of Mexican wolves into the BRWRA has increased the amount of time that ranchers must spend managing their livestock. Credible data or studies however were not identified to quantify the economic impacts of additional hired labor or labor input from ranchers and family members or decreased time for other activities throughout the study area. Consequently, the analysis only calculates the economic impact of the estimated time that ranchers spend on the compensation process for depredation losses.

Additional Expenditures on Ranch Supplies

The presence of wolves may cause ranchers to purchase additional provisions and animals in order to protect livestock and maintain herd size. Some ranchers report purchasing more dogs in order to increase the number guarding herds. Furthermore, the presence of wolves may decrease the useful life of dogs from nine or ten years to five or six years because of the additional stress caused by the presence of wolves; thus, ranchers might need to replace the dogs more rapidly. Ranchers may also have to hold more calves as replacement heifers or buy more cows when large numbers are depredated in a particular year in order to maintain herd size and ensure future calf crops. Another material expense occurs if ranchers increase the frequency of visits to range areas in order to inspect livestock when wolves are in the area or if they haul livestock to different grazing areas. Either of these activities would require fuel and increase the wear on ranch vehicles. Finally, some ranchers have mentioned purchasing camping equipment for herdsmen so that they may sleep out on the range with the livestock in order to protect the animals from depredation.

Defenders and the Mexican wolf fund (two non-profit entities) have provided compensation to the ranchers for the material because they were able to demonstrate that the purchases were for the purpose of protecting livestock from wolf depredations. This analysis recognizes that ranchers have spent money on goods in order to better manage their operations in the presence of wolves. 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.

Property Value Impacts

Several public comments related to the five-year program review stated that the greatest economic impact of the wolf reintroduction is that ranch property values may be affected by wolf depredation. Commenters stated that ranches disproportionally affected by depredations and wolves could reach a threshold that drives them out of business. Additionally, commenters anticipated that even if ranches were not driven out of business that wolves could cause a decreased value of the ranch itself due to the threat of depredations. Thus, the public commenters made two general points: 1) conducting ranching operations on affected ranches could make ranching uneconomical; and 2) property values of ranches could be reduced due to a change in the public perception of that property and its desirability.

Numerous published studies have documented that livestock production frequently does not provide enough income to enter the ranching business, or even to continue operating a family ranch. Depending on ranch size, nominal rates of return from livestock are typically reported to be from negative amounts to about three percent (Torell 2001). Torell (2001)states that that "given the stated and observed desire to remain in ranching, perhaps the most reasonable assumption for policy analysis is that western ranchers will continue in business until forced to leave." Given observed rancher behavior, it is unclear that the presence of wolves would necessarily lead to ranchers leaving the industry.

Changes to private property values associated with public attitudes about the limits and costs of implementing the Reintroduction Project would be known as "stigma" impacts. However, the 5-Year Review found no evidence that the Mexican wolf population or reintroduction activities were having any notable effects regarding stigma (IEc 2005). At the time the 5-Year Review was conducted concern was also expressed about the differential rates of ranch appreciation for public land ranches compared to deeded land. The study concluded that the difference was primarily attributable to uncertainty about future grazing access on public lands and the many controversies associated with public land grazing, including issues such as grazing fees, NEPA compliance, and ESA compliance. Thus, wolf reintroduction activities may have been one of many factors, along with conservation activities for other endangered species, as well as other controversies and uncertainties, that contributed to a difference in appreciation rates for private versus public land ranches in the BRWRA but evidence did not exist that the Mexican wolf alone was responsible for a discernable effect.

A recent research report out of the College of Agricultural, Consumer, and Environmental Sciences within New Mexico State University looked at the trends in the market value of New Mexico ranches and grazing permits and explored the key factors that influenced the value of ranches (Torell et al. 2012). The authors noted that previous analyses increasingly showed that ranchland values were not solely a function of the income earning potential associated with livestock production. The authors cite recent studies that found amenity values such as scenic views and recreational opportunities were major factors affecting value. Torrell et al. (2012) looked at the value of ranchlands over the period 1996 to 2010 and developed a hedonic model to better understand the many different factors that influence ranchland values. They found that factors such as the amount of State and public land included on the ranch, ranch size and location, and hunting opportunities were all influential in the value of the ranch. However, the study also determined that the livestock earning potential of the ranch has been of declining importance over time and not statistically significant in their updated model. They note that this finding is consistent with another study that noted that pasture land values throughout the nation are being influenced by amenity and developmental factors.

Total Economic Impacts

Table 4-11 provides an estimate of the total economic impact incurred by cattle livestock ranchers due to the presence of the Mexican wolf since 1998. This analysis estimates that the total market value of depredated cattle since 1998 was nearly $1.0 million. Given that the number of wolves has fluctuated over the years it is estimated that on average each wolf is responsible for about $1,500 in economic impact to cattle ranching operations on an annual basis. Average annual impacts per wolf have ranged from a low of $243 per wolf in 2000 when they were first introduced to a high of nearly $2,700 per wolf in 2007. Since then average annual impacts have slowly declined, perhaps reflecting the increasing effectiveness of preventative programs.

Table 4-11. Total Economic Impact of Mexican Wolves on Cattle Ranching Operations in the BRWRA.

Year	Mkt Value of Confirmed and Unconfirmed Depredations ($2013)	Economic Cost of Compensation Claim Preparations (confirmed kills)	Total Economic Cost	Number of Wolves	Economic Impact per Wolf
1998	$0	$0	$0	5	$0
1999	$25,087	$1,683	$26,770	15	$1,785
2000	$5,017	$337	$5,354	22	$243
2001	$25,087	$1,683	$26,770	26	$1,030
2001	$45,157	$3,029	$48,186	41	$1,175
2003	$15,052	$1,010	$16,062	55	$292
2004	$40,140	$2,692	$42,832	46	$931
2005	$100,350	$6,731	$107,081	42	$2,550
2006	$135,472	$9,086	$144,559	59	$2,450
2007	$130,455	$8,750	$139,205	52	$2,677
2008	$95,332	$6,394	$101,727	52	$1,956
2009	$80,280	$5,385	$85,664	42	$2,040

2010	$35,122	$2,356	$37,478	50	$750
2011	$100,350	$6,731	$107,081	67	$1,598
2012	$90,315	$6,058	$96,373	75	$1,285
Average	$61,548	$4,128	$65,676	43	$1,518
Total	$923,219	$61,922	$985,141	n/a	n/a

Uncompensated Ranch Losses

While ranchers who did not or could not report livestock losses lost the production value associated with their lost livestock over the study period, some ranchers who did not report wolf depredation received compensation from the Defenders during the period 1998 through 2010 and from the Mexican Wolf/Livestock Coexistence Council (Coexistence Council) in 2011 and 2012. In theory, if the value of the livestock to the ranchers was compensated at a fair market value for the lost production value of the livestock, as well as the time and materials invested in reporting the claim, then the ranchers should have been "made whole" through these payments. Table 4-12 shows how depredation compensation compares to the estimate of total economic cost. With the exception of the inaugural year, compensation has been less than total estimated economic cost. As shown in the figure, uncompensated losses total over $800,000 and have been averaging about $53,500 per year.

Table 4-12. Estimated Uncompensated Cattle Livestock Operation Losses 1998 – 2012 ($2013).

Year	Total Economic Cost	Depredation Compensation	Uncompensated Losses
1998	$0	$540	-$540
1999	$26,770	$2,440	$24,330
2000	$5,354	$1,540	$3,814
2001	$26,770	$10,230	$16,540
2001	$48,186	$5,300	$42,886
2003	$16,062	$8,500	$7,562
2004	$42,832	$5,090	$37,742
2005	$107,081	$19,000	$88,081
2006	$144,559	$37,825	$106,734
2007	$139,205	$31,117	$108,088
2008	$101,727	$5,878	$95,849
2009	$85,664	$19,203	$66,461
2010	$37,478	$3,568	$33,910
2011	$107,081	$17,430	$89,651
2012	$96,373	$14,300	$82,073
Average	$65,676	$12,131	$53,545
Total	$985,141	$181,961	$803,180

(1) Total economic cost calculated as the market value of confirmed and unconfirmed depredated livestock plus the economic cost associated with applying for compensation.

(2) Compensation totals obtained from Exhibit 3-15 of the Five-Year Review, and the Mexican Wolf Annual Progress Reports. A small number of compensation claims were paid for non-cattle depredations. (Defenders reported that over the eleven year period 1998 through 2009 that there were ten sheep that qualified for compensation payments.) Due to the method that compensation payments were presented it was not feasible to subtract out the sheep payments.

Sheep and Lambs

As presented in Chapter 3, in 2012 there were 64,473 sheep and lambs within the five counties that constitute the BRWRA (of which the overall vast majority were located in Apache County, which has a significant portion of its boundaries lying outside of the BRWRA). Since Mexican wolves have been reintroduced into the BRWRA there have been only eleven documented sheep depredations. The majority of these (*n* = 8) occurred during 2007 on a single sheep allotment within the BRWRA. In subsequent years, the IFT worked with the sheep producer to implement proactive measures (night penning sheep in turbo fladry) to reduce the potential interaction. Sheep and wolves continued to occupy the same area through 2011 (with only one additional sheep depredation). In addition, only once did wolves kill more than a single sheep during predation attempts, and in that instance there were two sheep. Our experience in the BRWRA was limited to this one sheep allotment, but we did not observe the large number of sheep killed or injured that has occurred in the northern Rocky Mountain area. Accordingly, we do not expect situations were a large number of sheep are killed in one night in the MWEPA. However, we do expect wolf depredations to occur in areas where wolves occupy land grazed by sheep. Considering this pattern and the limited number of sheep depredations that have occurred in the BRWRA, we do not anticipate large numbers of sheep to be killed by Mexican wolves annually. While we expect no significant economic impact from wolf depredations on sheep, the low number of sheep in the BRWRA combined with limited depredation events does not allow for any reasonable prediction of economic impacts on sheep ranches at this time.

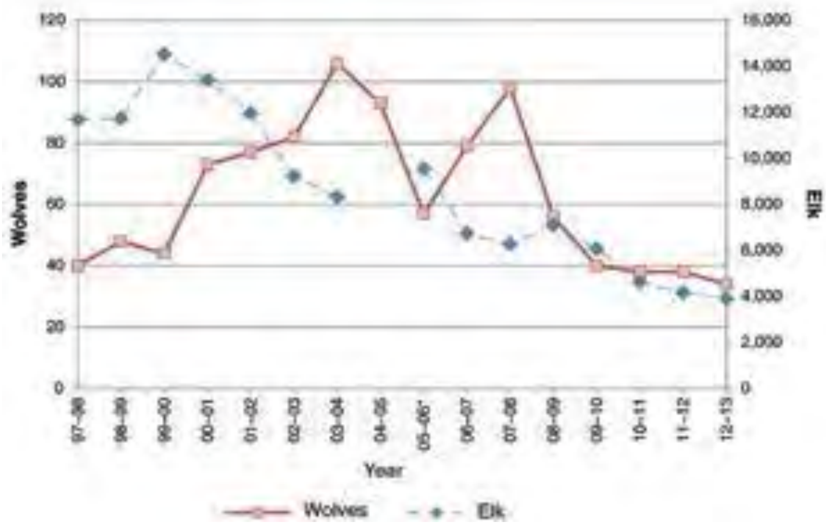
4.4.2 Impacts on Big Game (Elk) Hunting Activities

The AGFD conducted a review on the impact that Mexican wolves had on deer and elk populations. The review period was for the years 1998 through 2012 (AGFD 2013). The review found that while Mexican wolves do target elk as their primary prey source, including elk calves during the spring and summer season, there was no discernable impact on the number of elk calves that survive through early fall periods. A similar finding was made for mule deer. The review also reported that the number of elk permits authorized in GMU 1 and 27 by AGFD has varied since wolves were reintroduced into Arizona. The review reports that the variation is attributable to a variety of management-related objectives. Elk tags in Unit 1 declined from over 1,800 in 2003 to approximately 700 in 2007 and have since steadily risen back to nearly 1,800 in 2013. Elk availability for hunters, however, was not the reason for the decline.

Under cooperative management agreement with the WMAT Mexican wolves have occupied the Fort Apache Indian Reservation since 2001. The White Mountain Apache Tribe has stated, “So far, there have been no significant impacts to overall big game population numbers (per yearly surveys, animals have been moved by wolves, but also rotate back to areas)” due to wolf presence on the FAIR (MWRT Tribal Subgroup 2014).

There have been many more studies looking at the effect that the reintroduction of the gray wolf has had on elk hunting in the northern Rocky Mountains in contrast to the limited number of studies looking at the effect of Mexican wolves on elk populations and their movement patterns. Since 1996 the Yellowstone Wolf Project has annually published a report documenting how gray wolves are functioning within the Park (Smith 2013). In 2012, wolves were documented to have killed 159 elk, 32 bison, 13 mule deer, and other species. Elk constituted 62 percent of their diet. The composition of the elk kills was 40 percent cows, 28 percent calves, 21 percent bulls with the remainder yearlings or unknowns. Bison kills have been increasing over the years as the number of elk in the Park has decreased (Smith 2013).

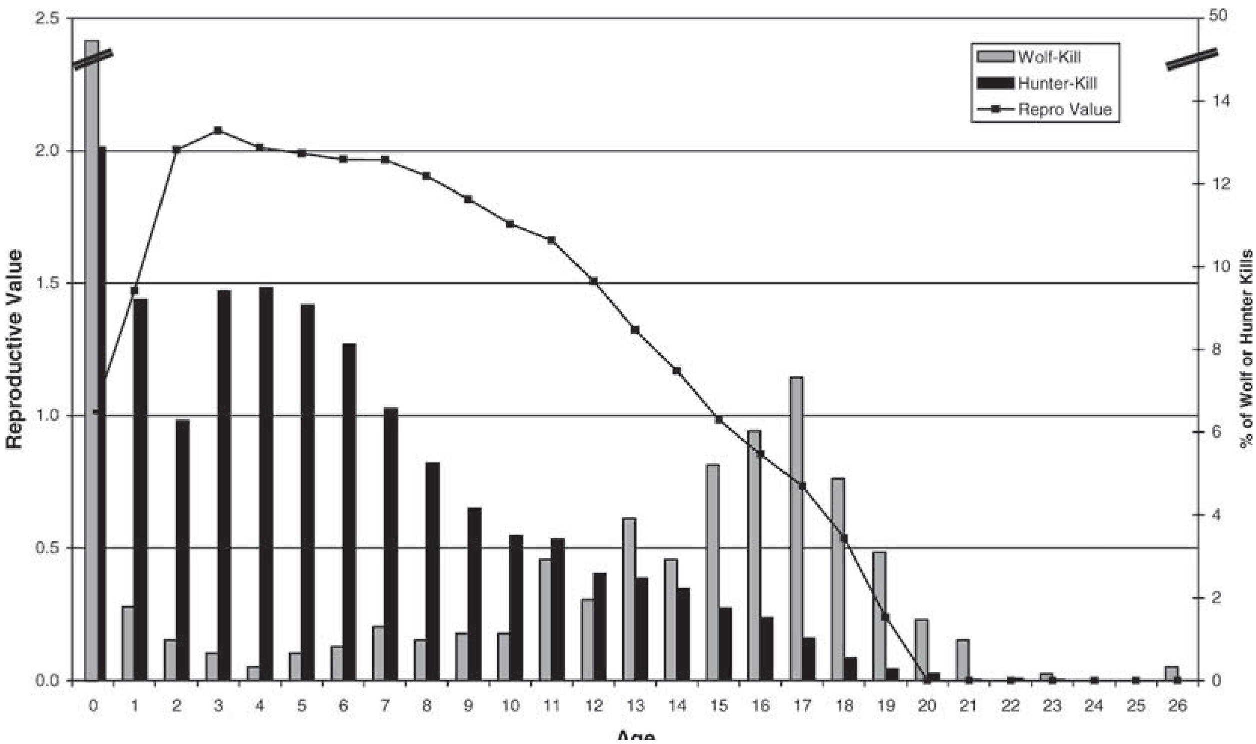
Since wolves were reintroduced into Yellowstone National Park, elk population numbers in the northern range of the park have declined by over 50 percent (Figure 4-5). However to what extent wolves have played in this decline remains unclear. Over the past five years both the number of wolves and the number of elk have declined at similar rates. Other factors affecting elk populations include other predators, management of elk outside of the Park, and the effect that weather has on forage (i.e., drought) (Smith 2013).



Source: Yellowstone Wolf Project, Annual Report 2012.

Figure 4-5. Yellowstone National Park northern range elk and wolf counts, 1995–2012.

One study looked at both the effects of hunting and wolf predation on reproductive female elk over time (Wright, et al. 2006) (Figure 4-6). They found that wolves tended to prey on unproductive elk such as calves and older cows. Specifically the authors report that the average age of a cow elk killed by wolves in the Northern Yellowstone area was 13.9 years while the average age of cow elk harvested by hunters was 6.5 years. In general, wolves harvested adult cows that were beyond productive, reproductive age while hunters tended to harvest elk cows with high reproductive potential. The authors conclude that the combined pressures of hunters targeting prime reproductive elk along with wolf predation on calves and overall depredations from other predators (e.g. grizzly bears) would lead to a decline in the future elk population.



Source: Wright, et. al. 2006.

Figure 4-6. Reproductive values of female northern Yellowstone elk and age distributions of hunter (Gardiner Late Hunt, 1996–2001) and wolf-killed females (1995– 2001)

Middleton et al. (2013) looked at whether the presence of wolves affected elk herds indirectly through changes in behavior, body fat, or pregnancy. The authors found that when wolves approached elk herds the herd response was to increase their rates of movement, displacement, and vigilance and that such encounters only occurred once every nine days in the high-risk areas. The authors conclude that while wolves have a direct effect on herd members through predation that their presence has little to no indirect effects.

At the moment it is difficult to identify a measurable effect that the reintroduction of Mexican wolves has had on big game hunting. Table 4-13 summarizes the rational for this conclusion for the concerns identified at the beginning of this section. Although less than significant impacts to wild ungulates (elk) are predicted by our biological resources analysis for Alternatives One and Two, we recognize that these alternatives include the proposed rule's definition for "unacceptable impact to a wild ungulate herd" and related take provision. In addition, the proposed rule specifies that tribal governments can request the removal of wolves from tribal trust land for any reason, which could include impacts to trophy game hunting. Therefore, we conclude that any hunting impacts that would occur could be mitigated down to no impact for these two alternatives. Therefore, we predict no significant direct or indirect adverse impact to big game hunting from Alternatives One and Two for Zones 1, 2, and 3. For Alternative Three, the definition of "unacceptable impact to a wild ungulate herd" and the related take provision are not included. Both Alternative Three and Alternative Four (for which we predict less than significant impacts to wild ungulates (elk) in our biological resources analysis), would rely on the definition and related take provision in the 1998 Final Rule for mitigation, "Impact on game populations in ways which may inhibit further wolf recovery". This provision is less responsive to impacts to wild ungulate populations (and therefore big game hunting entities) than the proposed rule. Based on the biological resources analysis and the lesser mitigation measure available under the 1998 Final Rule as compared to the proposed rule, we predict that a less than significant indirect adverse effect to hunting activity would occur in Zones 1 and 2 of Alternative Three and in the BRWRA for the No Action (Alternative Four) Alternative. We predict no impact in Zone 3 of Alternative Three due to no or very low wolf presence.

Table 4-13. Mexican Wolf Effects on Elk Hunting in the BRWRA - Summary of Conclusions

Concerns	Conclusion	Rationale
Big Game Population Effects	No discernable effect	Lack of scientific literature finding correlation between wolves and elk numbers. Other literature suggests changes in herd sizes more likely influenced by hunter harvest management objectives and natural forage conditions.
Effects of Hunter Visitation to the Region	No discernable effect	Licensed hunters have increased since 2007.
Hunting Success Effects	No discernable effect	Overall hunting success have not declined in the BRWRA for elk.
Lost Income/Costs to Outfitters	No discernable effect	Licensed hunter numbers in the BRWRA have not decreased.
Regional Economic Effects	No discernable effect	Regional economic effects would only occur should there be a significant reduction in hunting-related expenditures.

4.4.3 Tourism

If Mexican wolf reintroduction results in increased forest visits, these visits in turn would generate an increase in visitation and visitor expenditures in the local communities surrounding the National Forests. Proponents of reintroduction believe that an increase in tourism and associated expenditures would benefit souvenir shops, gas stations, restaurants, and lodging facilities (IEc 2005). Many of these proponents note how the reintroduction of gray wolves into Yellowstone National Park resulted in a stimulus of visits specifically to see wolves.

Anecdotally, the 2012 Yellowstone Wolf Project Annual Report (Smith et. al., 2013) reported a minimum estimate of 27,500 people observing wolves and 17,978 visitor contacts by wolf project staff. Compared to the total number of Yellowstone Park visitors in 2012 (3.45 million), the percentage of visitors observing wolves constituted less than one percent.

It should be noted however, that there exists a significant difference in topography between Yellowstone National Park and the BRWRA. In Yellowstone, wolves have tended to locate in the Lamar Valley portion of the Park. In contrast to other areas of the Park, the Lamar Valley is characterized as having wide-open views making it easier to spot wolves from roadsides and turnouts. In contrast the BRWRA is characterized as forested, mountainous area with limited views for readily spotting wildlife.

Both the Apache-Sitgreaves and Gila National Forests require all commercial outfitters to obtain a permit in order to conduct their business on National Forest property. To date nether the Apache-Sitgreaves or Gila National Forests have received any applications from outfitters or guides to conduct Mexican wolf tourism-related operations (John Baumberger, Gila National Forest, pers. comm. 6/25/2014; Tom Olsen, Apache-Sitgreaves National Forest, pers. comm. 6/26/2014). Forest personnel commented that visitors have asked about Mexican wolves as part of their visit but that to date there have been no organized and permitted tours to indicate that the presence of Mexican wolves has resulted in any notable, measureable increase in visits that can be attributable to the wolves.

Due to a lack of evidence that reintroduced Mexican wolves to date has not resulted in any notable increase in National Forest visits, combined with the fact that the topography of the BRWRA makes it very challenging to spot Mexican wolves this analysis concludes 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 will not likely result in any significant change from the baseline. Therefore, we predict no significant beneficial effect to tourism from any of the alternatives, including Alternative Four (No Action).

4.4.4 Potential Environmental Impacts and Proposed Mitigation Measures

This section briefly discusses the different management alternatives being considered in the EIS and the expected corresponding impact on cattle/calf operations. Impact estimates for each alternative are provided for 20 years for comparative purposes. During this time frame, the experimental population will reach its maximum population size under each alternative, although during different years (years 13, 19, 17, and 7 for Alternatives One, Two, Three, and Four, respectively). We identify the maximum annual impact to the ranching community (which corresponds to the maximum population size) that we would expect to occur for each alternative; this forms the basis of our determinations related to the level of significance of the impacts.

Alternative One (Proposed Action and Preferred Alternative)

Table 4-14 shows the expected effect of a growing wolf population on the depredations of cattle and calves for Alternative One. The exhibit shows that the annual number of depredations (both confirmed and unconfirmed) is expected to grow from 119 to 412 cows/calves as the wolf population also grows from 91 to 315 individuals in accordance with the population growth projections of Appendix D. Based on 2013 prices, the total economic impact to the ranching community for the next 20 years is calculated to be almost $6.5 million over the next 20 years with a net present value of $2.9 million (Net present value represents the current value of future losses and was calculated based on a 7 percent discount rate.). The maximum annual impact to the ranching community we would expect is $457,958 (in 2013 dollars), when the population reaches 315 wolves. We expect both the population and the impacts to the ranching community to stabilize from year 13 into the foreseeable future.

Based on our estimates of maximum annual impact, we do not expect long-term significant adverse economic effect on ranching/livestock production as a whole across the project study area from Alternative One. However, we recognize that an individual rancher/livestock producer could sustain substantial short-term economic loss in a given year due to the depredation of cattle by wolves. Short term losses of livestock are expected to be variable between years and between areas and could therefore have a disproportionate impact on an individual rancher/livestock producer. Alternative One (proposed action and preferred alternative) minimizes the potential impact to small ranching entities in several ways relative to the other action alternatives and the no action alternative. First, Alternative One includes take provisions on federal and non-federal land related to wolf attack of livestock or domestic animals, intentional harassment, opportunistic harassment, conditional take permits on non-federal land, and take provisions for the Service or a designated agency to take problem wolves, that are not offered in Alternative Three or Four (No Action). Second, Alternative One maximizes our ability to conduct initial releases in areas of high quality habitat (relative to Alternatives Two and Four) that are remote and has high populations of wild ungulates. Conducting initial realeases in these areas will minimize nuisance events associated with initial releases. Third, Alternative One provides a population objective of 300-325 wolves, which results in a lower wolf density and smaller wolf population, and therefore fewer estimated depredations, than Alternatives Two and Three.

In addition to the minimization measures provided by the proposed rule, one or more sources of compensation may be available to ranchers to further mitigate impacts. Compensation for confirmed and probable livestock depredations, while not a guaranteed future source of mitigation, is currently available through two sources. If the Mexican Wolf/Livestock Trust Fund continues to be funded, we would expect the Mexican Wolf /Livestock Coexistence Council (Coexistence Council) to compensate 100 percent of the market value of confirmed depredated cattle and 50 percent of market value for probable kills with payments to affected ranchers (Mexican Wolf/Livestock Coexistence Plan 2014). We would also expect the Coexistence Council to continue to provide funding for proactive conservation measures to decrease the likelihood of depredation and Payments for Presence of Mexican wolves to offset indirect costs. Another possible source of mitigation funding is the USDA Livestock Indemnity Program, part of the 2014 Farm Bill, which provides (among other benefits) benefits to livestock producers for livestock lost due to attacks by animals introduced into the wild by the federal government or protected by federal law, including wolves. This program may pay a livestock owner 75 percent of the market value of the applicable livestock (http://www.fsa.usda.gov/Internet/FSA_File/lip_long_fact_sht_2014.pdf). These measures may help reduce monetary losses to individual livestock operators.

Based on our estimate of annual maximum impacts, mitigation of impacts available based on the regulations in the proposed rule, and current (and possible future) compensation programs, we predict a less than significant direct adverse impact on ranching activities/livestock production within proposed Zones 1 and 2 from implementation of Alternative One. We predict no significant direct or indirect adverse impact on ranching activities/livestock production within proposed Zone 3 due to no or very low wolf presence.

In summary, we predict from implementation of Alternatives One: less than significant direct adverse impact on ranching activities/livestock production within proposed Zones 1 and 2; no significant direct or indirect adverse impact on ranching activities/livestock production within proposed Zone 3; no significant direct or indirect adverse impact to big game hunting in Zones 1, 2, and 3; and no significant beneficial effect to tourism.

Table 4-14. Alternative 1: Mean Estimates for Economic Impact on Ranching Activities.

Year	Wolves	Avg. Depredations per wolf (Confirmed and Unconfirmed)	Market Value of Depredations ($2013)	Claims Preparations (confirmed kills only)	Total Economic Cost of Depredations	Impact per wolf
2014	91	119	$124,382	$7,917	$132,299	$1,454
2015	100	131	$136,684	$8,700	$145,383	$1,454
2016	110	144	$150,352	$9,570	$159,922	$1,454
2017	122	160	$166,754	$10,614	$177,368	$1,454
2018	134	175	$183,156	$11,658	$194,814	$1,454
2019	147	192	$200,925	$12,789	$213,714	$1,454
2020	162	212	$221,427	$14,094	$235,521	$1,454
2021	178	233	$243,297	$15,486	$258,783	$1,454
2022	196	256	$267,900	$17,052	$284,952	$1,454
2023	215	281	$293,870	$18,705	$312,574	$1,454
2024	237	310	$323,940	$20,619	$344,559	$1,454
2025	260	340	$355,377	$22,620	$377,997	$1,454
2026	287	375	$392,282	$24,969	$417,250	$1,454
2027	315	412	$430,553	$27,405	$457,958	$1,454
2028	315	412	$430,553	$27,405	$457,958	$1,454
2029	315	412	$430,553	$27,405	$457,958	$1,454
2030	315	412	$430,553	$27,405	$457,958	$1,454
2031	315	412	$430,553	$27,405	$457,958	$1,454
2032	315	412	$430,553	$27,405	$457,958	$1,454
2033	315	412	$430,553	$27,405	$457,958	$1,454
Total $ 6,460,840 NPV (0.07) $ 2,937,803						

Source: Division of Economics, US FWS.

<u>Alternative Two</u>

Table 4-15 shows the expected effect of a growing wolf population on the depredations of cattle and calves for Alternative Two. The exhibit shows that the annual number of depredations (both confirmed and unconfirmed) is expected to grow from 119 to 699 cows/calves as the wolf population also grows from 91 to 534 individuals during the period 2013 through 2033. Based on 2013 prices, the total economic impact to the ranching community for the next 20 years is calculated to be $7.6 million with a net present value of $3.3 million. The maximum annual impact to the ranching community we would expect is $776,348 (in 2013 dollars), when the population reaches 534 wolves after year 19. We expect both the population and the impacts to the ranching community to stabilize from year 19 into the foreseeable future.

Based on our estimates of maximum annual impact, we do not expect long-term significant adverse economic effect on ranching/livestock production as a whole across the project study area from Alternative Two. However, as with Alternative One, we recognize that an individual rancher/livestock producer could sustain substantial short-term economic loss in a given year due to the depredation of cattle by wolves. Short term losses of livestock are expected to be variable between years and between areas and could therefore have a disproportionate impact on an individual rancher/livestock producer. The availability of mitigation measures to the ranching community or individual livestock producers, would be the same in Alternative Two as Alternative One. However, compared with Alternative One, the impacts to the ranching community would be higher from Alternative Two due to the larger wolf population size and related increase in possible number of depredations. In addition, the smaller size of Zone 1 in Alternative Two, as compared with Alternatives One and Three, means that nuisance wolf behavior from initial releases would likely be higher under this Alternative. Although impacts from Alternative Two would be greater than Alternative One, we predict a less than significant direct adverse impact on ranching activities/livestock production within proposed Zones 1 and 2 from implementation of Alternative Two based on the maximum annual impact expected from Alternative Two, and the availability of mitigation measures and possible compensation. We predict no significant direct or indirect adverse impact on ranching activities/livestock production within proposed Zone 3 due to no or very low wolf presence.

Table 4-15. Alternative 2: Mean Estimates for Economic Impact on Ranching Activities.

Year	Wolves	Avg Depredations per wolf (Confirmed and Unconfirmed)	Market Value of Depredations ($2013)	Claims Preparations (confirmed kills only)	Total Economic Cost of Depredations	Impact per wolf
2014	91	119	$124,382	$7,917	$132,299	$1,454
2015	100	131	$136,684	$8,700	$145,383	$1,454
2016	110	144	$150,352	$9,570	$159,922	$1,454
2017	122	160	$166,754	$10,614	$177,368	$1,454
2018	134	175	$183,156	$11,658	$194,814	$1,454
2019	147	192	$200,925	$12,789	$213,714	$1,454
2020	162	212	$221,427	$14,094	$235,521	$1,454
2021	178	233	$243,297	$15,486	$258,783	$1,454
2022	196	256	$267,900	$17,052	$284,952	$1,454
2023	215	281	$293,870	$18,705	$312,574	$1,454
2024	237	310	$323,940	$20,619	$344,559	$1,454
2025	260	340	$355,377	$22,620	$377,997	$1,454
2026	287	375	$392,282	$24,969	$417,250	$1,454
2027	315	412	$430,553	$27,405	$457,958	$1,454
2028	347	454	$474,292	$30,189	$504,481	$1,454
2029	381	498	$520,764	$33,146	$553,911	$1,454
2030	420	549	$574,071	$36,539	$610,610	$1,454
2031	461	603	$630,111	$40,106	$670,218	$1,454
2032	508	665	$694,353	$44,195	$738,548	$1,454
2033	534	699	$729,890	$46,457	$776,348	$1,454
Total $ 7,567,208 NPV (0.07) $ 3,258,157						

Source: Division of Economics, US FWS.

In summary, we predict from implementation of Alternatives Two: less than significant direct adverse impact on ranching activities/livestock production within proposed Zones 1 and 2; no significant direct or indirect adverse impact on ranching activities/livestock production within proposed Zone 3; no significant direct or indirect adverse impact to big game hunting in Zones 1, 2, and 3; and no significant beneficial effect to tourism.

Alternative Three

Table 4-16 shows the expected effect of a growing wolf population on the depredations of cattle and calves for Alternative Three. The exhibit shows that the annual number of depredations (both confirmed and unconfirmed) is expected to grow from 119 to 699 cows/calves as the wolf population also grows from 91 to 534 individuals during the period 2013 through 2031. Based on 2013 prices, the total economic impact to the ranching community for the next 20 years is calculated to be $8.2 million with a net present value of $3.5 million. The maximum annual impact to the ranching community we would expect is $776,348 (in 2013 dollars), when the population reaches 534 wolves after year 17. We expect both the population and the impacts to the ranching community to stabilize from year 17 into the foreseeable future.

Based on our estimates of maximum annual impact, we do not expect long-term significant adverse economic effect on ranching/livestock production as a whole across the project study area from Alternative Three. However, as with Alternatives One and Two, we recognize that an individual rancher/livestock producer could sustain substantial short-term economic loss in a given year due to the depredation of cattle by wolves. Short term losses of livestock are expected to be variable between years and between areas and could therefore have a disproportionate impact on an individual rancher/livestock producer. The annual maximum impact of Alternative Three is equivalent to Alternative Two, both of which are higher than Alternative One due to the larger size of the wolf population. Moreover, the availability of mitigation measures to the ranching community or individual livestock producers in Alternative Three would be less than in Alternatives One and Two, because several take provisions on federal and non-federal land related to wolf depredation on livestock or domestic animals or permitted conditional take would not be available. However, Alternative Three, as with Alternative One, would enable us to minimize nuisance wolf behavior associated with initial release due to the expanded Zone 1 as compared with Alternative Two. The possibility of mitigation through the compensation programs described for Alternative One would be equivalent for Alternative Three. Based on the maximum annual impacts predicted and the availability of some mitigation measures, we predict a less than significant direct adverse impact on ranching activities/livestock production within proposed Zones 1 and 2 from implementation of Alternative Three. We predict no significant direct or indirect adverse impact on ranching activities/livestock production within proposed Zone 3 due to no or very low wolf presence.

In summary, we predict from implementation of Alternatives Three: less than significant direct adverse impact on ranching activities/livestock production within proposed Zones 1 and 2; no significant direct or indirect adverse impact on ranching activities/livestock production within proposed Zone 3; less than significant indirect adverse impact to big game hunting in Zones 1, 2, and 3; and no significant beneficial effect to tourism.

Table 4-16. Alternative Three: Mean Estimates for Economic Impact on Ranching Activities.

Year	Wolves	Avg Depredations per wolf (Confirmed and Unconfirmed)	Market Value of Depredations ($2013)	Claims Preparations (confirmed kills only)	Total Economic Cost of Depredations	Impact per wolf
2014	91	119	$124,382	$7,917	$132,299	$1,454
2015	101	132	$138,050	$8,787	$146,837	$1,454
2016	112	147	$153,086	$9,744	$162,829	$1,454
2017	125	164	$170,854	$10,875	$181,729	$1,454
2018	139	182	$189,990	$12,093	$202,083	$1,454
2019	154	201	$210,493	$13,398	$223,891	$1,454
2020	171	224	$233,729	$14,877	$248,606	$1,454
2021	190	249	$259,699	$16,530	$276,229	$1,454
2022	210	275	$287,036	$18,270	$305,305	$1,454
2023	234	306	$319,840	$20,358	$340,197	$1,454
2024	259	339	$354,010	$22,533	$376,543	$1,454
2025	288	377	$393,649	$25,056	$418,704	$1,454
2026	319	417	$436,021	$27,753	$463,773	$1,454
2027	355	464	$485,227	$30,885	$516,111	$1,454
2028	394	515	$538,533	$34,277	$572,811	$1,454
2029	437	572	$597,307	$38,018	$635,326	$1,454
2030	485	634	$662,915	$42,194	$705,110	$1,454
2031	534	699	$729,890	$46,457	$776,348	$1,454
2032	534	699	$729,890	$46,457	$776,348	$1,454
2033	534	699	$729,890	$46,457	$776,348	$1,454
					Total	$ 8,237,426
					NPV (0.07)	$ 3,519,748

Source: Division of Economics, US FWS.

Alternative Four (No Action)

Table 4-17 shows the expected effect of a growing wolf population on the depredations of cattle and calves for the No Action Alternative. The exhibit shows that the annual number of depredations (both confirmed and unconfirmed) is expected to grow from 119 to 233 cows/calves as the wolf population also grows from 91 to 178 individuals during the period 2013 through 2020. Based on 2013 prices, the total economic impact to the ranching community for the next 20 years is calculated to be $4.6 million with a net present value of $2.3 million. The maximum annual impact to the ranching community we would expect is $258,783 (in 2013 dollars), when the population reaches 178 wolves after year 7. We expect both the population and the impacts to the ranching community to stabilize from year 7 into the foreseeable future.

Based on our estimates of maximum annual impact, we do not expect long-term significant adverse economic effect on ranching/livestock production as a whole across the project study area from Alternative Four. However, as with the other alternatives, we recognize that an individual rancher/livestock producer could sustain substantial short-term economic loss in a given year due to the depredation of cattle by wolves. Short term losses of livestock are expected to be variable between years and between areas and could therefore have a disproportionate impact on an individual rancher/livestock producer. Although the annual maximum impact of Alternative Four is less than any of the action alternatives due to the population stabilizing at a smaller size, the impact would be spread over the smallest number of livestock producers. Measures to the ranching community or individual livestock producers with Alternative Four would be available via the provisions of the 1998 Final Rule, which provide fewer take provisions to address wolf-livestock or wolf-domestic animal conflicts than the proposed rule. Based on the maximum annual impacts predicted and the availability of some mitigation measures, including the possible compensation programs discussed under Alternative One, we predict a less than significant direct adverse impact on ranching activities/livestock production from implementation of Alternative Four (No Action).

Table 4-17. No Action Alternative: Mean Estimates for Economic Impact on Ranching Activities.

Year	Wolves	Avg Depredations per wolf (Confirmed and Unconfirmed)	Market Value of Depredations ($2013)	Claims Preparations (confirmed kills only)	Total Economic Cost of Depredations	Impact per wolf
2014	91	119	$124,040	$7,895	$131,935	$1,454
2015	100	131	$136,444	$8,685	$145,129	$1,454
2016	110	144	$150,089	$9,553	$159,642	$1,454
2017	121	158	$165,098	$10,508	$175,606	$1,454
2018	133	174	$181,607	$11,559	$193,167	$1,454
2019	146	191	$199,768	$12,715	$212,483	$1,454
2020	178	233	$243,297	$15,486	$258,783	$1,454
2021	178	233	$243,297	$15,486	$258,783	$1,454
2022	178	233	$243,297	$15,486	$258,783	$1,454
2023	178	233	$243,297	$15,486	$258,783	$1,454
2024	178	233	$243,297	$15,486	$258,783	$1,454
2025	178	233	$243,297	$15,486	$258,783	$1,454
2026	178	233	$243,297	$15,486	$258,783	$1,454
2027	178	233	$243,297	$15,486	$258,783	$1,454
2028	178	233	$243,297	$15,486	$258,783	$1,454
2029	178	233	$243,297	$15,486	$258,783	$1,454
2030	178	233	$243,297	$15,486	$258,783	$1,454
2031	178	233	$243,297	$15,486	$258,783	$1,454
2032	178	233	$243,297	$15,486	$258,783	$1,454
2033	178	233	$243,297	$15,486	$258,783	$1,454
Total $ 4,640,918 NPV (0.07) $ 2,301,710						

Source: Division of Economics, US FWS.

In summary, we predict that the No Action Alternative would have less than significant direct adverse impact on ranching activities/livestock production within the BRWRA; less than significant indirect adverse impact to big game hunting in the BRWRA; and no significant beneficial effect to tourism.

4.5 HUMAN HEALTH/PUBLIC SAFETY

The wolf has been historically viewed as a predator dangerous to both livestock and humans (Jenness 1985). Intolerance for wolves and the efforts to eradicate them in the United States were rooted in the same "conflict, competition, cultural beliefs and fears" that led to their extermination in much of northern and central Europe (Boitani 2003, Linnell et al. 2002). Human antipathy towards large carnivores (including wolves) stems from depredation on domestic livestock, competition with human hunters for wild ungulate prey, and the possibility of being injured or killed in an attack (Fritts et al. 2003, Linnell et al. 2002). Despite historically negative attitudes toward wolves, surveys now show that the majority of the general population has a positive attitude toward wolves and wolf restoration (Williams et al. 2002). Farmers, ranchers, and people living in rural areas that have a higher potential for direct interaction with wolves tend to have attitudes that are more negative. These attitudes may be influenced by the belief that wolves may affect their economic interests or because wolf reintroduction is representative of urban outsiders (e.g. national) dominance over rural (e.g. local and state) interests (Williams et al. 2002). In the United States attitudes toward large carnivores in general and the debate about wolf recovery, wolf management and the risk that wolves may pose to human safety is overlaid with wide differences in belief systems, larger political issues and the strong emotions that wolves evoke in people (Rutherford and Clark 2005). On one end of the polarized debate are those who idealize the wolf as a noble, mystical animal whose return to wild will restore the natural balance in damaged ecosystems. For these people the wolf may also serve as a "symbol of wilderness unspoiled by humans" (Wilmot and Clark 2005). On the other end of the spectrum are those who vilify the wolf as a vicious predator that kills and maims for pleasure and for whom "the only good wolf is a dead wolf". For these people the wolf may also serve as a symbol of "ecological imperialism" (Wilmot and Clark 2005). How a wolf-human interaction is interpreted is therefore inextricably linked to, and filtered by, the observer's own belief system and emotions and the wolf's perceived intent, rather than its actual behavior, is often reported in that context (Walsh 2013, Rutherford and Clark 2005, Carnes 2004). In particular, the perception of the threat a wolf actually does, or does not, present during an encounter can be based not only on the person's level of experience and knowledge of wild animals, but also influenced by their belief system and emotions. Some people may perceive an encounter in which a wolf demonstrates curious and inquisitive behavior as "playful" and a powerful bonding experience between human and wild animal. Other people may perceive a wolf sighting, regardless of location, proximity and whether the animal merely continued on its way, as a serious threat to their personal safety. The account of either of these incidents will very likely reflect the person's own biases so that in the first instance the person may not recognize a potentially habituated wolf to which the most appropriate management action may be hazing, aversive conditioning and possible removal. And in the second instance the person may report a wolf that presented a threat or "stalked them" when the wolf's actual behavior may have been neither investigative nor aggressive. The analysis of the potential impact to human health and public safety from the proposed action and alternatives must therefore recognize the possibility of bias in the accounts of wolf-human encounters while addressing a two part question:

- Do wolves pose a credible threat to humans (both to inflict physical injury/death and as vectors of zoonotic disease); and
- if the threat is indeed credible, then what is the risk (probability) of an encounter with a wolf to result in physical injury or death to a human, or the transmission of disease from wolf to human?

4.5.1 Public Safety

Wolves' reactions to humans include a range of non-aggressive to aggressive behaviors and the manner in which a wolf reacts to human presence may depend on their prior experience with people (Fritts et al. 2003). Before addressing the risk for a wolf to attack a human the question of whether a wolf poses a credible threat (i.e. does it have the capacity to cause physical injury or death) should be addressed.

Wolves, whether acting as a pack or alone, are able to kill wild prey that is much larger (i.e. moose, elk and bison) and better able to defend themselves than an unarmed human (Bangs et al. 2005). Wolves are large, powerful predators, and as such, like many other predators such as black bear, grizzly bear or cougar, are potentially dangerous (Butler et al. 2011, Mech 1998). Wolves therefore have the capacity to inflict serious injury or to kill a human and in a review of the accounts of wolf attacks on humans worldwide Linnell et al. (2002) determined that "there is good evidence that people have been attacked and killed by both healthy and rabid wolves".

With the understanding that wolves do in fact pose a credible threat to human safety the question of the risk of an attack occurring can be addressed. From the data they collected Linnell et al. (2002) conclude that:

- the majority of attacks concern wolves with rabies;
- predatory attacks are aimed mainly at children;
- attacks in general are unusual but episodic; and
- humans are not part of wolves' normal prey (Linnell et al. 2002).

Reviews of the history of wolf-human encounters in North America have found that documented aggressive attacks by non-rabid wolves on humans are extremely rare, even in Canada and Alaska where there are large wolf populations (Mech 1970, Young 1944, Rutter and Pimlott 1968, Fritts et al. 2003, McNay 2002a and 2002b). Young (1944) uses the records of early trappers, explorers and traders to provide a detailed review of pre-1900 accounts of wolf attacks on humans. He prefaces the section entitled "Attacks on Man" by stating: "Whether these stories are products of the fertile imaginations, or are truth, is difficult to determine". Young (1944) found few accounts that "assert that persons were actually killed by wolves in unprovoked attacks" and notes that in the 25 years in which the U.S. Fish and Wildlife Service (formerly the Bureau of Biological Survey) had conducted wolf control no incidents of "unprovoked attack on man" by wolves had come to the attention of the Service. Young concludes that while his review of accounts in the wolf literature "…seem to leave little doubt that wolves have at times made unprovoked attacks on humans...the extent to which this has been caused by the disease rabies, or by famine, is difficult to determine" (Young 1944).

The rarity of aggressive wolf-human encounters in 20th century North America may reflect the fact that wolves were virtually extirpated in the lower 48 states and southern Canada and were subject to effective government-sponsored control programs in Alaska and northern Canada (McNay 2002b). Fritts et al. (2003) suggest that an increase in wolf-human interactions and incidents of aggressive behavior in wolves toward humans from the 1970's through the early 2000's are likely due to increasing wolf populations and increasing visitor use of parks and other remote areas. McNay (2002b) reported the incidence of aggression as very low but increasing in recent years. He documents only one case of unprovoked wolf aggression between 1900 and 1969 compared to 18 cases of unprovoked aggression toward people between 1969 and 2000 (McNay 2002a, 2002b). Most of the recent documented cases of wolf aggression occurred in areas where wolves were protected such as national, state or provincial parks, or near large industrial sites, such as mines, oil fields, and logging camps, located in remote wilderness areas (ADFG 2008). Neither McNay (2002a, 2002b) nor Linnell et al. (2002) reported finding records of confirmed fatalities in North America as a result of wolf attacks on humans. However, since their publication in 2002 there has been one probable wolf attack in Canada and one confirmed wolf attack in Alaska that resulted in human fatalities. The probable fatal attack by wolves occurred in 2005, when a 22 year old man was found killed and partially consumed by a predator in northern Saskatchewan, Canada. Evaluation of the evidence by multiple experts yielded conflicting conclusions of black bear or wolf being responsible for the attack. However, the official judicial inquest found that the student died from "injuries consistent to that of a wolf attack" (Jobin 2007) and after a review of the evidence McNay (2007) strongly favored "the conclusion of predation and feeding by wolves, rather than by a black bear". The confirmed fatal attack by wolves occurred in March, 2010, when a 32-year-old female jogger was found dead on the outskirts of the Village of Chignik Lake, Alaska (Murphy 2010). Wolves and wolf tracks were observed near the body and genetic analysis of several wolves that were lethally removed in the area subsequent to the incident confirmed their responsibility for the attack (Butler et al. 2011).

Aggression by wolves toward people was evident in 51 of 80 cases of wolf-human encounters in Alaska and Canada studied by McNay (2002a, 2002b). Twelve of those cases involved wolves known or suspected to be infected with rabies, fourteen involved wolves that acted aggressively in self-defense, or in defense of conspecifics, and six involved wolves that were aggressive toward people accompanied by dogs. The remaining 19 case of aggression were considered by McNay (2002b) to be unprovoked and included threat displays, charges, or bites with agonism (e.g., *behavior* that includes elements of aggression, defense, and avoidance) or predation (McNay 2002a, 2002b). Of the 18 cases of unprovoked aggression documented after 1969, habituation contributed to unprovoked wolf aggression toward people in 11 cases and non-habituated wolves in remote areas displayed unprovoked aggression in seven cases (McNay 2002a, 2002b). All 11 cases of unprovoked aggressive behavior by habituated wolves resulted in bites while only two of seven cases of aggressive behavior by non-habituated wolves resulted in bites, none of them serious (McNay 2002a, 2002b). In his review Carnes (2004) found what he considered 28 reliable reports of human injuries caused by presumably healthy wild wolves in North America since 1900. He indicates that in 21 of 28 incidents (75%) habituation was a contributing factor and suggests that in many cases the habituation was a result of food conditioning (Carnes 2004). A recent wolf-human incident occurred in Minnesota in 2013 when a 16-year old boy's head was grabbed by a wolf while sleeping in a sleeping bag outside of his tent at a developed campground. After a short struggle the wolf released the boy but not before inflicting puncture wounds and a 4.3 inch (11 centimeter) laceration on the boy's scalp. Results from the necropsy show the wolf, estimated to be 1½ years old, suffered from a severe facial deformity, dental abnormalities and brain damage caused by infection. The day before the attack, the wolf had been seen in and around the campground where it bit into a tent, punctured an air mattress and stood on a picnic table (Dan Stark personal communication Sept 10, 2013, Smith M.L. 2013). There is overlap in the cases reviewed by both McNay (2002a, 2002b) and Carnes (2004). Both reviews conclude that habituated and food conditioned wolves pose a higher risk to human safety than wild, non-habituated wolves (Carnes 2004, McNay 2002b).

Graves (2007) presents translations from Russian writings, including a chapter on "Wolf Attacks on Humans" and an appendix presenting an excerpt from M.P. Pavlov's *The Wolf in Game Management* entitled "The Danger of Wolves to Humans". These sections catalogue multiple accounts of both rabid and non-rabid wolf attacks on humans in Russia and the former Soviet Union. Both Graves (2007) and Geist (2007) argue that "the experiences Russians and others have had with wolf attacks can be repeated with North American wolves - under similar circumstances" (Graves 2007). Mech (1998) and Van Ballenberge (personal communication, June 19, 2014) both point out that "individual wolves and packs are highly variable". Some are shy, some are bold and some may have a propensity toward habituation or might demonstrate aggressive behavior under conditions where others might not (Van Ballenberge, personal communication, June 19, 2014, Mech 1998). The factors (circumstances and conditions) that increase the risk of aggressive behavior or an attack by a wolf include habituation and food conditioning, the presence of dogs, rabies and situations in which the wolf is defending itself.

Habituation and food conditioning

McNay (2002b) defines the term habituation when applied to wild animals as: "the loss of an animal's fear response to people arising from frequent non-consequential encounters." Food conditioning occurs in wolves and other wild animals when the animal learns to associate food with the presence of people (McNay 2002b). While habituation may occur without the involvement of food, food conditioned wild animals are almost always habituated (Carnes 2004). A food conditioned wolf may seek out humans or human use areas and may demonstrate an agonistic lunge, charge or bite if the food reward that they seek is withheld (McNay 2002b). Food conditioning was a known or suspected factor in 16 cases of habituated behavior examined in McNay 2002a). Carnes (2004) determined that habituation of wolves to humans was a contributing factor in 75 percent of the reports of human injuries caused by presumably healthy wild wolves that he examined. McNay (2002b) determined that habituation contributed to 11 of 18 (61 percent) cases of unprovoked aggression toward people documented after 1969. The fatal attack in Saskatchewan, Canada in 2005 is attributed by McNay (2007) to food conditioned and habituated wolves. In parks and areas where wildlife is protected habituated wolves have demonstrated unprovoked aggressive behavior, most notably in Algonquin Provincial Park, Canada between 1987 and 1998 (McNay 2002a, 2002b, Carnes 2004). One of the incidents in the park involved a wolf which bit a 12-year old boy's face while the boy was sleeping in a sleeping bag on the ground in the open. The wolf dragged the boy a short distance before being driven off by the boy's father. The wolf had been previously seen by other campers in the area, had chewed and damaged camping gear and clothing, approached other people and was found to have human food and garbage in its stomach after it was lethally removed (McNay 2002a). This incident is very similar to the 2013 incident in Minnesota where a wolf grabbed and bit the head of a 16-year old boy sleeping in the open at a campsite, and to an incident on Vargas Island, Canada in 2000 where a man sleeping in the open was awakened by a wolf tugging on his sleeping bag, shouted and then was attacked and received serious lacerations from bites to the head. In all these incidents the wolves involved had been previously observed in the campsites and had investigated and damaged camping gear (McNay 2002a, Stark pers.comm 2013). None of these attacks were evaluated as demonstrating elements of predation. Instead, they seem to be examples of investigative search behavior by habituated wolves where the biting may have been initially exploratory (Carnes 2004) but culminated in an agonistic response and serious human injury when the victim reacted and struggled (McNay 2002a). In 2001 Denali National Park closed a campground because wolves had become a nuisance demonstrating fearless behavior and stealing campground items (NPS 2013). Because of the recognized increased risk of aggressive behavior toward humans by habituated wolves Yellowstone National Park has developed a *Habituated Wolf Management Plan* which details a strategy to address both human and wolf behavior with the goal not only to prevent prevent human injury from a habituated wolf but to prevent the habituation from occurring (NPS 2013).

Presence of dogs

Attacks on dogs are among the most commonly reported conflicts between wolves and humans (McNay 2002b). Wolves defend territories against other wolves and wolf mortality caused by other wolves is common (ADFG 2008). Wolves treat dogs as trespassers in their territory and will kill dogs wherever the two canids occur (Fritts et al. 2003). They will also prey on domestic dogs and other wild canids such as coyotes and foxes, and dogs may be an important food source for wolves in some areas (Carnes 2004, Fritts et al. 2003). A wolf-dog conflict can occur regardless of the presence of a human. Loose dogs running free are more vulnerable but incidents have also occurred where the dog was on a leash or being held by its owner (McNay 2002a). Dogs were involved in 3 of 28 of the incidents resulting in human injury reviewed by Carnes (2004). McNay (2002a) details six cases of aggression by nonhabituated wolves toward people in the presence of dogs. In many of these cases examined the wolf was focused on the dog and the human was injured in an attempt to intervene. In other cases the dog may have acted as the primary stimulant for aggression by the wolf which then, because of being in a heightened state of excitation acted aggressively toward the accompanying human (McNay 2002b).

Rabies

Wild animals infected with rabies exhibit a variety of symptoms including loss of fear of humans, frequent shifting of aggressive behavior from one object to another, biting the ground or other inanimate objects, excessive salivation and lack of reflex response if struck by a thrown object (AGFD 2008). Diseased wolves may demonstrate fearless behavior (McNay 2002, Fritts et al. 2003) and the global review of wolf attacks by Linnell et al. (2002) concludes that rabies is "the most important factor explaining the incidence of present day and probably most historic wolf attacks". Although the incidence of rabies in wolf populations is low, a wolf that is in the furious phase of the disease poses a high risk of attack on a human.

Self-Defense

Unlike bears which often react in a defensive attack when surprised, wolves rely upon their speed and quickness to avoid confrontations with potential enemies (ADFG 2008, McNay 2002b). Although many wolves will act passively when they are trapped or cornered a wolf may also act aggressively to defend itself when it feels it can't escape (ADFG 2008, McNay 2002b). Therefore, situations in which the risk of injury to a human from agonistic aggressive behavior by a wolf in self-defense can be considered high include capture and release operations (i.e. to fit a wolf with a radio telemetry collar), when a wolf is caught in a trap, when a wolf is injured and immobile, or when a wolf is pursued by aircraft or vehicle and then approached. Defense of an occupied wolf den may include threat displays where the adult wolves dash toward the human intruder then veer off and vocalize with short barks and snorts. The wolves may withdraw a short distance and howl and then dash at the intruder again in an attempt to drive them off. There are many accounts of wolf pups being handled or removed from a den without interference from the parents and there are no documented attacks resulting in human injury by wolves defending a den (ADFG 2008, Linnell et al. 2002). Similarly, wolves will demonstrate inhibited aggression and do not typically attack a human intruder to defend a kill site (i.e. the carcass of a wolf killed animal) (McNay 2002b). Instead, they may vocalize and dash at the intruder and then withdraw to wait for the human to leave (ADFG 2008).

Predatory Attacks

Although any attack by a wild animal, including wolves, on a human could be interpreted and initially reported as predaceous "there are frequently factors that contribute to the attack that may not be immediately obvious to the investigation team" (Butler et al. 2011). Linell et al. (2002) concluded that humans are not a normal prey item for wolves. This may be that wolves' perceive humans that walk upright and wear clothes as "unique in their environment" with behavioral patterns that do not suggest vulnerable prey (Fritts et al. 2003, Rutter and Pimlott 1968). Carnes (2004) suggests that the minor nature of the wounds inflicted in the majority of the incidents of human injury he examined, most of which consisted of a single bite, are indicative that they were not the result of "determined predatory attempts".

McNay (2002a, 2002b) evaluates three incidents as containing elements of predation - all of them involving attack and injury to children. The first incident occurred circa 1900 when a wolf ran from cover to grab a toddler playing on the edge of the Koyukuk River in Alaska. The wolf was followed into the brush where it was shot and the child saved (Carnes 2004, McNay 2002a). The second incident occurred in 1998 in Algonquin Provincial Park, Canada when over the course of several months a habituated and possibly food conditioned wolf fought with and injured dogs, became increasingly bold in the presence of people, stalked a four year old girl walking with her parents, and then the following day entered a campground where it attacked a 19-month old boy who was sitting on the ground near his father (Carnes 2004, McNay 2002a). A third incident evaluated as a predatory attack on a child by McNay (2002a) happened in 2000 at an isolated logging camp in Icy Bay, Alaska. There, over the course of a year, a collared male wolf demonstrated increasingly bold behavior and was seen frequently around the logging camp and a nearby log sort yard (McNay and Mooney 2005). The attack on a six year old boy occurred after the wolf emerged from forest cover on the edge of the camp, reportedly growled/snarled/showed its teeth and then moved forward. As the boy and another boy ran from the wolf a dog which had been in the vicinity intercepted and fought with the wolf before the wolf disengaged and attacked the younger boy. The boy was bitten on the back, legs and buttocks as the wolf attempted to lift and drag the boy toward the forest cover. The dog reengaged with the wolf, the wolf continued to focus on the boy, four adults responded to the boy's cries for help and succeeded in driving the wolf off and then subsequently killed it (McNay and Mooney 2005). McNay (2002a, 2002b), McNay and Mooney (2005) and Carnes (2004) agree that habituation, and possibly food conditioning was a contributing factor to the attack but disagree on the motivation of the wolf. McNay (2002a, 2002b) and McNay and Mooney (2005) suggest that various elements of the attack indicate a "highly aroused predation response" in the wolf while Carnes (2004) concludes that "this was an agonistic wolf-dog encounter in which the boy got entangled".

In their *Findings Related to the March 2010 Fatal Wolf Attack near Chignik Lake*, Alaska, Butler et al. (2011) confirmed through DNA evidence and evidence at the scene the involvement of from two to four wolves in the fatal attack on a 32-year old woman. They concluded that the cause of the fatality appeared to be an "aggressive, predatory attack that was relatively short in duration". In their investigation they determined that defensive behavior, habituation, and food attractants were not contributing factors and speculated that the small body size of the woman, that she was jogging alone, and the possibility that she may have fled when she sighted the wolves could have triggered a predatory response by the wolves.

McNay's (2007) review of the evidence related to the fatal attack on a 22-year old man in Saskatchewan, Canada in 2005 determined that the "environmental conditions, presence of animal tracks, patterns of feeding, position of the body, dragging of the body, removal of clothing (and) types of injuries" were consistent with wolf predation. In this incident wolves had been observed scavenging at a nearby garbage dump site over the previous several months and four days prior to the attack had acted aggressively toward other people. McNay (2007) concludes that the man was a victim of "predation and feeding by wolves" and that the "wolves involved in this case were conditioned to the use of human foods and were habituated to the presence of people".

Wolf attacks on humans in North America are rare and attacks evaluated as predatory in nature are even more uncommon. Therefore, data regarding the circumstances under which a predatory attack might occur is limited. Three of the five incidents described as predatory clearly involved habituated wolves and three of the five incidents were attacks on small children. Carnes (2004) and McNay (2002a) catalog multiple incidents in which habituation of wolves was contributory to agonistic or predatory aggression and McNay (2002b) suggests that because wolves are adept at determining prey vulnerability children are more likely to be the target of a predatory attack than adults. The majority of the predatory attacks in European countries, including Russia, described by Linnell et al. (2002) involved children as victims and they describe this pattern as consistent with wolves selecting "the weakest, and most easily captured category of prey" (Linnell et al. 2002). In India multiple well-documented cases of "child-lifting" predatory attacks are described in Linnell et al. (2002) and Krithivasan et al. (2009). In the Hamedan province of western Iran between 2001 and 2010, 47 incidents of wolf attack on people, 70 percent of which were on children, were reported (Behdarvand et al. 2014). Both Behdarvand et al. (2014) and Krithivasan et al. (2009) suggest that wolves came to opportunistically target children as prey in heavily human modified ecosystems lacking wild native prey and having scarce or well guarded livestock. Although wolves are generally believed to avoid populated regions factors Behdarvand et al. 2014 found that the probability of wolf attacks on humans increased in "agroecosystems" that had a higher proportion of irrigated farms and high human density. Factors contributing to wolf attacks on humans in these areas include the loss of almost all natural forests, replaced by crop fields which provide cover and water, and the loss of wild prey species, causing wolves to be attracted to human settlements with abundant food sources (e.g. garbage and livestock) (Behdarvand et al. 2014). Linnell et al. (2002) suggest that historical episodes of predatory attacks on people often occurred in heavily modified landscapes characterized by scarcity of wild prey species, forest clearance, introduction of domestic ungulates and association of food sources (whether livestock or human garbage) with humans. The association of food sources with humans by habituated wolves may have been contributory to the 2005 fatal predatory attack in Saskatchewan, Canada (McNay 2007).

Summary

Wolf caused injuries to humans worldwide, but especially in North America, are exceptionally rare and incidents evaluated as a predatory attack by a wolf on a human are even rarer. 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 (ADFG 2008, Carnes 2004, Linnell et al. 2002, McNay 2002b). 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 lead to the conclusion that:

- the risk to human safety posed by healthy wild non-habituated wolves is extremely small;
- agonistic or predatory aggression toward humans is most likely to occur in habituated and food conditioned wolves;
- the presence of a domestic dog increases the risk of agonistic aggression by wolves;
- 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).

4.5.2 The Mexican Wolf Experimental Population: Human Health and Public Safety

In 2007 the Service conducted public scoping as part of the process to prepare a new EIS for contemplated changes to the Mexican Wolf Reintroduction Project. Concerns regarding human health and public safety were expressed in comments both during that scoping period and in comments received during the scoping that followed the publication of our Notice of Intent to Prepare an EIS (78 FR 47268) on August 5, 2013. Concerns brought forward by the public during scoping included:

- Risk of attack on humans by Mexican wolves;
- Potential for habituation of Mexican wolves to humans;
- Potential negative psychological effects to children from the presence of Mexican wolves; and
- Potential for Mexican wolves to carry/transmit disease.

Risk of attack by Mexican wolves

No human injuries from a wolf attempting to defend itself or from a wolf with rabies and no incidents of predatory behavior or prey testing directed at humans have been reported or documented in the Mexican wolf experimental population. Of the 108 wolf-human interactions/nuisance reports investigated, by the IFT (from 1998 through 2013), 91 (84 percent) were categorized as investigative searches and 13 (12 percent) were categorized as investigative approaches. Four incidents (~4 percent) were categorized as aggressive (agonistic) charges with three of those incidents involving dogs (75 percent). The fourth incident occurred in 2013 when a wolf ran toward a human who responded by yelling and waving hands at which point the animal veered off and ran away. The incident was categorized as an aggressive charge but it is unclear in the investigation as to whether the wolf was actually aware of the human presence or was focused on other stimuli, such as coyotes which were also present in the area. Of the 108 documented wolf-human incidents 42 occurred within three months of initial release or translocation (39 percent). From 1998 through 2013 fifteen wolves were removed for nuisance behavior.

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 BRWRA (AMOC and IFT 2005). Mexican wolves have also been released and have occupied the FAIR since 2000 under agreement with the WMAT. No report of injury or serious threat by wolves on the Reservation has been reported and conflicts between wolves and pets have been infrequent with no deaths attributed to wolves reported (MWRT Tribal Sub-Group 2014). WMAT conclude that "while threats to people and pets are possible, it is felt that it is fairly unlikely per observations of wolves on the Reservation from the past 14 plus years" (MWRT Tribal Sub-Group 2014).

Potential for habituation of Mexican wolves to humans

Approximately 39 percent of the documented human-wolf interactions in the BRWRA have involved wolves recently released from captivity, suggesting that wolves released from captivity may be more prone to initial fearless behavior toward humans, despite appropriate captive management and selection criteria for release candidates (AMOC and IFT 2005). Wolves in captivity are managed and cared for in accordance with the guidelines set forth in the *Mexican Gray Wolf Husbandry Manual* (USFWS 2009). One of the primary goals of managing Mexican wolves in captivity is to "preserve the natural behaviors necessary for wolves that may eventually be reintroduced to the wild" (USFWS 2009). The animal caretakers and veterinarians that have contact with captive bred and reared wolves in the recovery program make every effort to prevent the wolves from becoming habituated to humans. While captive wolves are fed (once or twice weekly, depending on the season), caretakers make efforts to separate human contact from feeding. No "hand-feeding" occurs. Caretakers enter the pen to elicit a flight response from the wolves, and then leave food in an area not visible from the place where the wolves are hiding. Wolves typically flee to the furthest limit of their pen when operations within the pen are necessary, and exhibit extreme flight during activities that require human contact, such as vaccinations. Wolves that fail to exhibit fear of humans are actively hazed. In accordance with the *Husbandry Manual* guidelines, "Wolves that are potential candidates for release to the wild are evaluated based on a number of behavioral and physiological criteria including genetic makeup, age, reproductive performance, proven parental skills and appropriate social behavior, and aversion to humans (USFWS 2009). In selecting wolves for release the Reintroduction Project seeks those with fear of humans (AMOC and IFT 2005). Once selected, and prior to release, wolves are acclimated in USFWS-approved facilities. Pre-release facilities in New Mexico include the Ladder Ranch Wolf Management Facility, managed by the Turner Endangered Species Fund, and the Sevilleta Wolf Management Facility, managed by the USFWS at Sevilleta National Wildlife Refuge. In pre-release facilities, contact between wolves and humans is minimized. Carcasses of road-killed native prey species, primarily deer and elk, supplement the routine diet of processed carnivore logs supplied to wolves. Genetically and socially compatible breeding pairs are established and evaluated for physical, reproductive, and behavioral suitability for direct release into the wild. Single wolves are also evaluated for release and potential pairing with wolves in the wild. Prior to release, wolves may be adversely conditioned to food types (i.e., domestic livestock) and human presence. As close to release as possible, wolves may be subjected to taste aversion conditioning in efforts to deter their use of domestic livestock as a food source. Separately, or in addition to taste aversion conditioning, wolves in pre-release facilities may be hazed (purposefully harassed) prior to release in efforts to increase their avoidance of humans and/or inhabited areas. Wolves are released or translocated using either a soft release or a hard release method. The soft release method holds wolves at the release site for one day to several months to acclimate them to the specific area. Wolves generally self-release within a few days. A hard release is a direct release of a wolf (or wolves) from a crate into the wild or into an enclosure built of fladry (flagging hanging on a rope surrounding a small protected area; sometimes the fladry "fence-line" is electrified). All wolves released from captivity are fitted with radio-telemetry collars so that they can be tracked and management actions are taken when considered necessary to increase the probability of the wolf successfully acclimatizing to the wild while minimizing the possibility of nuisance behavior, depredation or wolf-human interactions.

Psychological effects to children from fear of wolves

In the absence of direct experience based knowledge, myths and other culturally transmitted forms of knowledge will appear (Lescureux and Linnell 2010). Fear of wolves in European culture and history is related to both supernatural associations of the wolf as a symbol of the devil and to concerns for personal safety (Linnell et al. 2002). The dangerous wolf is the subject of folklore and fairy tales (e.g. "The Three Little Pigs", "Little Red Riding Hood", and "Peter and the Wolf") and there are many examples in western literature describing the ferocious nature of the animal (Mech 1970, Jenness 1985).

The BRWRA is comprised of portions of Greenlee and Apache counties in Arizona and Catron, Sierra and Grant counties in New Mexico. The majority of residents in these counties live in small ranching and farming based communities. The elected representatives and the local county governments as well as stakeholder groups such as the Gila Livestock Growers Association have expressed long-standing and ongoing opposition to the reintroduction of Mexican wolves (Walsh 2013). Rancher attitudes as expressed at public hearings and comments during scoping, as well as reported in the media and recorded on various stakeholder websites and web blogs, are overwhelmingly critical of the reintroduction project and express strong opinions about what is regarded as an infringement on personal and property rights, federal government overreach, disregard of local authority and indifference to the threat that wolves present to the physical safety of people, in particular children (Walsh 2013). As discussed in Walsh (2013) documentary evidence (photos, video) illustrating "close encounters with wolves, bloody wounds to pets and livestock and mauled animal corpses" and representative anecdotes detailing accounts of wolves following children home from school, wolves surrounding a child in the woods, a wolf forcing a mother and her children to barricade themselves in their home, wolf-proof school bus stop shelters, and parents requiring a child to be armed when playing in the yard are recounted, repeated and circulated. This describes the rhetorical landscape through which information and communication about wolves and the reintroduction project are filtered (Walsh 2013, Walsh 2009). Seen through these "filters" an experiential report as represented by these anecdotes of the dangerous threat posed by wolves to people and children from "trusted insiders" carries more weight than scientific evidence presented by "outsiders" that wolves "simply do not constitute an appreciable (statistically significant) threat to human safety or health" (Walsh 2013, AMOC and IFT 2005).

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. However, Catron County's submission to the Department of the Interior in 2012 entitled *Problem Wolves in Catron County, New Mexico: A County in Crisis* provides an account of the negative effects of the reintroduction on county residents whose rights and lives are perceived to be "collateral damage" to the success of the project (Carey 2012). The report includes two studies which address symptoms of psychological stress and post-traumatic stress disorder (PTSD) in children and parents. Neither study purports to be scientifically conducted in its collection of data, its evaluation of the data or its findings. Both provide anecdotal accounts based on interviews with area residents of emotional distress and stress related disorders related to fear of a loss of income, damage to their way of life and wolf attack on livestock, pets and humans, especially small children (Martin 2007 and Thal 2006 in Carey 2012).

Potential for Mexican wolves to carry/transmit disease

Wolves are subject to diseases that affect all canines, including domestic dogs, coyotes and foxes, and can transmit such diseases within their populations and to some other species. Pathogens that wolves could potentially be exposed to in the wild include canine parvovirus, canine distemper, infectious canine hepatitis, leptospirosis, intestinal and external parasites and rabies. Of these pathogens, intestinal parasites, leptospirosis and rabies are of concern for transmission to humans. No cases of leptospirosis or rabies have been documented in the Mexican wolf experimental population. While recent concerns regarding contagious tapeworm (*Echinococcus spp*.) have been raised regarding the wolf population in the northern Rocky Mountains (Foreyt et al. 2009), the *Echinococcus* parasite has not been found in the Mexican wolf experimental population. All released, translocated, and handled wolves are administered vaccine against the full spectrum of canine diseases including rabies, distemper, canine parvovirus, and infectious canine hepatitis viruses, and are dewormed for intestinal and external parasites. Captive wolves receive annual booster shots. Wild-born animals are vaccinated opportunistically whenever captured for other reasons such as radio-collaring. Given these precautions, the Mexican wolves in the experimental population are less likely to carry disease than other wild canids and are not likely to transmit parasites or disease-causing pathogens that are not already carried by other canids (USFWS 1996). Because of the comparatively (to other populations of wildlife, including other canids such as coyote and fox) small size of the experimental population of Mexican wolves, the active management and surveillance routinely conducted by the IFT and the vaccination protocol followed for captive, released and handled wolves the Mexican wolf's contribution to the overall parasite or pathogen load in the BRWRA is minimal. There is no reason to anticipate an increase in the risk of disease transmission to humans in the project study area from a larger experimental population of wolves distributed over a larger area.

4.5.3 Potential Environmental Impacts and Proposed Mitigation Measures

Alternative One (Proposed Action and Preferred Alternative)

Under this alternative we would adopt a phased management approach to minimize or avoid possible impacts to wild ungulate populations (specifically elk) in portions of western Arizona. In this alternative we intend to achieve a Mexican wolf experimental population objective of from 300 to 325 wolves within the entire MWEPA. We would allow the initial release of wolves in a larger area to be known as management Zone 1 and we would allow wolves to disperse into and occupy the MWEPA (proposed management Zones 1, 2 and 3). Under Alternative One the initial release and translocation of wolves and their natural dispersal and occupancy in portions of western Arizona in Zones 1 and 2 would be limited in accordance with the phased management described in section 2.3.1. Alternative One would implement changes to the take provisions authorized under the experimental population rule that would allow domestic animal owners or their agents to take (including kill or injure) any Mexican wolf that is in the act of biting, wounding or killing domestic animals on non-federal land anywhere within the MWEPA. This alternative would also allow the Service or designated agency to issue permits to allow domestic animal owners or their agents to take (including intentional harassment or kill) any Mexican wolf that is present on non-Federal land where specified in the permit.

Alternative One proposes to allow the initial release of Mexican wolves into release sites within, or adjacent to, the Aldo Leopold and Gila Wilderness areas of the Gila National Forest. These release sites are currently only available for use for the translocation of wolves. In the *Evaluation of Initial Release and Translocation Site Availability and Suitability* conducted by the IFT (IFT 2009), the majority of these ten release sites rate highly suitable in terms of their "human score", which evaluates the likelihood of human-wolf interaction based on the distance from human habitation. The additional areas of national forest proposed to be added to Zone 1 (the Sitgreaves National Forest, the Payson, Pleasant Valley, and Tonto Basin Ranger Districts of the Tonto National Forest; and the Magdalena Ranger District of the Cibola National Forest) would increase the number of available potential release sites in remote locations, including additional wilderness areas. Implementation of this proposal would require the selection and evaluation of sites in the additional national forest areas using the same criteria, including the likelihood of human-wolf interaction, used for the evaluation of sites within the existing BRWRA. The absence of nuisance behavior and wolf-human interaction is one of the main criteria for a successful release of a captive wolf to the wild. Because under this alternative we would utilize release sites ranked high in overall suitability, we expect that the initial release of wolves at these sites will increase the probability of their successful transition to the wild.

Both McNay (2002b) and Fritz et al. (2003) suggest that the risk of wolf-human interaction and aggressive behavior by wolves becomes higher as increases in wolf populations converge with increases in human activity in those areas occupied by wolves. Habituation is the most likely factor to lead to aggressive behavior towards humans by wolves. Habituation is most likely in wolf populations that are protected (i.e. in parks) or not subject to human exploitation (i.e. hunting) (McNay 2002b). Under Alternative One we expect the experimental population of Mexican wolves to grow in accordance with the projections provided in Appendix D. We also expect the population to be more widely distributed and primarily occupy available suitable habitat within proposed management Zones 1 and 2. Proposed management Zone 1 consists exclusively of federal national forest land which supports a wide range of use described in section 3.2. Proposed management Zone 2 consists of a mix of federal and non-federal land with the majority of suitable wolf habitat occurring on federal land. A larger population of wolves distributed over a wider working landscape with a wide range of human activity presents a higher likelihood of wolf-human interaction. However, we expect the potential risk of aggressive behavior to be mitigated by management activities which would be carried out by the Reintroduction Project in accordance with the guidance of a management plan for the Mexican wolf experimental population. This management plan will be revised in accordance with, and under the authority of, the regulations of the final experimental population 10(j) rule. The management actions implemented in accordance with the management plan would be designed to not only provide the means necessary to respond to reports of wolf-human interactions but to also reduce the likelihood of nuisance scenarios and more serious conflicts occurring. Federal funding to state, tribal and Federal agency partners to assist in the execution of these management activities would be provided under this alternative. Management actions to be carried out by the Reintroduction Project under Alternative One may include, but are not limited to:

- 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.
- Investigation by authorized agencies of reported wolf incidents no later than 48 hours after a report is received.
- Aversive conditioning (hazing/ harassment, scare devices) of problem wolves to stop or modify undesirable behaviors such as displaying fearless behavior of humans or interacting with domestic animals or pet dogs.
- Elimination of attractants and use of guard animals, range riders, fladry, and other techniques to reduce wolf interest in human activity.
- Capture, radio collar, release on site, and radio telemetry monitoring.
- 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.
- 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.

We expect the proposed modifications to the take provisions we propose under Alternative One will provide greater flexibility to a domestic animal owner on non-federal land to act to protect their domestic animals (see definition of *domestic animal* in the List of Definitions) from harm from a wolf. We predict that the use of release sites for the initial release of Mexican wolves in proposed management Zone 1 that are evaluated as highly suitable in terms of their "human score" will minimize human-wolf interactions and nuisance behaviors compared to the baseline condition represented by the No Action Alternative. During the period (up to 12 years from the effective date of the final 10(j) rule) that the phased management approach proposed in this alternative is in effect the initial release and translocation of wolves and their natural dispersal and occupancy in portions of western Arizona in Zones 1 and 2 would be limited. We expect that these limitations will avoid or minimize the possibility of human-wolf interactions and wolf nuisance behaviors in these areas.

Under the actions proposed in Alternative One we expect the experimental population of Mexican wolves to increase and to occupy a wider area of the MWEPA. Although, under this alternative we expect to release more wolves from captivity to support our need to improve the genetic variation within the experimental population, the majority of wolves in the experimental population will be wild born. Wolves born in the wild have a lower propensity to engage in nuisance behavior. We expect that the continuation and extension of a practical, responsive management program for the wider area which wolves would be allowed to occupy under this alternative, including use of pre and post-release management measures, aversive conditioning to promote avoidance behavior, and removal of problem wolves will minimize wolf-human interaction and nuisance behaviors. Through use of these management measures we expect to prevent to the maximum extent possible the development of habituated wolves which pose the greatest risk of acting in an aggressive manner toward humans. There have been no incidents of aggressive behavior towards humans by Mexican wolves indicative of predation, prey testing or self-defense. While the possibility exists that an incident of aggression by a healthy wild wolf in the experimental population could occur we consider the probability (risk) of such an occurrence to be extremely low. There are no peer reviewed studies or scientifically collected data available to make an evaluation as to whether implementation of Alternative One will have a significant adverse or beneficial psychological impact on children living in the project study area. There have been no documented cases of rabies in the Mexican wolf experimental population, no wolves have tested positive for *Echinococcus spp* or leptospirosis and no other common pathogens such as plague, tularemia, *Neospora*, anthrax, listeria, brucellosis, and tuberculosis have been detected. Under this alternative we would continue the active disease surveillance programs and health protocols already established for the Reintroduction Project. The Mexican wolf experimental population does not present a credible source of enzootic parasites or pathogens that are a risk to human health. We do not expect this to change under the proposals put forward under this alternative. For these reasons we expect no significant direct or indirect adverse or beneficial impacts to human health and public safety in any of the proposed management zones to result from the implementation of Alternative One (Proposed Action and Preferred Alternative).

Alternative Two

Under Alternative Two the area proposed for the initial release of wolves in the proposed management Zone 1 would be smaller (limited to the existing BRWRA) than under Alternative One. Under this alternative, additional areas of national forest would not be added to Zone 1. Therefore, fewer potential release sites in remote locations, including additional wilderness areas would be available for the initial release of wolves. Alternative Two would implement changes to the take provisions authorized under the experimental population rule that would allow domestic animal owners or their agents to take (including kill or injure) any Mexican wolf that is in the act of biting, wounding or killing domestic animals on non-federal land anywhere within the MWEPA. This alternative would also allow the Service or designated agency to issue permits to allow domestic animal owners or their agents to take (including intentional harassment or kill) any Mexican wolf that is present on non-federal land where specified in the permit.

Alternative Two proposes to allow the initial release of Mexican wolves into release sites within, or adjacent to, the Aldo Leopold and Gila Wilderness areas of the Gila National Forest. These release sites are currently only available for use for the translocation of wolves. In the *Evaluation of Initial Release and Translocation Site Availability and Suitability* conducted by the IFT (IFT 2009), the majority of these ten release sites rate highly suitable in terms of their "human score", which evaluates the likelihood of human-wolf interaction based on the distance from human habitation. The absence of nuisance behavior and wolf-human interaction is one of the main criteria for a successful release of a captive wolf to the wild. Because under this alternative we would utilize release sites ranked high in overall suitability, we expect that the initial release of wolves at these sites will increase the probablility of their successful transition to the wild.

Both McNay (2002b) and Fritz et al. (2003) suggest that the risk of wolf-human interaction and aggressive behavior by wolves becomes higher as increases in wolf populations converge with increases in human activity in those areas occupied by wolves. Habituation is the most likely factor to lead to aggressive behavior towards humans by wolves. Habituation is most likely in wolf populations that are protected (i.e. in parks) or not subject to human exploitation (i.e. hunting) (McNay 2002b). Under Alternative Two we expect the experimental population of Mexican wolves to grow in accordance with the projections provided in Appendix D. We also expect the population to be more widely distributed and primarily occupy available suitable habitat within proposed management Zones 1 and 2. Proposed management Zone 1 consists exclusively of federal national forest land which supports a wide range of use . described in section 3.2. Proposed management Zone 2 consists of a mix of federal and non-federal land with the majority of suitable wolf habitat occurring on federal land. A larger population of wolves distributed over a wider working landscape with a wide range of human activity presents a higher likelihood of wolf-human interaction. However, we expect the potential risk of aggressive behavior to be mitigated by management activities which would be carried out by the Reintroduction Project in accordance with the guidance of a management plan for the Mexican wolf experimental population. This management plan will be revised in accordance with, and under the authority of, the regulations of the final experimental population 10(j) rule. The management actions implemented in accordance with the management plan would be designed to not only provide the means necessary to respond to reports of wolf-human interactions but to also reduce the likelihood of nuisance scenarios and more serious conflicts occurring. Federal funding to state, tribal and Federal agency partners to assist in the execution of these management activities would be provided under this alternative. Management actions to be carried out by the Reintroduction Project under Alternative Two may include, but are not limited to:

- 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.
- Investigation by authorized agencies of reported wolf incidents no later than 48 hours after a report is received.
- Aversive conditioning (hazing/ harassment, scare devices) of problem wolves to stop or modify undesirable behaviors such as displaying fearless behavior of humans or interacting with domestic animals or pet dogs.
- Elimination of attractants and use of guard animals, range riders, fladry, and other techniques to reduce wolf interest in human activity.
- Capture, radio collar, release on site, and radio telemetry monitoring.
- 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.

- 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.

We expect the proposed modifications to the take provisions we propose under Alternative Two will provide greater flexibility to a domestic animal owner on non-federal land to act to protect their domestic animals (see definition of *domestic animal* in the List of Definitions) from harm from a wolf. Although fewer release sites would be available under this alternative than under Alternative One or Three we predict that the use of additional release sites for the initial release of Mexican wolves in the wilderness areas of proposed management Zone 1 that are evaluated as highly suitable in terms of their "human score" will minimize human-wolf interactions and nuisance behaviors compared to the baseline condition represented by the No Action Alternative.

Under the actions proposed in Alternative Two we expect the experimental population of Mexican wolves to increase and to occupy a wider area of the MWEPA. Although, under this alternative we expect to release more wolves from captivity to support our need to improve the genetic variation within the experimental population, the majority of wolves in the experimental population will be wild born. Wolves born in the wild have a lower propensity to engage in nuisance behavior. We expect that the continuation and extension of a practical, responsive management program for the wider area which wolves would be allowed to occupy under this alternative, including use of pre and post-release management measures, aversive conditioning to promote avoidance behavior, and removal of problem wolves will minimize wolf-human interaction and nuisance behaviors. Through use of these management measures we expect to prevent to the maximum extent possible the development of habituated wolves which pose the greatest risk of acting in an aggressive manner toward humans. There have been no incidents of aggressive behavior towards humans by Mexican wolves indicative of predation, prey testing or self-defense. While the possibility exists that an incident of aggression by a healthy wild wolf in the experimental population could occur we consider the probability (risk) of such an occurrence to be extremely low. There are no peer reviewed studies or scientifically collected data available to make an evaluation as to whether implementation of Alternative Two will have a significant adverse or beneficial psychological impact on children living in the project study area. There have been no documented cases of rabies in the Mexican wolf experimental population, no wolves have tested positive for *Echinococcus spp* or leptospirosis and no other common pathogens such as plague, tularemia, *Neospora*, anthrax, listeria, brucellosis, and tuberculosis have been detected. Under this alternative we would continue the active disease surveillance programs and health protocols already established for the Reintroduction Project. The Mexican wolf experimental population does not present a credible source of enzootic parasites or pathogens that are a risk to human health. We do not expect this to change under the proposals put forward under this alternative. For these reasons we expect no significant direct or indirect adverse or beneficial impacts to human health and public safety in any of the proposed management zones to result from the implementation of Alternative Two.

<u>Alternative Three</u>

Alternative Three proposes changes in the management of the experimental population of Mexican wolves that would allow the initial release of wolves in a larger area to be known as management Zone 1 and would allow wolves to disperse into and occupy the entire MWEPA (proposed management Zones 1, 2 and 3). Alternative Three does not propose the changes to the take provisions for Mexican wolves within the MWEPA that are included in Alternatives One and Two.

Alternative Three proposes to allow the initial release of Mexican wolves into release sites within, or adjacent to, the Aldo Leopold and Gila Wilderness areas of the Gila National Forest. These release sites are currently only available for use for the translocation of wolves. In the *Evaluation of Initial Release and Translocation Site Availability and Suitability* conducted by the IFT (IFT 2009), the majority of these ten release sites rate highly suitable in terms of their "human score", which evaluates the likelihood of human-wolf interaction based on the distance from human habitation. The additional areas of national forest proposed to be added to Zone 1 (the Sitgreaves National Forest, the Payson, Pleasant Valley, and Tonto Basin Ranger Districts of the Tonto National Forest; and the Magdalena Ranger District of the Cibola National Forest) would increase the number of available potential release sites in remote locations, including additional wilderness areas. Implementation of this proposal would require the selection and evaluation of sites in the additional national forest areas using the same criteria, including the likelihood of human-wolf interaction, used for the evaluation of sites within the existing BRWRA. The absence of nuisance behavior and wolf-human interaction is one of the main criteria for a successful release of a captive wolf to the wild. Because under this alternative we would utilize release sites ranked high in overall suitability, we expect that the initial release of wolves at these sites will increase the probability of their successful transition to the wild.

Both McNay (2002b) and Fritz et al. (2003) suggest that the risk of wolf-human interaction and aggressive behavior by wolves becomes higher as increases in wolf populations converge with increases in human activity in those areas occupied by wolves. Habituation is the most likely factor to lead to aggressive behavior towards humans by wolves. Habituation is most likely in wolf populations that are protected (i.e. in parks) or not subject to human exploitation (i.e. hunting) (McNay 2002b). Under Alternative Three we expect the experimental population of Mexican wolves to grow in accordance with the projections provided in Appendix D. We also expect the population to be more widely distributed and primarily occupy available suitable habitat within proposed management Zones 1 and 2. Proposed management Zone 1 consists exclusively of federal national forest land which supports a wide range of use use described in section 3.2. Proposed management Zone 2 consists of a mix of federal and non-federal land with the majority of suitable wolf habitat occurring on federal land. A larger population of wolves distributed over a wider working landscape with a wide range of human activity presents a higher likelihood of wolf-human interaction. However, we expect the potential risk of aggressive behavior to be mitigated by management activities which would be carried out by the Reintroduction Project in accordance with the guidance of a management plan for the Mexican wolf experimental population. This management plan will be revised in accordance with, and under the authority of, the regulations of the final experimental population 10(j) rule. The management actions implemented in accordance with the management plan would be designed to not only provide the means necessary to respond to reports of wolf-human interactions but to also reduce the likelihood of nuisance scenarios and more serious conflicts occurring. Federal funding to state, tribal and Federal agency partners to assist in the execution of these management activities would be provided under this alternative. Management actions to be carried out by the Reintroduction Project under Alternative Three may include, but are not limited to:

- 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.
- Investigation by authorized agencies of reported wolf incidents no later than 48 hours after a report is received.
- Aversive conditioning (hazing/ harassment, scare devices) of problem wolves to stop or modify undesirable behaviors such as displaying fearless behavior of humans or interacting with domestic animals or pet dogs.
- Elimination of attractants and use of guard animals, range riders, fladry, and other techniques to reduce wolf interest in human activity.
- Capture, radio collar, release on site, and radio telemetry monitoring.

- 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.
- 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.

We predict that the use of release sites for the initial release of Mexican wolves in proposed management Zone 1 that are evaluated as highly suitable in terms of their "human score" will minimize human-wolf interactions and nuisance behaviors compared to the baseline condition represented by the No Action Alternative. Under this alternative there would be less flexibility than under Alternative One and Two provided to a domestic animal owner on non-federal land to act to protect domestic animals (see definition of *domestic animal* in the List of Definitions) from harm from a wolf.

Under the actions proposed in Alternative Three we expect the experimental population of Mexican wolves to increase and to occupy a wider area of the MWEPA. Although, under this alternative we expect to release more wolves from captivity to support our need to improve the genetic variation within the experimental population, the majority of wolves in the experimental poplulation will be wild born. Wolves born in the wild have a lower propensity to engage in nuisance behavior. Although under this alternative there would be less flexibility provided to a domestic animal owner on non-federal land to act to protect domestic animals from harm from a wolf other management actions will still be available. These would include non-lethal and lethal control actions taken by the Reintroduction Project. We expect that the continuation and extension of a practical, responsive management program for the wider area which wolves would be allowed to occupy under this alternative, including use of pre and post-release management measures, aversive conditioning to promote avoidance behavior, and removal of problem wolves will minimize wolf-human interaction and nuisance behaviors. Through use of these management measures we expect to prevent, to the maximum extent possible, the development of habituated wolves which pose the greatest risk of acting in an aggressive manner toward humans. There have been no incidents of aggressive behavior towards humans by Mexican wolves indicative of predation, prey testing or self-defense. While the possibility exists that an incident of aggression by a healthy wild wolf in the experimental population could occur we consider the probability (risk) of such an occurrence to be extremely low. There are no peer reviewed studies or scientifically collected data available to make an evaluation as to whether implementation of Alternative Three will have a significant adverse or beneficial psychological impact on children living in the project study area. There have been no documented cases of rabies in the Mexican wolf experimental population, no wolves have tested positive for *Echinococcus spp* or leptospirosis and no other common pathogens such as plague, tularemia, *Neospora*, anthrax, listeria, brucellosis, and tuberculosis have been detected. Under this alternative we would continue the active disease surveillance programs and health protocols already established for the Reintroduction Project. The Mexican wolf experimental population does not present a credible source of enzootic parasites or pathogens that are a risk to human health. We do not expect this to change under the proposals put forward under this alternative. For these reasons we expect no significant direct or indirect adverse or beneficial impacts to human health and public safety in any of the proposed management zones to result from the implementation of Alternative Three for the Proposed Action.

Alternative Four (No Action)

Under the No Action Alternative we would make no changes to the 1998 Final 10(j) Rule language or the Reintroduction Project management policy governing the management of the experimental population of Mexican wolves. The initial release of Mexican wolves would continue to occur only within the PRZ of the BRWRA and wolves would continue to be captured and removed should they disperse to establish territories wholly outside of the BRWRA. The majority of wolf-human interactions that have been documented during the period of the reintroduction (1998-2013) are categorized as investigative searches (84 percent) or investigative approaches (12 percent). Dogs were associated with six of the thirteen incidents (46 percent) categorized as investigative approaches. Four incidents (4 percent) were categorized as aggressive (agonistic) charges with three of those incidents involving dogs (75 percent). Of the 108 documented wolf-human incidents 42 occurred within three months of initial release or translocation (39 percent). From 1998 through 2013 fifteen wolves were removed for nuisance behavior. Without changes in the Reintroduction Project management policy governing initial releases or modifications to the regulations which designate the area that wolves are allowed to occupy within the MWEPA we would expect the wolf population to grow in accordance with the population projection provided in Appendix D. Because the initial release of wolves will continue to be limited to the PRZ of the BRWRA the great majority of this population growth will come from natural increase. Nearly four out of every ten nuisance incidents have involved initially released or translocated wolves. Although we expect the experimental population to increase under the No Action alternative, the majority of these wolves will be wild born with a lower propensity to engage in nuisance behavior. Therefore, we do not expect appreciable changes in the levels (an average of approximately seven incident reports per year) or types of wolf-human interaction or the areas in which they occur. There have been no incidents of aggression towards humans by Mexican wolves indicative of predation, prey testing or self-defense and while the possibility exists that an incident of aggression by a healthy wild wolf in the experimental population could occur we consider the probability (risk) of such an occurrence to be extremely low. 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. There have been no documented cases of rabies in the Mexican wolf experimental population, no wolves have tested positive for *Echinococcus spp* or leptospirosis and no other common pathogens such as plague, tularemia, *Neospora*, anthrax, listeria, brucellosis, and tuberculosis have been detected. Under the No Action alternative we would continue active disease surveillance programs and health protocols already established for the Reintroduction Project and we would continue the pre and post-release management measures, including aversive conditioning necessary to promote avoidance behavior. We would also continue to remove wolves that exhibit habituated behavior. For these reasons we expect no significant direct or indirect adverse or beneficial impacts to human health and public safety from the No Action alternative.

4.6 ENVIRONMENTAL JUSTICE

Sections 4.2 through 4.5 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.

Based on our analysis the proposed action and alternatives would have no significant direct or indirect effects to any resource areas in the proposed management Zone 3. In proposed management Zone 1 or 2 no significant direct or indirect adverse effects were identified for Biological Resources (Vegetation), Biological Resources (Other predator and non-ungulate wild prey species), Economic Activity (Tourism), Land Use, and Human Health/Public Safety. Because there are no significant adverse effects identified we do not address the question of disproportionality in the environmental justice analysis for these resource areas. We do predict that implementation of the proposed action and alternatives could have less than significant direct adverse effects in proposed management Zones 1 and 2 on: Biological Resources (native wild prey species, specifically elk) and Economic Activity (Ranching/Livestock Production). Alternative Three could have less than significant impact on Economic Activity (Hunting)

4.6.1 Methodology and Analysis

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 disproportionate and adverse impacts to population groups of concern we use comparison to a reference population. A reference population provides context for the analysis of impacts to communities with EJ 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 EJ 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. A difference in adverse impacts across population groups does not mean there is a disproportionately high and adverse impact. A disproportionately high and adverse impact is declared when the differences are substantial enough to merit agency action such as mitigation.

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. The benefits 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 section 4.4. Additional positive effects from the Mexican wolf such as positive ecosystem effects like trophic cascades are addressed in section 4.3. 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 that wolves may occur.

4.6.1.1 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.

4.6.1.2 Analysis

The low-income and minority populations and tribal members are population groups of concern within the project study area. The counties of Apache, Gila, Greenlee, and Navajo in Arizona and the counties of Catron, Grant, Hidalgo and Sierra in New Mexico have some portion of their land within the area currently designated as the BRWRA. These counties, as well as Coconino, Maricopa and Yavapai in Arizona and Socorro in New Mexico have portions of their land included within the proposed management Zone. All have population groups of concern, either low-income or minority Additional counties with population groups of concern in proposed management Zone 2 include Cochise, Graham, Mohave, Pima, Pinal, and Santa Cruz, in Arizona and Bernalillo, Cibola, Dona Ana, Hidalgo, Lincoln, Luna, McKinley, Otero, Socorro, Torrance, and Valencia in New Mexico. Through cooperative agreement with the White Mountain Apache Tribe Mexican wolves currently occupy the Fort Apache Indian Reservation. Implementation of the proposed action and alternatives may affect additional tribes with reservations that have suitable wolf habitat and are within proposed management Zones 1 and 2 are the San Carlos Apache Tribe, Mescalero Apache Tribe, Navajo Nation (including Ramah Navajo and the Alamo Band), Pueblo of Acoma, Pueblo of Isleta, Pueblo of Laguna, and Pueblo of Zuni.

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 is not possible. State level industry demographics could also help to inform the analysis but because the data is only available at the state level it is not useful in the selection of the comparison group.

We compared the demographic and economic characteristics of those population groups of concern in the project study area to 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. We use national demographic and economic data as the basis of comparison in this analysis.

4.6.1.3 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 4-7 the risk source is the increased presence of the wolf (i.e. more wolves in a larger area) and changes of management 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), 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.

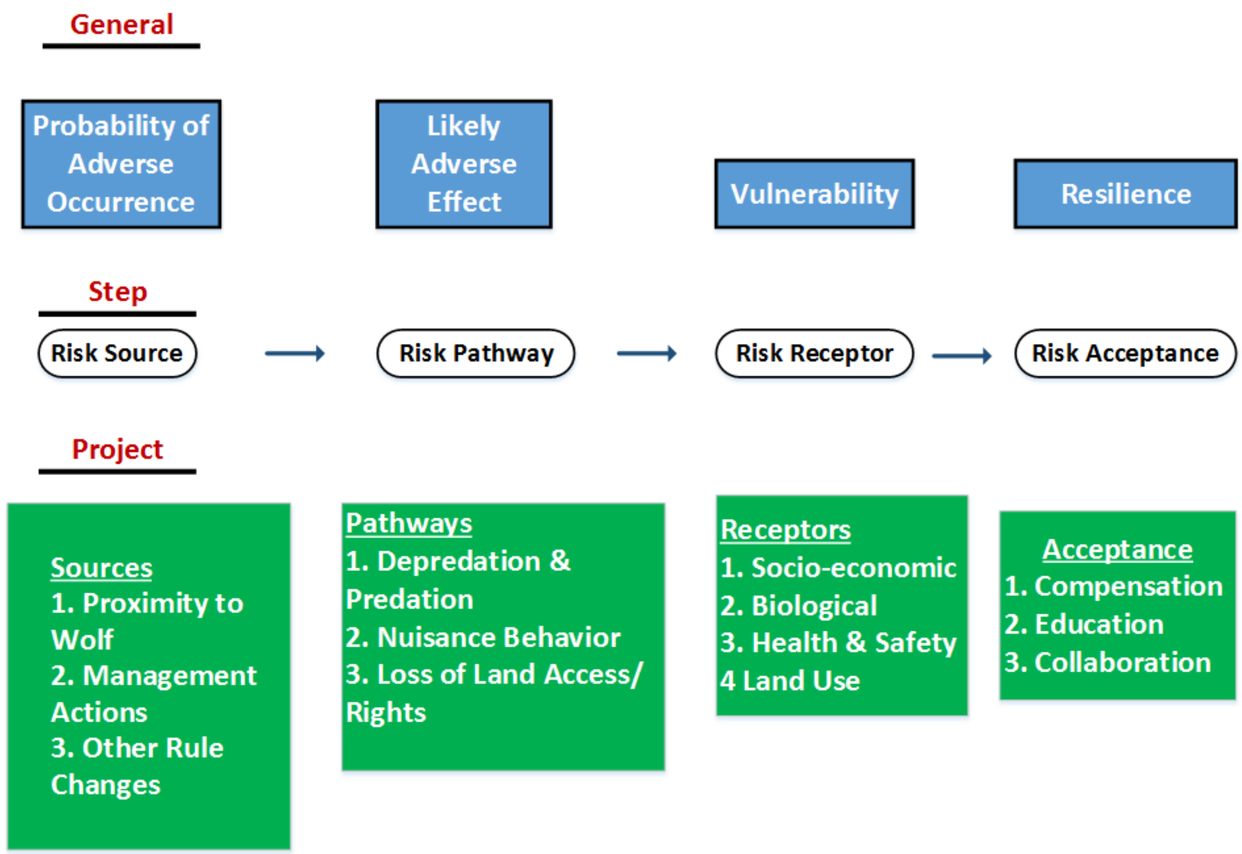


Figure 4-7. Source-Pathway-Receptor-Acceptance Model

Analysis for disproportionate adverse economic impacts

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 the proposed 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 section 4.5 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 4-7 in section 4.5 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 farms' total profits could be greatly diminished by only one depredation. Table 3-23 in section 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 reference national 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 are larger when taking cultural identity and community cohesion into account. 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. Section 4.3 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. However, our analysis in section 4.5 concludes that no significant adverse impacts on hunting would occur from implementation of Alternatives One and Two and less than significant impacts from implementation of Alternative Three. Because we expect no significant or less than significant impacts to the hunting industry to occur and because there are no indigenous peoples that subsist wholly on wild game we do not expect any disproportionate adverse effects to occur for population groups of concern from wolf predation on wild ungulates, specifically elk.

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 Sub-Group 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 is an environmental justice concern of special importance due to these populations often living close to subsistence levels and relying more heavily on 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. However, tribes as population groups of concern are marginally more at risk from economic losses that may affect their primary source of income. For this reason tribal population groups of concern could suffer high and disproportionate adverse impacts from implementation of the proposed action and alternatives.

4.6.2 Potential Environmental Impacts and Proposed Mitigation Measures

4.6.2.1 Alternative One (Proposed Action and Preferred Alternative)

Alternative One proposes changes in the management of the experimental population of Mexican wolves that would adopt a phased management approach to minimize or avoid possible impacts to wild ungulate populations (specifically elk) in portions of western Arizona. We would conduct the initial release of wolves in a larger area to be known as management Zone 1 and we would allow wolves to disperse into and occupy the MWEPA (proposed management Zones 1, 2 and 3). Under Alternative One the initial release and translocation of wolves and their natural dispersal and occupancy in portions of western Arizona in Zones 1 and 2 would be limited in accordance with the phased management described in section 2.3.1. Scenario A and B were modeled with the same growth rate, but differed relative to the implementation of the phases and thus the area that wolves were allowed to occupy. The impacts would be more concentrated under Scenario A within the smaller area defined by Phase 1 relative to the broader area defined by Phase 3. Alternative One would implement changes to the take provisions authorized under the experimental population rule that would allow domestic animal owners or their agents to take (including kill or injure) any Mexican wolf that is in the act of biting, wounding or killing domestic animals on non-federal land anywhere within the MWEPA. This alternative would also allow the Service or designated agency to issue permits to allow domestic animal owners or their agents to take (including intentional harassment or kill) any Mexican wolf that is present on non-Federal land where specified in the permit. Under Alternative One we expect the experimental population of Mexican wolves to grow in accordance with the projections provided in Appendix D. This alternative is intended to achieve a Mexican wolf experimental population objective of from 300 to 325 wolves. We expect the population to be more widely distributed and primarily occupy available suitable habitat within proposed management Zones 1 and 2.

Members of population groups of concern involved with small ranching operations and tribal members engaged in livestock production are the most likely to experience disproportionate adverse effects. For individuals who are members of a population group of concern experiencing adverse economic impacts compensating them for their lost revenue, time and other additional operating costs associated with Mexican wolves could avoid disproportionate impacts. Alternative One minimizes the potential impact to small ranching entities in several ways relative to the other action alternatives and the no action alternative. First, Alternative One offers several forms of harassment and take of Mexican wolves on federal and non-federal land that are not offered in Alternative Three or Four (No Action). Second, Alternative One maximizes our ability to conduct initial releases in areas of high quality habitat (relative to Alternatives Two and Four) in order to minimize nuisance events associated with initial releases. In addition to the minimization measures proposed under Alternative One there are one or more sources of compensation which may be available to ranchers to further mitigate impacts. If the Mexican Wolf/Livestock Trust Fund continues to be funded, we would expect the Mexican Wolf /Livestock Coexistence Council (Coexistence Council) to compensate 100 percent of the market value of confirmed depredated cattle and 50 percent of market value for probable kills with payments to affected ranchers (Mexican Wolf/Livestock Coexistence Plan 2014). We would also expect the Coexistence Council to continue to provide funding for proactive conservation measures to decrease the likelihood of depredation and Payments for Presence of Mexican wolves to offset indirect costs. Another possible source of mitigation funding is the USDA Livestock Indemnity Program, part of the 2014 Farm Bill, which provides (among other benefits) benefits to livestock producers for livestock lost due to attacks by animals introduced into the wild by the federal government or protected by federal law, including wolves. This program may pay a livestock owner 75 percent of the market value of the applicable livestock (http://www.fsa.usda.gov/Internet/FSA_File/lip_long_fact_sht_2014.pdf). These measures will help reduce monetary losses to individual livestock operators and no significant long-term effect on overall ranching/livestock production in the project study area is expected.

Alternative One proposes a phased management approach which during the first 12 years following implementation which may limit wolf occupancy in parts of western Arizona in proposed management Zone 1 and 2. Alternative One also sets a population objective of from 300 to 325 wolves in the experimental population which may serve to reduce depredation on livestock. Management measures to reduce depredation risk and compensation programs to mitigate economic losses due to wolf depredation will be available. High and disproportionate adverse economic impacts to small ranch operations, which have a large percentage of focus minority groups identified as principal operators, and to tribal members engaged in livestock production could occur from implementation of Alternative One. Both these population groups of concern are marginally most at risk from economic losses. However, we expect any adverse disproportionate impacts that might be experienced by these groups to be less than significant due to the mitigation measures available under this alternative.

4.6.2.2 Alternative Two

Under Alternative Two the area proposed for the initial release of wolves in the proposed management Zone 1 would be smaller (limited to the existing BRWRA) than under Alternative One. Under this alternative, additional areas of national forest would not be added to Zone 1. Therefore, fewer potential release sites in remote locations, including additional wilderness areas would be available for the initial release of wolves. Alternative Two would implement changes to the take provisions authorized under the experimental population rule that would allow domestic animal owners or their agents to take (including kill or injure) any Mexican wolf that is in the act of biting, wounding or killing domestic animals on non-federal land anywhere within the MWEPA. This alternative would also allow the Service or designated agency to issue permits to allow domestic animal owners or their agents to take (including intentional harassment or kill) any Mexican wolf that is present on non-federal land where specified in the permit. Under Alternative Two we expect the experimental population of Mexican wolves to grow in accordance with the projections provided in Appendix D. Under Alternative Two the population would be allowed to continue to grow and would reach approximately 534 wolves in year 19 and then remain stable. We also expect the population to be more widely distributed and primarily occupy available suitable habitat within proposed management Zones 1 and 2.

Members of population groups of concern involved with small ranching operations are the most likely to experience disproportionate adverse effects. No unique disproportionately high and adverse impacts are expected from this alternative for tribal population groups of concern. For individuals who are members of a population group of concern experiencing adverse economic impacts compensating them for their lost revenue, time and other additional operating costs associated with Mexican wolves could avoid disproportionate impacts. Alternative Two minimizes the potential impact to small ranching entities by offering several forms of harassment and take of Mexican wolves on federal and non-federal land that are not offered in Alternative Three or Four (No Action). In addition to the minimization measures proposed under Alternative Two there are, one or more sources of compensation which may be available to ranchers to further mitigate impacts. If the Mexican Wolf/Livestock Trust Fund continues to be funded, we would expect the Mexican Wolf /Livestock Coexistence Council (Coexistence Council) to compensate 100 percent of the market value of confirmed depredated cattle and 50 percent of market value for probable kills with payments to affected ranchers (Mexican Wolf/Livestock Coexistence Plan 2014). We would also expect the Coexistence Council to continue to provide funding for proactive conservation measures to decrease the likelihood of depredation and Payments for Presence of Mexican wolves to offset indirect costs. Another possible source of mitigation funding is the USDA Livestock Indemnity Program, part of the 2014 Farm Bill, which provides (among other benefits) benefits to livestock producers for livestock lost due to attacks by animals introduced into the wild by the federal government or protected by federal law, including wolves. This program may pay a livestock owner 75 percent of the market value of the applicable livestock (http://www.fsa.usda.gov/Internet/FSA_File/lip_long_fact_sht_2014.pdf). These measures will help reduce monetary losses to individual livestock operators and no significant long-term effect on overall livestock production in the project study area is expected.

Alternative Two does not provide the phased management approach proposed in Alternative One. Neither does it propose to set a population objective for the experimental population of Mexican wolves. However, management measures to reduce depredation risk and compensation programs to mitigate economic losses due to wolf depredation will be available. High and disproportionate adverse economic impacts to small ranch operations, which have a large percentage of focus minority groups identified as principal operators, and to tribal members engaged in livestock production, could occur from implementation of Alternative Two. Both these population groups of concern are marginally most at risk from economic losses. However, we expect any adverse disproportionate impacts that might be experienced by these groups to be less than significant due to the mitigation measures available under this alternative.

4.6.2.3 Alternative Three

Alternative Three proposes changes in the management of the experimental population of Mexican wolves that would allow the initial release of wolves in a larger area to be known as management Zone 1 and would allow wolves to disperse into and occupy the entire MWEPA (proposed management Zones 1, 2 and 3). Alternative Three does not propose the changes to the take provisions for Mexican wolves within the MWEPA that are included in Alternatives One and Two. Under Alternative Three we expect the experimental population of Mexican wolves to grow in accordance with the projections provided in Appendix D. Under Alternative Two the population would be allowed to continue to grow and would reach approximately 534 wolves in year 17 and then remain stable. We also expect the population to be more widely distributed and primarily occupy available suitable habitat within proposed management Zones 1 and 2. Implementation of this alternative is expected to cause more depredations than the other action alternatives, but only slightly more than Alternative Two.

Members of population groups of concern involved with small ranching operations are the most likely to experience disproportionate adverse effects. No unique disproportionately high and adverse impacts are expected from this alternative for tribal population groups of concern. For individuals who are members of a population group of concern experiencing adverse economic impacts compensating them for their lost revenue, time and other additional operating costs associated with Mexican wolves could avoid disproportionate impacts. Alternative three is expected to be the most adverse to the population groups of concern, and therefore possibly the highest level a disproportionate impacts as well. Members of population groups of concern involved with small businesses ranching are the most likely to experience disproportionate adverse effects. Although under this alternative there would be less flexibility provided to a domestic animal owner on non-federal land to act to protect domestic animals from harm from a wolf other management actions will still be available. These would include non-lethal and lethal control actions taken by the Reintroduction Project. In addition to these management actions one or more sources of compensation which may be available to ranchers to further mitigate impacts. If the Mexican Wolf/Livestock Trust Fund continues to be funded, we would expect the Mexican Wolf /Livestock Coexistence Council (Coexistence Council) to compensate 100 percent of the market value of confirmed depredated cattle and 50 percent of market value for probable kills with payments to affected ranchers (Mexican Wolf/Livestock Coexistence Plan 2014). We would also expect the Coexistence Council to continue to provide funding for proactive conservation measures to decrease the likelihood of depredation and Payments for Presence of Mexican wolves to offset indirect costs. Another possible source of mitigation funding is the USDA Livestock Indemnity Program, part of the 2014 Farm Bill, which provides (among other benefits) benefits to livestock producers for livestock lost due to attacks by animals introduced into the wild by the federal government or protected by federal law, including wolves. This program may pay a livestock owner 75 percent of the market value of the applicable livestock (http://www.fsa.usda.gov/Internet/FSA_File/lip_long_fact_sht_2014.pdf). These measures will help reduce monetary losses to individual livestock operators and no significant long-term effect on overall livestock production in the project study area is expected.

Alternative Three does not provide the additional flexibility provided to a domestic animal owner on non-federal land to act to protect domestic animals from harm from a wolf as proposed under Alternatives One and Two. Neither does it provide the phased management approach proposed in Alternative One or propose to set a population objective for the experimental population of Mexican wolves. However, management measures to reduce depredation risk and compensation programs to mitigate economic losses due to wolf depredation will be available. High and disproportionate adverse economic impacts to small ranch operations, which have a large percentage of focus minority groups identified as principal operators, and to tribal members engaged in livestock production, could occur from implementation of Alternative Two. Both these population groups of concern are marginally most at risk from economic losses. However, we expect any adverse disproportionate impacts that might be experienced by these groups to be less than significant due to the mitigation measures available under this alternative.

4.6.2.4 No Action

Under the No Action Alternative we would make no changes to the 1998 Final 10(j) Rule language or the Reintroduction Project management policy governing the management of the experimental population of Mexican wolves. The initial release of Mexican wolves would continue to occur only within the PRZ of the BRWRA and wolves would continue to be captured and removed should they disperse to establish territories wholly outside of the BRWRA. Without changes in the Reintroduction Project management policy governing initial releases or modifications to the regulations which designate the area that wolves are allowed to occupy within the MWEPA we would expect the wolf population to grow in accordance with the population projection provided in Appendix D.

The No Action Alternative would not provide the additional flexibility provided to a domestic animal owner on non-federal land to act to protect domestic animals from harm from a wolf as proposed under Alternatives One and Two. However, management measures to reduce depredation risk and compensation programs to mitigate economic losses due to wolf depredation will be available and under the No Action Alternative the Mexican wolf experimental population would be smaller compared to any of the action alternatives and would continue to be limited to occupancy in the BRWRA.

High and disproportionate adverse economic impacts to small ranch operations in Catron, Grant and Sierra Counties in New Mexico and Greenlee and Apache Counties in Arizona, which have a large percentage of focus minority groups identified as principal operators, and to tribal members of the White Mountain Apache and the San Carlos Apache Tribes engaged in livestock production, could occur from the No Action Alternative. Both these population groups of concern are marginally most at risk from economic losses. However, we expect any adverse disproportionate impacts that might be experienced by these groups to be less than significant due to the mitigation measures available under this alternative.

4.7 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). Cumulative impacts can result from "individually minor but collectively significant actions taking place over a period of time" (40 CFR 1508.7). Cumulative impacts should be addressed using standards of practicality and reasonableness and NEPA requires only a discussion of those cumulative impacts with the potential for significance. The discussion of cumulative impacts should reflect the severity of the impacts and their likelihood of occurrence, but it need not provide the same level of detail as the discussion of the environmental effects attributable to the project alone. CEQ guidance in considering cumulative effects involves defining the scope of the past, present, and reasonably forseeable future actions and their interrelationship with the proposed action and alternatives. The scope of these actions must consider geographical and temporal overlap among the proposed action and alternatives and other past, present, anf reasonably foreseeable future actions. The cumulative effects analysis must also evaluate the nature of the interactions at the time of overlap. Cumulative effects can be either positive or negative. They are most likely to result when a relationship or synergism exists between the proposed action and alternatives and other actions expected to occur in a similar location or during a similar time period. Actions overlapping or in close proximity to the proposed action and alternatives would be expected to have more potential for a relationship than those geographically separated (CEQ 1997, 2005).

The number of past, present, and reasonably foreseeable future actions are numerous. These actions occur in the proposed expanded MWEPA which covers 153,872 mi^2/398,524 km^2 in the southern halves of Arizona and New Mexico. It is impossible to catalogue all past, present, and reasonably foreseeable future actions in an action area of this size. Generally, most of the action area consists of land owned by the United States. On those Federal lands, actions generally have included or include grazing, recreational activities (e.g. hunting, camping, and OHV use), oil, gas, and mineral extraction, and timber harvesting. The action area also includes non-Federal, state, private and Tribal trust lands. The actions taken on those lands are varied and numerous, but in the non-Federal lands containing suitable wolf habitat generally they are similar to activites carried out on Federal lands. This does not mean that actions all non-Federal and Tribal lands have been exactly the same as activities carried out on Federal lands. For instance, a private ranch might not have engaged in timber harvesting in the past or present. A private ranch might have no plans for future timber harvesting.

4.7.1 Analysis of Potential Cumulative Impacts from Past, Present and Reasonably Foreseeable Actions in Proposed Management Zones 1, 2 and 3

NEPA requires only a discussion of those cumulative impacts with the potential for significance and only for those resources that are affected by the proposed action and alternatives (EPA 1999). We have determined that the proposed action and alternatives would have no effects on 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. No further analysis of impacts to these resources areas is made because the proposed action adds no incremental impact to past, present, and reasonably foreseeable future actions in the action area.

The proposed management zones in the MWEPA define the geographic scope within the project study area in which we analyze the possible effects from implementation of the proposed action and alternatives. Actions are evaluated based on proximity, connection to the same ecological systems, potential for subsequent impacts or activities and similar impacts. As defined in all three action alternatives Management Zone 3 would be established for the most eastern portion of the state of New Mexico and the most western portion of the state of Arizona. Only approximately one percent (882mi^2/2,283 km^2) of this proposed management zone has suitable habitat for wolves (Figure 3-1). Although we would allow Mexican wolves to naturally disperse into and occupy Management Zone 3 we would not conduct initial releases of wolves in it nor would we translocate wolves into it. Because proposed Management Zone 3 has only a small amount of suitable wolf habitat we expect few, if any, Mexican wolves will occupy it. Should they disperse into this zone, we would more actively manage them under the authorities of the proposed rule to reduce conflict with humans due to depredation or nuisance behavior. Therefore, we expect no significant effects to Land Use, Biological Resources, Economic Activity, Human Health/Public Safety or Environmental Justice to occur in proposed management Zone 3 from implementation of the proposed action or any of the alternatives. Because we expect no significant effects to occur from the proposed action and alternatives in Management Zone 3 we do not analyze cumulative impacts to these resources in this area.

Based on our analysis the proposed action and alternatives would have no significant direct or indirect effects in proposed management Zone 1 or 2 on Biological Resources (Vegetation), Biological Resources (Other predator and non-ungulate wild prey species), Economic Activity (Tourism), Land Use, and Human Health/Public Safety. Therefore, the possible cumulative impact to these resource areas from the proposed action when added to the aggregate effects from other actions in the project study area is not addressed. We do predict that implementation of the proposed action and alternatives could have less than significant direct adverse effects in proposed management Zones 1 and 2 on: Biological Resources (native wild prey species, specifically elk) and Economic Activity (Ranching/Livestock Production). We also predict that implementation of the proposed action and alternatives will have less than significant indirect beneficial effects to Biological Resources (scavenger species) and direct beneficial effects to Biological Resources (Special status species, specifically the federally listed Mexican wolf and the experimental population). We also predict that implementation of Alternative Three could have less than significant impacts on Economic Activity (big game hunting) in proposed management Zones 1 and 2.

4.7.1.1 Cumulative Impacts in Proposed Management Zones 1 and 2

Under Alternatives One (Proposed Action and Preferred Alternative) and Three the proposed Management Zone 1 would include all of the Apache and Gila National Forests (the existing BRWRA) and any or all of the Sitgreaves National Forest; the Payson, Pleasant Valley, and Tonto Basin Ranger Districts of the Tonto National Forest; and the Magdalena Ranger District of the Cibola National Forest. Under Alternative Two only the existing BRWRA (the Apache and the Gila National Forests) would be designated Management Zone 1. Under Alternative One the initial release and translocation of wolves and their natural dispersal and occupancy in portions of western Arizona in Zones 1 and 2 would be limited in accordance with the phased management described in section 2.3.1. Depending on the alternative suitable wolf habitat occurs in approximately 83 to 87 percent of proposed Zone 1 and in approximately 27 to 30 percent of proposed Management Zone 2. All of the suitable wolf habitat in proposed Management Zone 1 and the majority (approximately 62 percent) of suitable habitat in proposed Management Zone 2 occurs on federal land. The remainder of the suitable habitat on non-federal land in proposed Management Zone 2 is on tribal land (17.5 percent), private land (14 percent) and state owned land (6 percent). Because all of the suitable habitat in proposed management Zone 1, and the majority of suitable wolf habitat in proposed management Zone 2, is on federal land this is where cumulative effects are most likely to occur. All of the suitable habitat on federal land in Zone 1 and approximately 91 percent of the suitable habitat on federal land in Zone 2 is in the national forests. Approximately 7 percent of the suitable habitat in Zone 2 is on BLM managed land. Because "it is not practical to analyze how the cumulative effects of an action interact with the universe" we narrow the focus of our analysis of environmental effects to the aggregate effects of past, present and reasonably future actions that are truly meaningful (CEQ 2005). Accordingly, our cumulative effects analysis primarily considers those federal agency (especially Forest Service) actions within the proposed management zones 1 and 2 that may affect the resources that may also be affected by the proposed action and alternatives.

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 multi-forests and links to the websites for the nine National Forests within proposed Management Zones 1 and 2. Each National Forest website has a Land and Resource Management webpage that provides the current Schedule of Proposed Action (SOPA) Report and environmental planning references for each national forest. The current SOPA reports contains a list of proposed actions that will begin, or are currently undergoing, environmental analysis and documentation. Past SOPA reports are also available for review. The Planning/NEPA webpage of the BLM-New Mexico website (http://www.blm.gov/nm/st/en/prog/planning.1.html) and the Planning webpage of the BLM-Arizona (http://www.blm.gov/az/st/en/prog/planning.html) provide information about current major planning projects and links to the Planning and NEPA websites for each Field Office which manages the BLM land within proposed Management Zones 1 and 2. Coordination with the Forest Service and BLM assisted in identifying those actions that may affect the same resources as the proposed action and alternatives of this EIS. Relevant projects were determined to be those projects reviewed, or planned for environmental review, above the level of a Categorical Exclusion (CATEX) and which occur within the proposed management Zones 1 and 2. The actions planned by these agencies are neither dependent on the proposed action and alternatives addressed in this EIS nor are they part of it and the environmental analyses have been, or will be, conducted separately, with the results of those analyses incorporated into environmental planning documents prepared by the Forest Service or BLM.

Biological Resources and Economic Activity (big game hunting)

Wild Prey (elk)

We predict less than significant direct adverse impacts on wild prey (specifically elk which are the primary prey species for Mexican wolves in the BRWRA) within proposed management Zones 1 and 2 from implementation of Alternatives One (the proposed action and preferred alternative) Two and Three. We also predict that implementation of Alternative Three could have less than significant impacts on Economic Activity (Big game hunting) in proposed management Zones 1 and 2.Within these zones we considered whether cumulative effects to elk as a biological resource and to hunting as an economic activity could occur from two other actions: livestock grazing management on Federal and non-Federal lands and state management of elk populations.

The introduction of livestock, primarily cattle and sheep into the arid and semi-arid regions of the west resulted in degradation in wildlife habitat and competition for forage with wild ungulate populations. During the era of homesteading, Western public rangelands were often overgrazed because of policies designed to promote the settlement of the West and a lack of understanding of these arid ecosystems. The unregulated grazing that took place before enactment of the Taylor Grazing Act of 1934 caused unintended damage to soil, plants, streams, and springs. As a result, grazing management was initially designed to increase productivity and reduce soil erosion by controlling grazing through both fencing and water projects and by conducting forage surveys to balance forage demands with the land's productivity ("carrying capacity"). These initial improvements in livestock management, which arrested the degradation of public rangelands while improving watersheds, were appropriate for the times. Agencies managing grazing on public lands have now moved in general to better management or protection of specific rangeland resources, such as riparian areas, threatened and endangered species, sensitive plant species, and cultural or historical objects. Consistent with this enhanced role, the BLM has developed or modified the terms and conditions of grazing permits and leases and implemented new range improvement projects to address these specific resource issues, promoting continued improvement of public rangeland conditions (BLM 2014).

Livestock grazing on Federal and non-Federal (tribal, state and private land) can still result in present and possible future direct, indirect and cumulative effects to wildlife species. Livestock impact wildlife in a variety of ways: by their presence, through behavioral impacts, and by their competing use of forage. Impacts to wildlife and habitat components include, but are not limited to; cover and forage removal, soil disturbance and erosion, reduction of fine fuels available to carry fire (altered fire regime), addition of artificial water, food and mineral sources; habitat fragmentation, changes in overland and channel flow regimes, and long-term vegetative community conversion. Fences can impede big game movement and pose the risk of entanglement. Competition for forage is one of the most important direct effects.

Livestock grazing on tribal trust land is controlled by individual tribe's rangeland management program. Rangelands occupy a large portion of many reservations. Rangeland management program are responsible for the proper management of rangeland health, livestock grazing, agriculture and irrigation. Program services include: oversight, and administrative and technical assistance to the reservation livestock associations, management and control of excess feral horse populations; and maintenance and repair of rangeland infrastructure. Generally, the management of such lands is low intensity and consists of achieving desired conditions through natural processes. Livestock grazing is an important use of State lands in both Arizona and New Mexico. Rangeland management on State Trust land is a mutual effort between the Land Department and its grazing leasees. Responsibilities for rangeland management on state trust land include developing coordinated resource management plans for grazing leases, rangeland monitoring, and coordinating efforts with federal and private land managers. Individual ranchers control grazing and grazing management on private land. Technical expertise to aid in improving rangeland health, and to develop appropriate grazing strategies to protect the range, while meeting the needs of the rancher is available through the state agriculture department and the local soil and water conservation district or natural resource conservation district.

State trust and private land intermingle with federal land, resulting in a mosaic of ownership that complicates rangeland management. A single ranch often contains private, state trust, and federal land – each with its own set of requirements, leases, permits, and administrators. Forest Service and BLM projects which address livestock grazing management could affect the elk population within the proposed management zones. Grazing management projects in the National Forests address the authorization of livestock grazing allotments and determine grazing management strategies in a manner that maintains and/or moves the areas within the allotments toward the Forest's Land and Resource Management Plan (or "forest plan") desired conditions. Desired conditions are the long-term management goals for a particular area. These goals include consideration of commodity production as well as other resource management requirements such as soils, vegetation, riparian and wildlife. BLM planning regulations require that Resource Management Plans follow the principles of multiple use and sustained yield. The terms and conditions for grazing on BLM-managed lands (such as stipulations on forage use and season of use) are set forth in the permits and leases issued by the Bureau to public land ranchers (BLM 2014). Consistent with the Federal Land Policy and Management Act of 1976 (FLPMA) the BLM manages livestock grazing in a manner aimed at achieving and maintaining public land health. To achieve desired *conditions*, the agency uses rangeland health standards and guidelines. Standards describe specific conditions needed for public land health, such as the presence of streambank vegetation and adequate canopy and ground cover. Guidelines are the management *techniques* designed to achieve or maintain healthy public lands, as defined by the standards. These techniques include such methods as seed dissemination and periodic rest or deferment from grazing in specific allotments during critical growth periods (BLM 2014).

In general, grazing analysis, which includes the determination of wildlife forage needs before allocation of forage for livestock, and improved standards and guidelines for the maintenance of rangeland health have reduced direct and indirect impacts to the wildlife resources and have improved the habitat condition across the Federal lands which provide grazing allotments to private ranchers/livestock producers. Protection and long-term sustainability of the natural resource base are objective in state rangeland management. State rangeland protection acts such as the New Mexico Rangeland Protection Act are enacted for the general welfare of the state to apply methods to "enhance the multiple-use management, development and conservation of rangeland so as to restore rangeland capacity to carry livestock and wildlife, conserve valuable soil and water resources and restore environmental quality" . Therefore, we do not predict that significant adverse cumulative impacts on wild prey (elk) or economic activity (big game hunting) in proposed management Zones 1 or 2 would occur from the proposed action and alternatives when added to the aggregate effects of tribal, state land department, private or Forest Service and BLM grazing management actions.

State wildlife management agencies manage populations of big game species, including elk, on federal and non-federal (excluding Tribal) land. In New Mexico, NMDGF identifies population goals for individual Game Management Units (GMUs) in the Long-Range Elk Management Plan. The goals are derived through a comprehensive evaluation of both the ecological and social carrying capacities of the GMU. Ecological carrying capacities are determined in consultation with the public land management agencies (i.e. the Forest Service and the BLM) based upon the condition of available forage. Social carrying capacities are determined through a public involvement process that includes private landowners, ranchers, sportsmen and the general public. NMDGF revises the Long-Range Elk Management Plan every five years, at which time the ecological and social carrying capacities of individual GMUs are re-evaluated and the population goals are changed accordingly (NMDGF 2014). In Arizona, AGFD manages elk populations in accordance with the *Arizona Statewide Elk Management Plan*. AGFD's management goal is to "maintain and, where possible, enhance elk populations at levels that provide maximum and diverse recreational opportunities, while avoiding adverse impacts to the species and its habitat while minimizing land use conflicts (AGFD 2011a). Elk share use of a limited forage base with other wildlife, livestock, and agricultural production on both public and private lands. With increasing elk populations in both Arizona and New Mexico conflicting demands for forage can result in management decisions to increase elk harvest in some areas through regulated hunting to achieve population management objectives and reduce depredation complaints. Although adverse impacts on localized populations of elk may occur, both Arizona and New Mexico manage elk to maintain stable to increasing statewide populations. Therefore, we do not predict that significant adverse cumulative impacts on wild prey (elk) would occur from the proposed action and alternatives when added to the aggregate effects of NMDGF and AGFD elk management actions.

The Intergovernmental Panel on Climate Change (IPCC) in its *Fourth Assessment Report* concluded that "most of the observed increase in global average temperatures since the mid-20th century is very likely due to the observed increase in anthropogenic greenhouse gas concentrations" (IPCC 2007). There is no longer any doubt that the Earth's climate is changing at an accelerating rate and that the changes are largely the result of human-generated greenhouse gas concentrations in the atmosphere (USFWS 2010c). Drought conditions are expected to worsen and the higher temperatures caused by global climate change now being experienced in the Southwest are projected to continue. Climate change is projected to cause shifts in ecosystem distribution as species move northward and to higher elevations. These shifts include reductions in existing high-elevation ecosystems such as alpine forests and tundra, as well as expansions of grasslands (EPA 2014). In temperate environments, growth rates of populations of large herbivores are often limited by effects of winter weather on survival and recruitment. The regulating effect on ungulate populations in areas that experience severe winters may be lost due to higher winter minimum temperatures which enhance the recruitment of juveniles and wetter summers that enhance the survival of calves (Wang et al. 2002). In the lower latitude of the project study area winters are less severe and winter die off less pronounced. Elk populations in the project study area may be more influenced by reduced water in the system and higher temperatures which may reduce or localize wild ungulate populations in the summer months and cause reductions or distributional shifts in populations over the longer term. However, the possible long term effects of climate change on elk populations are not fully understood and therefore we do not predict that significant adverse cumulative impacts on wild prey (elk) would occur from the proposed action and alternatives when added to the aggregate effects of human caused global climate change.

Other Wildlife Species (Scavengers) and Threatened and Endangered Species

Based on our field observations of coyotes, black bears, ravens, turkey vultures, bald and golden eagles scavenging on Mexican wolf-killed ungulates, we expect some increased level of both direct and indirect effects on these species to occur from a larger population of wolves. While the magnitude of the potential effects are unknown, these interactions are viewed as beneficial ecosystem effects and we predict less than significant indirect beneficial impacts to other wildlife species (scavengers) in proposed Management Zones 1 and 2 from implementation of either Alternative One, Two or Three. Cumulative beneficial effects on other wildlife species that live within suitable wolf habitat might be expected from projects that improve forest health. The fuels management projects in the National Forests include wildland urban interface hazardous fuels reduction projects and forest restoration projects. Both types of projects use forest thinning and prescribed burns designed to improve vegetative structural stage distributions. Conifer encroachment is addressed through meadow treatments. Maintenance prescribed burns are conducted which provide improvement to habitat for wildlife species that depend on healthy browse and grass components. In general, these fuels management projects increase forage production for grazing species. Therefore, these types of projects are expected to provide ecosystem-wide direct and indirect beneficial effects. The direct beneficial effects are an improvement of habitat and forage for herbivore populations. Larger populations of herbivore prey species support larger predator populations and the multiple scavenger species which utilize carcasses at kill sites. These are indirect beneficial effects from habitat improvement and forest restoration actions for other wildlife species such as predators and scavengers.

We expect implementation of our proposed action and alternatives to, over time, result in both the growth and the wider distribution of the experimental population of Mexican wolves. Appendix D provides our population size, distribution and density projections for the experimental population of Mexican wolves for each alternative. Even if the wolf population size, distribution and density projected in Appendix D is achieved we do not do not expect that wolves would be at an ecologically effective density within the MWEPA to produce detectable community impacts on other wildlife species. Therefore, we expect that these effects, should they occur, will be less than significant and we do not predict that significant cumulative beneficial effects on other wildlife species (scavengers) would occur from the proposed action and alternatives when added to the aggregate effects of Forest Service and BLM management actions.

We expect implementation of the proposed action and action alternatives to provide direct and indirect beneficial impacts to the the experimental population of the Mexican wolf and the federally listed Mexican wolf subspecies. Actions within the project study area to improve forest health could also provide a beneficial impact to the Mexican wolf.experimental population and the federally listed Mexican wolf subspecies. Fuels management projects increase forage production for grazing species and can provide direct beneficial effects through improvement of habitat and forage for herbivore populations. Larger populations of herbivore prey species could support larger predator populations including the Mexican wolf.

Although we predict implementation of the proposed action and action alternatives to provide direct and indirect beneficial impacts to the the experimental population of the Mexican wolf and the federally listed Mexican wolf subspecies we do not predict that significant cumulative beneficial effects would occur when added to the aggregate effects of other management actions in the project study area.

<u>Economic Activity</u>

Ranching/Livestock Production

We predict a less than significant direct adverse impact on ranching/livestock production within proposed Zones 1 and 2 from implementation of the proposed action and alternatives. While we do not expect a long-term significant adverse economic effect on ranching/livestock production as a whole across the project study area we do predict that an individual rancher/livestock producer could sustain substantial short-term economic loss in a given year due to the depredation of cattle by wolves.

Many factors, including disease, accidents, malnutrition, inclement weather, stress and predation are causes of mortality in livestock (Breck et al. 2011, Warren et al. 2001). Of particular concern is the effect that weather and climate have on the viability of ranching operations in Arizona and New Mexico. The climate of the Southwest region is changing. Over the last century, the average annual temperature has increased about 1.5°F. Average annual temperature is projected to rise an additional 2.5-8°F by the end of the century. Warming has already contributed to decreases in spring snowpack and river flows throughout the region. Future warming is projected to produce more severe droughts in the Southwest with further reductions in water supplies (EPA 2014). Higher temperatures and drought in the project study area could impact livestock both directly and indirectly in a number of ways:

- Longer and hotter summers and more frequent heat waves can cause heat stress in livestock. Over time, heat stress can increase vulnerability to disease, reduce fertility, and reduce milk production.
- Drought may threaten pasture and feed supplies. Drought reduces the amount of quality forage available to grazing livestock.
- An increase in the prevalence of parasites and diseases that affect livestock caused by shorter and warmer winters. (EPA 2012)

Many factors affect a ranch's profitability regardless of depredation events by wolves. Primarily, ranch operations are affected by cyclical market prices that are difficult to predict and cannot be controlled by the individual livestock producer. Economies of scale allow larger ranches to reduce operating costs, to survive market fluctuations in cattle prices and to more easily absorb losses than smaller ranches (Ashcroft et al. 2010). A combination of low cattle prices, higher operating costs and additional losses due to depredation, drought, or other causes may make ranching economically infeasible for smaller operations in a given year (Ashcroft et al. 2010).

The Intergovernmental Panel on Climate Change (IPCC) in its *Fourth Assessment Report* concluded that "most of the observed increase in global average temperatures since the mid-20th century is very likely due to the observed increase in anthropogenic greenhouse gas concentrations" (IPCC 2007). There is no longer any doubt that the Earth's climate is changing at an accelerating rate and that the changes are largely the result of human-generated greenhouse gas concentrations in the atmosphere (USFWS 2010c). Drought conditions are expected to worsen and the higher temperatures caused by global climate change now being experienced in the Southwest are projected to continue. These conditions are expected to cause both direct and indirect adverse effects on cattle resulting in economic losses for livestock producers.

Nearly 90 percent of the ranches in Arizona and New Mexico have fewer than 50 head of cattle. While these ranches represent the majority of the number of ranches in the two states, they only account for about 10 percent of the states' total cattle and calf inventory. The largest operations, those with an inventory greater than 500 cattle, account for over 80 percent of the total cattle inventory in Arizona and 66 percent of the total inventory in New Mexico. We estimated there are approximately 12,275 small cattle ranches in the project study area (see section 4.4). Under Alternative One we expect the annual number of depredation to be approximately 412/cows/calves. Under Alternative Two we expect the annual number of depredation to be approximately 699/cows/calves. Under Alternative Three we expect the annual number of depredation to be approximately 699/cows/calves. If those depredations were evenly distributed approximately a small percentage of ranches in the project study area would experience an annual depredation event. However, because wolves seem to concentrate in particular areas, and to the extent that livestock are targeted by the pack for depredations, it is likely that some ranch operations will experience a disproportionate share of depredations while other ranches will be unaffected.

The annual depredation loss caused by Mexican wolves as a percentage of the total number of cattle in proposed management Zones 1 and 2 is expected to be small and less than significant adverse impact to ranching/livestock production as a whole within the project study area is expected to occur from implementation of the proposed action and alternatives. Higher temperatures and drought in Arizona and New Mexico that result from global climate change may reduce the economic viability of smaller and marginal ranching operations in the future. The largest operations, which account for the majority of the total cattle inventory are more likely to be resilient and able to adapt to changing conditions. Depending on the size of their ranch operations the significance of economic losses due to depredation by Mexican wolves could be increased when added to losses due to heat stress, reduced forage, and disease caused by drought and higher temperatures. We do expect that the cumulative impact of the proposed action and alternatives on some small individual ranchers/livestock producers, when combined with the aggregate effects of human caused global climate change, could be significant. However, we predict that less than significant adverse cumulative impacts on ranching/livestock production as a whole within the project study area will occur from the proposed action and alternatives when added to the aggregate effects of human caused global climate change.

The management of Federal livestock permits for grazing by the Forest Service and BLM are actions that have can have direct and indirect impacts on ranching/livestock production. Grazing management projects in the National Forests address the authorization of livestock grazing allotments and determine grazing management strategies in a manner that maintains and/or moves the areas within the allotments toward the Forest's Land and Resource Management Plan (or "forest plan") desired conditions. Desired conditions are the long-term management goals for a particular area. These goals include consideration of commodity production as well as other resource management requirements such as overall ecological health of soils, vegetation, riparian areas and wildlife. BLM planning regulations require that Resource Management Plans follow the principles of multiple use and sustained yield. The terms and conditions for grazing on BLM-managed lands (such as stipulations on forage use and season of use) are set forth in the permits and leases issued by the Bureau to public land ranchers (BLM 2014). Consistent with the Federal Land Policy and Management Act of 1976 (FLPMA) the BLM manages livestock grazing in a manner aimed at achieving and maintaining public land health. To achieve desired conditions, the agency uses rangeland health standards and guidelines. Standards describe specific conditions needed for public land health, such as the presence of streambank vegetation and adequate canopy and ground cover. Guidelines are the management techniques designed to achieve or maintain healthy public lands, as defined by the standards. These techniques include such methods as seed dissemination and periodic rest or deferment from grazing in specific allotments during critical growth periods (BLM 2014). Protection of wildlife habitat may, in some instances, require reduction of permitted livestock or exclusion of livestock from sensitive areas. Land management agencies provide for multiple use activities on their lands, including the conservation of federally listed species. For example, on June 10, 2014, the Service listed the New Mexico meadow jumping mouse as endangered under the ESA. As part of this action, Service proposed, but has not finalized a determination, to designate critical habitat for the mouse, including parts of the Lincoln National Forest in New Mexico and the Apache-Sitgreaves National Forest in Arizona. Threats to the jumping mouse include grazing pressure and destruction of habitat in riparian areas. A temporary closure order in the Wills Canyon area within the Lincoln National Forest excludes cattle from jumping mouse occupied habitat while providing livestock watering lanes in order to allow permitted livestock to access water. Some grazing management decisions by federal land management agencies may reduce the number of cattle on a given allotment in a given year or restrict access to protect sensitive resources or achieve other desired conditions intended to maintain public land health. However, the agency goals of multiple use and sustained yield are intended to maximize long-term net public benefits in an environmentally sound manner. Therefore, we predict that less than significant adverse cumulative impacts on ranching/livestock production as a whole within the project study area will occur from the proposed action and alternatives when added to the aggregate effects of grazing management decisions by the Forest Service and BLM.

4.8 REGULATORY COMPLIANCE AND CONSISTENCY WITH APPROVED STATE OR LOCAL PLANS OR LAWS

NEPA requires agencies to prepare EISs concurrently with and integrated with environmental impact analyses and related surveys and studies required by the Fish and Wildlife Coordination Act (16 U.S.C. 661 et seq.), the National Historic Preservation Act of 1966 (16 U.S.C. 470 et seq.), the Endangered Species Act of 1973 (16 U.S.C. 1531 et seq.), and other environmental review laws and executive orders. Federal permits, licenses, and other entitlements which must be obtained in implementing the proposal are also to be listed (40 CFR 1502.25). To better integrate EISs into State or local planning processes, an evaluation of the consistency of the proposed action with approved State or local plans or laws must be discussed (40 CFR 1506.2).

4.8.1 Compliance with Federal acts and executive orders

We prepared this EIS in compliance with and including but not necessarily limited to, the Federal acts and executive orders listed below. The proposed action and alternatives will be implemented pursuant to the Endangered Species Act (ESA) through issuance of a final nonessential experimental rule (see Appendix A for proposed rule) and a revised Section 10(a)(1)(A) research and recovery permit (see Appendix B for draft permit).

- Administrative Procedure Act (APA) of 1946 (5 U.S.C. 511-599). The Administrative Procedure Act (APA) governs the process by which federal agencies develop and issue regulations. It includes requirements for publishing notices of proposed and final rulemaking in the Federal Register, and provides opportunities for the public to comment on notices of proposed rulemaking.
- Endangered Species Act (ESA) of 1973 (16 U.S.C. 1531-1544) as amended. The 1973 Endangered Species Act provides for the conservation of ecosystems upon which threatened and endangered species of fish, wildlife, and plants depend. The Act: authorizes the determination and listing of species as endangered and threatened; prohibits unauthorized taking, possession, sale, and transport of endangered species; provides authority to acquire land for the conservation of listed species, using land and water conservation funds; authorizes establishment of cooperative agreements and grants-in-aid to States that establish and maintain active and adequate programs for endangered and threatened wildlife and plants; authorizes the assessment of civil and criminal penalties for violating the Act or regulations; and authorizes the payment of rewards to anyone furnishing information leading to arrest and conviction for any violation of the Act or any regulation issued thereunder. Section 4(f)(1) of the ESA directs the Secretary of the Interior to "develop and implement recovery plans for the conservation and survival of endangered species". Section 7 of the Act requires federal agencies to insure that any action authorized, funded or carried out by them is not likely to jeopardize the continued existence of listed species or modify their critical habitat. Section 10(a)(1)(A) of the Act permits acts otherwise prohibited by Section 9 for scientific purposes or to enhance the "...survival of the affected species, including but not limited to, acts necessary for the establishment and maintenance of experimental populations...". Section 10(j)(2)(A) of the Act specifies that the Secretary of the Interior may authorize the release…of any population…of an endangered species…if the Secretary determines that such release will further the conservation of such species. This EIS is being prepared to analyze: proposed changes to the regulations established for the experimental population of Mexican wolves in our Final 10(j) Rule entitled "Establishment of a Nonessential Experimental Population of the Mexican Gray Wolf in Arizona and New Mexico" (63 FR 1752, January 12, 1998); and revisions to the Mexican Wolf Recovery Program's Section 10(a)(1)(A) research and recovery permit. Pursuant to Section 7 of the Act we have conducted Intra-Service

formal consultation and received a conference/biological opinion that addresses the impacts of issuance of a section 10(a)(1)(A) research and recovery permit to implement Mexican gray wolf (*Canis lupus baileyi*) recovery activities within the experimental nonessential area (i.e., designated 10(j) area) in Arizona and New Mexico, and for areas outside of the designated 10(j) area.

- Federal Land Policy and Management Act (FLPMA) of 1976 (43 U.S.C. 1712). FLPMA was enacted for the purposes of establishing a unified, comprehensive, and systematic approach to managing and preserving public lands in a way that protects "the quality of scientific, scenic, historical, ecological, environmental, air and atmospheric, water resource, and archeological values." It is the principal law governing how the Bureau of Land Management (BLM) manages public lands. It guides the BLM in management, protection, development, and enhancement of the public lands. FLPMA specifically requires the agency to manage for the multiple use and sustained yield of public land resources for both present and future generations.

- Fish and Wildlife Coordination Act (16 U.S.C. 661 et seq.). The Fish and Wildlife Coordination Act of March 10, 1934, authorizes the Secretaries of Agriculture and Commerce to provide assistance to and cooperate with Federal and State agencies to protect, rear, stock, and increase the supply of game and fur-bearing animals, as well as to study the effects of domestic sewage, trade wastes, and other polluting substances on wildlife. The 1958 amendments added provisions to recognize the vital contribution of wildlife resources to the Nation and to require equal consideration and coordination of wildlife conservation with other water resources development programs, and authorized the Secretary of Interior to provide public fishing areas and accept donations of lands and funds.

- National Environmental Policy Act (NEPA) of 1969 (42 U.S.C. 4321-4347). Title I of the 1969 NEPA requires that all federal agencies prepare detailed environmental impact statements for "every recommendation or report on proposals for legislation and other major Federal actions significantly affecting the quality of the human environment. The 1969 statute stipulated the factors to be considered in environmental impact statements, and required that Federal agencies employ an interdisciplinary approach in related decision-making and develop means to ensure that unquantified environmental values are given appropriate consideration, along with economic and technical considerations. Executive Order 11991 of 24 May 1977 directed the CEQ to issue regulations for procedural provisions of NEPA; these are binding for all federal agencies. This EIS was prepared in accordance with the NEPA, 42 U.S.C. §§ 4321-4370d, as implemented by the CEQ Regulations, 40 CFR Parts 1500-1508.

- National Forest Management Act (NFMA) of 1976 (16 USC 472). NFMA is an amendment of the Forest and Rangeland Renewable Resources Planning Act of 1974 (RPA). This Act establishes standards for how the Forest Service manages the national forests, requires the development of land management plans for national forests and grasslands, and directs the Forest Service to develop regular reports on the status and trends of the Nation's renewable resources on all forest and rangelands. Forest plans guide natural resource management activities on the national forest, and along with the associated laws and regulations, are the basis for management of the national forests, production of outputs, use by the public, and protection of natural resources, cultural resources and visitors.

- National Historic Preservation Act (NHPA) of 1966 (16 U.S.C. 470 et seq). The NHPA provides for preservation of significant historical features (buildings, objects and sites) through a grant-in-aid program to the States. The Act established an Advisory Council on Historic Preservation and a National Register of Historic Places with a program of matching grants under the existing National Trust for Historic Preservation. Section 106 of the NHPA requires the head of any federal agency having direct or indirect jurisdiction over a proposed federal or federally-financed undertaking, prior to the expenditure of any federal funds on the undertaking, to take into account the effect of the undertaking on any historic property listed or eligible for listing in the National Register.

- Regulatory Flexibility Act (RFA) of 1980 (5 U.S.C. 601 et seq) as amended. The purpose of the RFA, as amended by the Small Business Regulatory Enforcement Fairness Act (SBREFA), is to fit regulatory requirements to the scale of the businesses, organizations, and governmental jurisdictions subject to the regulation. The RFA requires that agencies determine, to the extent feasible, the rule's economic impact on small entities, explore regulatory options for reducing any significant economic impact on a substantial number of such entities, and explain their ultimate choice of regulatory approach.
- Unfunded Mandates Reform Act (UMRA) of 1995 (2 U.S.C. 1501et seq). The UMRA was enacted to avoid imposing unfunded federal mandates on state, local, and tribal governments (SLTG), or the private sector. Most of UMRA's provisions apply to proposed and final rules for which a general notice of proposed rule-making was published, and that include a federal mandate that may result in the expenditure of funds by state, local, or tribal governments in the aggregate, or by the private sector of $100 million or more in any one year.
- Wilderness Act of 1964 (16 USC 1131 et seq.). This act provides the framework for designation by Congress of units of the National Wilderness Preservation System and prescribes policy for their management. “A wilderness…is recognized as an area where the earth and its community of life are untrammeled by man…Wilderness areas shall be administered for the use and enjoyment of the American people in such manner as will leave them unimpaired for future use and enjoyment as wilderness and the preservation of their wilderness character”.
- Executive Order 12372: Intergovernmental Review of Federal Programs (47 FR 30959). Executive Order 12372 was issued in 1982. Its purpose is to foster an intergovernmental partnership and a strengthened federalism by relying on State and local processes for the State and local government coordination and review of proposed federal financial assistance and direct Federal development.
- Executive Order 12898: Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations (59 FR 7629). Executive Order 12898 was issued in 1994. It directs all federal departments and agencies to incorporate environmental justice considerations in achieving their mission. Each federal department or agency must identify and address disproportionately high and adverse human health or environmental effects of federal programs, policies, and activities on minority populations and low-income populations
- Executive Order 13045: Protection of Children from Environmental Health Risks and Safety (62 FR 19883). Executive Order 13045 was issued in 1997. It requires each federal agency to “…make it a high priority to identify and assess environmental health and safety risks that may disproportionately affect children and shall…ensure that its policies, programs, activities and standards address disproportionate risks to children....”
- Executive Order 13175: Consultation and Coordination with Indian Tribal Governments (65 FR 67249). Executive Order 13175 was issued in 2000. This order sets forth guidelines for all federal agencies to: (1) establish regular and meaningful consultation and collaboration with Indian tribal officials in the development of Federal policies that have tribal implications; (2) strengthen the United States government-to-government relationships with Indian Tribes; and (3) reduce the imposition of unfunded mandates upon Indian Tribes.

4.8.2 Consistency of the proposed action and alternatives with approved State or local plans or laws

In an EIS, a federal agency must discuss any inconsistency of a proposed action with any approved State or local plan and laws (whether or not federally sanctioned). Where an inconsistency exists, the EIS should describe the extent to which the agency would reconcile its proposed action with the plan or law. We evaluated the consistency of the proposed action and alternatives with the approved State or local plans or laws listed below.

- Apache County, Arizona. Ordinance #2013-07. An Ordinance Setting Forth Emergency Predator-Human Incident Protective Measures. Adopted May 21, 2013
- Apache County, Arizona. Apache County Resolution No. 95-28. Land Use and Resource Policy. Amending the Apache County Comprehensive Plan. Undated.
- Catron County, New Mexico. Ordinance No. 002-2002. Prohibiting Release Into the Wild of Certain Genera. Adopted May 17, 2002.
- Catron County, New Mexico. Ordinance 001-2012. An Ordinance Setting Forth Emergency Predator-Human Incident Protective Measures Revising Catron County Ordinance No. 001-2007.
- Cochise County, Arizona. Comprehensive Plan. Adopted 1984. As amended: 1992, 1996, 2001, 2002, 2003, 2006, 2011. Update 2014
- Eddy County, New Mexico. Land Use Policies and Procedures for Federal, State and County. Adopted July 02, 2002.
- Grant (New Mexico) Soil and Water Conservation District (Grant SWCD). Long Range Resources and Agricultural Production Policies and Program & 5-Year Plan of Action. Adopted December 13, 2002, amended August 15, 2011 and May 19, 2014.
- Greenlee County, Arizona. Land Use and Resource Policy Plan (LURPP). Adopted June 06, 1995.
- Hereford (Arizona) Natural Resource Conservation District (Hereford NRCD). 2013-2018 Long Range Plan. Approved June 19, 2013.
- Luna County, New Mexico. Ordinance No. 7D: An Ordinance Setting Forth Wolf-Human Protective Measures. Adopted December 13, 2007, amended August 15, 2011 and May 19, 2014.
- Mohave County Resolution No. 2014-139: Approving Mohave County's Comments on the Draft Environmental Impact Statement…and Objecting to the Service Facilitating Any Wolves in Mohave County through Dispersement (*sic*) Naturally, Translocation or Release.
- Navajo County, Arizona. Ordinance No. 02-13 amending the Navajo County Predatory Animal Ordinance No. 01-08 by Amending Article 6-Enforcement. Adopted September 24, 2013.
- New Mexico Soil and Water Conservation District Resolutions Amending the District Land Use Plan for Adhering to NEPA Standards for District Participation in Reintroduction of Endangered Predators.
    - Dona Ana Soil and Water Conservation District (Dona Ana SWCD). Resolution #2014-04-1. Dated April 10, 2014.
    - Sierra Soil and Water Conservation District (Sierra SWCD). Resolution #14-010. Dated April 10, 2014

- Quemado Soil and Water Conservation District (Quemado SWCD). Unnumbered. Dated April 09, 2014.
- Upper Hondo Soil and Water Conservation District (Upper Hondo SWCD). Unnumbered. Dated April 08, 2014
- Salado Soil and Water Conservation District (Salado SWCD). Unnumbered. Dated April 01, 2014.
- Otero Soil and Water Conservation District (Otero SWCD). Resolution #06-1314. Dated April 02, 2014.
- Southwest Quay Soil and Water Conservation District (Southwest Quay SWCD). Unnumbered. Dated April 15, 2014
- Hagerman-Dexter Soil and Water Conservation District (Hagerman-Dexter SWCD). Resolution #2-2014. Dated April 14, 2014.
- Chaves Soil and Water Conservation District (Chaves SWCD). Resolution #2014-4-01. Dated April 14, 2014.
- Border Soil and Water Conservation District (Border SWCD). Unnumbered. Dated April 10, 2014
- Carrizozo Soil and Water Conservation District (Carrizozo SWCD). Unnumbered. Dated April 14, 2014
- Socorro Soil and Water Conservation District (Socorro SWCD). Unnumbered. Dated April 22, 2014
- Hidalgo Soil and Water Conservation District (Hidalgo SWCD). Resolution #14-010. Dated April 10, 2014.
- Carlsbad Soil and Water Conservation District (Carlsbad SWCD). Resolution No. VII. Dated April 14, 2014
- Central Valley Soil and Water Conservation District (Central Valley SWCD). Letter dated June 23, 2014. Enclosure missing.
- Penasco Soil and Water Conservation District (Penasco SWCD). Letter dated June 23, 2014. Enclosure missing.

- Pima (Arizona) Natural Resource Conservation District. 5 year Plan 2010-2015. June, 2009. Land Management Plan. Adopted April 15, 2009. Revised January 11, 2011.
- Sierra County, New Mexico. Ordinance 94-001. An Ordinance to Prevent Introduction of Predatory Species into Sierra County. Adopted February 03, 1994.
- Winkelman (Arizona) Natural Resource Conservation District (Winkelman NRCD). 2014-2020 Land and Natural Resource Management Plan. Approved July 20, 2014.

The Service has reviewed and considered the county and conservation district land use plans, policies, resolutions and ordinances listed above that were provided to the Service for review in the development of this EIS. All of these counties and conservation districts are within the project study area and many have a large portion of their land area under the control of federal agencies, primarily the U.S. Forest Service and BLM. A common element of the land use and management plans listed above is 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. Early and ongoing planning, coordination and consultation with state and local governments and stakeholders by federal agencies is consistent with NEPA's intent and governing regulations (40 CFR 1501.6, 1501.7). Therefore, the development of the proposed action and alternatives of the EIS through a process of public engagement, coordination and consultation with federal, state and local agencies, tribes and stakeholder groups has been consistent with county and district land use planning and policy that request federal agencies to coordinate with local government. However, directives and resolutions that require federal agencies to submit management plans for review by state or local agencies before implementation, direct that specific studies be completed before actions are taken, place restrictions on, or direct actions to be taken by the federal agency, or that require federal agencies comply with the provisions of county land use policies, ordinances, plans, resolutions and/or procedures are inconsistent and irreconcilable with Article 6 of the U.S. Constitution which establishes federal law as the highest form of law in the United States legal system (U.S. Const. art. VI.). The revision to the nonessential experimental rule and the Mexican Wolf Recovery Program's Section 10(a)(1))A) research and recovery permit, which form the basis of the proposed action of this EIS, are proposed pursuant to the Endangered Species Act of 1973, as amended (ESA, the Act). Accordingly, 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 are inconsistent and irreconcilable with Federal law. Furthermore, the United States Supreme Court has upheld in *Kleppe v. New Mexico (426 U.S. 529 1976)* that congressional power over federal public land is "without limitations" and that the complete power that Congress has over federal lands under the Property Clause (U.S. Const. art. IV, § 3., cl. 2) necessarily includes the power to regulate and protect wildlife living there, state law notwithstanding" (Fischman and Williamson 2011). Accordingly, local government policy statements, county and conservation district land use plans, resolutions and ordinances that assert local government management authority over federal public land are inconsistent and irreconcilable with federal land and resource laws including the ESA, FLPMA and NFMA. Therefore, the Service cannot reconcile the proposed action of this EIS with sections of local government policy statements, county and conservation district land use plans and ordinances that clearly contravene the nonessential experimental rule.

Under section 11(a)(3) of the Act and § 17.21(c)(2), any person may take (which includes killing as well as nonlethal actions such as harassing or harming) a Mexican wolf in self-defense or defense of the lives of others. This take must be reported to the Service or a designated agency within 24 hours. If the Service or a designated agency determines that a Mexican wolf presents a threat to human life or safety, the Service or the designated agency may kill the wolf or place it in captivity. To the extent that local government policy statements, county and conservation district land use plans, resolutions and ordinances adhere to this provision, they are consistent with our 1998 Final Rule and with the proposed nonessential experimental rule which forms the basis of the proposed action of this EIS. Local government policy statements, county and conservation district land use plans, resolutions and ordinances which impose restrictions on the release "into the wild any animal of the genera Canis...," ordain that an individual may kill or injure a predatory animal that is in the act of killing, wounding, biting, or attacking livestock, ordain the circumstances under which take permits "must be offered", or in any other way contravene the nonessential experimental rule are inconsistent with Federal law and the proposed actions in the nonessential experimental rule which forms the basis of the proposed action of this EIS. Therefore, the Service cannot reconcile the proposed action of this EIS with these sections of local government policy statements, county and conservation district land use plans, resolutions and ordinances that clearly contravene the nonessential experimental rule.

4.9 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 1502.16). Impacts that narrow the range of beneficial uses of the environment are of particular concern. For example: choosing one development option that reduces future flexibility in pursuing other options; or giving over a parcel of land to a certain use that eliminates the possibility of other uses at the site.

The majority (63 percent) of suitable habitat for wolves within the proposed expanded MWEPA (the project study area) occurs on Federal land. The presence of Mexican wolves on Federal land would be in conformance with the existing land use and the resource management plans of the Federal agencies, primarily the Forest Service and BLM, which manage this land. Tribal lands provide approximately 17.5 percent of the available suitable wolf habitat within the proposed expanded MWEPA. If any wolves were to occupy tribal trust land within the MWEPA, the Service would develop management actions in cooperation with the tribal government including capture and removal of the wolf or wolves if requested by the tribal government. Voluntary management agreements between the Service and tribal governments for the management of wolves would provide tribes the option of allowing or prohibiting wolf re-establishment, whether through natural dispersion, initial release, or translocation, on recognized tribal trust lands. Approximately 20 percent of suitable wolf habitat within the proposed expanded MWEPA occurs on state and private land. Under the proposed action and alternatives, wolves would be allowed to disperse into, and occupy, suitable habitat on both Federal and non-Federal (state and private) land within the MWEPA and would not be removed from these lands except in the case of depredation or nuisance behavior. Under voluntary management agreements, entered into with the concurrence of the state government, we could release or translocate wolves at release sites located on private land in Zones 1 and 2. However, section 10(j) of the Act does not provide for the designation of critical habitat for nonessential experimental populations and no changes in land use on non-Federal lands would be required as part of implementation of the proposed action and alternatives. Because of the regulatory flexibility provided by the nonessential experimental designation, we do not expect implementation of the proposed action or alternatives to have significant effects on any activities within Federal, state, private, or tribal trust lands within the MWEPA. In regard to section 7(a)(2) of the Act, the population is treated as threatened on National Park Service and National Wildlife Refuge lands and proposed for listing. Thus, Federal action agencies, other than the National Park Service and the Service on National Refuge lands, are not required to consult on activities that they authorize, fund or carry out. Section 7(a)(4) of the Act requires Federal agencies to confer (rather than consult) with the Service on actions that are likely to jeopardize the continued existence of a species proposed for listing under the ESA. However, because a nonessential experimental population is, by definition, not essential to the survival of the species, conferencing will unlikely be required within the MWEPA. Furthermore, the results of a conference are strictly advisory in nature and do not restrict agencies from carrying out, funding, or authorizing activities. In addition, section 7(a)(1) requires Federal agencies to use their authorities to carry out programs to further the conservation of listed species, which would apply on any lands within the experimental population area. As a result, some modifications to the Federal actions within the experimental population area may occur to benefit the Mexican wolf, but we do not expect projects on Federal lands to be halted or substantially modified due to implementation of the proposed action and alternatives. Additionally, as part of Alternatives One (Proposed Action and preferred alternative) and Two, we would provide, under the 10(j) experimental population final rule, increased flexibility to domestic animal owners on non-Federal private land to protect their domestic animals through the take (both non-injurious and lethal) of Mexican wolves under certain circumstances. For these reasons, we do not expect implementation of the proposed action and alternatives to change the character of the Federal and non-Federal land within the project study area, its long-term productivity, or its availability for other beneficial uses.

We expect implementation of our proposed action and alternatives to result over time in both the growth and the wider distribution of the experimental population of Mexican wolves. Appendix D provides our population, distribution and density projections for the experimental population of Mexican wolves for the proposed action and alternatives. Under any of the action alternatives we expect that achievement of a larger population of wolves distributed in a larger area to result in the loss of elk (their primary prey) and, to a lesser extent, other wild ungulates from predation. Some, but not all, of the mortality caused by wolf predation will be additive to mortality that would occur from other causes and elk are widespread and abundant in most of the suitable wolf habitat in proposed management Zones 1 and 2. Therefore, we expect less than significant short term direct adverse effects on the population of elk within the proposed management Zones 1 and 2 from implementation of the proposed action and alternatives. Although wolves are opportunistic predators, for the reason discussed in section 4.3 no measurable or observable short or long term significant impact is expected on other wild ungulate populations (i.e. deer, pronghorn, and big horn sheep). Should they become necessary, measures to mitigate short-term impacts to wild ungulate species from wolf predation are provided under the proposed action and alternatives. Alternative One (proposed action and preferred alternative) provides, through a phased management approach, additional measures intended to minimize possible impacts to wild ungulate populations (specifically elk) in portions of Arizona west of Highway 87 during the first 12 years following the implementation of the final rule. Wild ungulate population levels fluctuate in response to winter severity, habitat condition, hunter harvest, predation, and other environmental factors such as drought and wildfires. Under the proposed action and alternatives we expect these fluctuations to continue as they have in the past. However, even if the wolf population size, distribution and density projected in Appendix D is achieved, we do not expect that wolves would be at an ecologically effective density to significantly affect long-term elk populations across the broader landscape of the proposed management Zones 1 and 2. Wolves are an apex predator that is currently missing as a functional part of the ecosystem in the majority of the project study area. The successful reestablishment of an experimental population of Mexican wolves in the BRWRA was envisaged “as the first step toward recovery” (USFWS 1982, USFWS 1998). Should recovery of the Mexican wolf be achieved a more complete predator-prey relationship could have beneficial long-term effects on ecological relationships and ecosystem functions. Therefore, through improving the effectiveness of the Reintroduction Project in managing the experimental population of the Mexican wolf, the proposed action and action alternatives are expected to contribute to the maintenance and enhancement of long-term productivity of the environment.

We expect implementation of the proposed action and action alternatives to achieve a larger and more widely distributed experimental population of Mexican wolves which will result in the depredation of more cattle in a larger area than would occur under the No Action alternative. We estimate the average number of cattle killed (both confirmed and unconfirmed) in any given year will be 130.8 per 100 Mexican wolves. Should the experimental population reach the size, distribution and density within the project study area as projected in Appendix D, we expect the majority of depredation losses to occur in proposed management Zones 1 and 2. Under Alternative One we expect the maximum annual number of depredations to be approximately 412 cows and calves. Under Alternatives Two and Three we expect the maximum annual number of depredation to be approximately 699 cows and calves. Short-term losses of livestock are expected to be variable between years and between areas and could therefore have a disproportionate impact on an individual rancher/livestock producer. In the short term, an individual rancher/livestock producer could sustain a substantial loss of livestock in a given year. Alternative One (proposed action and preferred alternative) minimizes the potential impact to small ranching entities in several ways relative to the other action alternatives and the no action alternative. First, Alternative One offers several forms of harassment and take of Mexican wolves on federal and non-federal land that are not offered in Alternative Three or Four (No Action). Second, Alternative One maximizes our ability to conduct initial releases in areas of high quality habitat (relative to Alternatives Two and Four) in order to minimize nuisance events associated with initial releases. In addition to the minimization measures proposed under Alternative One, there are one or more sources of compensation which may be available to ranchers to further mitigate impacts. If the Mexican Wolf/Livestock Trust Fund continues to be funded, we would expect the Mexican Wolf/Livestock Coexistence Council (Coexistence Council) to compensate 100 percent of the market value of confirmed depredated cattle and 50 percent of market value for probable kills with payments to affected ranchers (Mexican Wolf/Livestock Coexistence Plan 2014). We would also expect the Coexistence Council to continue to provide funding for proactive conservation measures to decrease the likelihood of depredation and Payments for Presence of Mexican wolves to offset indirect costs. Another possible source of mitigation funding is the USDA Livestock Indemnity Program, part of the 2014 Farm Bill, which provides (among other benefits) benefits to livestock producers for livestock lost due to attacks by animals introduced into the wild by the federal government or protected by federal law, including wolves.

This program may pay a livestock owner 75 percent of the market value of the applicable livestock (http://www.fsa.usda.gov/Internet/FSA_File/lip_long_fact_sht_2014.pdf). These measures will help reduce monetary losses to individual livestock operators and no significant long-term effect on overall livestock production in the project study area is expected.

In the short term, we expect that the growth of the experimental population of Mexican wolves and their wider distribution will be controversial and will attract nationwide attention. We expect that the initial release of wolves and their dispersal into areas where they were not allowed under the 1998 Final Rule will be newsworthy and it is possible that people may venture into those areas hoping to hear or see wolves.

Although we predict no significant beneficial effect from increased tourism and outdoor recreation from implementation of the proposed action and alternatives, it is possible that an unquantifiable long-term increase in visitor use of the National Forests will occur because people will want to have the opportunity to see or hear wolves or see their sign in a wild setting. The presence of wolves may attract people to the states of Arizona and New Mexico by increasing visitorship at the National Forests which provide the majority of suitable habitat for wolves and have the established infrastructure (i.e., campgrounds, roads, trails) needed to support visitors. Therefore, although we do not have information suggesting that wolf presence will create significant (positive) economic impacts to a substantial number of businesses in the project study area, it is possible that an enhancement of long-term economic productivity from tourism could occur from implementation of the proposed action and alternatives.

Improving the effectiveness of the Reintroduction Project in managing the experimental population of Mexican wolves is expected to contribute to the eventual recovery of the Mexican wolf which could have beneficial long-term effects on ecological relationships and ecosystem functions. An enhancement of long-term economic productivity of the states of Arizona and New Mexico from tourism may also occur by increasing visitorship at the National Forests within the states. While short-term economic impacts may be sustained by individual ranchers/livestock producers no significant long-term effects on overall livestock production in the project study area is expected. For these reasons, 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.

4.10 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.

Implementation of the proposed action and any of the alternatives, including the no action alternative, will involve predation by wolves on wild prey and depredation on livestock. The loss of an individual animal is irreversible in that it is killed and cannot be restored to its original condition. However, the impact to the resource caused by predation or depredation is neither irreversible nor irretrievable given that both wild prey populations and livestock are renewable resources. Wild ungulates are the primary prey species utilized by Mexican wolves, and elk make up approximately 77 to 80 percent of their diet (Merkle et al. 2009, Reed et al. 2006). Less than significant impact to wild prey populations, specifically elk populations, is expected from implementation of the proposed action and alternatives. However, elk are abundant in the project study area and are considered to be widespread, abundant, and secure at the global, national, and statewide levels (USFS 2010, 2011). Studies conducted in the BRWRA determined that domestic livestock, specifically cattle, comprised from approximately eight to 17 percent of the Mexican wolf diet (Merkle et al. 2009, Reed et al. 2006). Implementation of the proposed action and alternatives is expected to cause less than significant short-term impacts to economic activity (Ranching/Livestock Production) due to wolf depredation on cattle. Under Alternative One we expect the maximum annual number of depredations to be approximately 412 cows and calves. Under Alternatives Two and Three we expect the maximum annual number of depredation to be approximately 699/cowsand calves. This is a small percentage of the total number of cattle (nearly 2 million) in the project study area (Section 3.5).

The Mexican Wolf Recovery Program is currently budgeted at $2,063,894.00 annually. The Reintroduction Project is funded by the Program. Costs associated with the reintroduction include labor, capital expenditures for equipment, materials, supplies and fuel. An increase in these costs due to additional consumption of labor and non-renewable use of equipment, materials, supplies and fuel is expected with implementation of the proposed action and alternatives. This additional consumption would represent an irreversible and irretrievable commitment of resources due to implementation of the proposed action and alternatives.

Individual animals will be lost to predation (on elk) and depredation (on cattle) but both elk and cattle are abundant and renewable resources. Therefore, we do not consider that the impacts of wolf predation on elk or depredation on cattle to be either irreversible or irretrievable. Increased costs, representing additional consumption of non-renewable resources, are expected to be incurred from implementation of the proposed action and alternatives. However, the additional cost represents an incremental increase in consumption over the existing consumptive use of the Reintroduction Project and is not expected to be significant. For these reasons, we do not expect that implementation of the proposed action and alternatives would result in a significant irreversible or irretrievable commitment of resources.

5 LIST OF PREPARERS

This EIS 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, with assistance from CJ Seto Support Services, LLC. In accordance with 40 CFR 1506.5(c) a disclosure statement signed by CJ Seto Support Services, LLC is provided as Appendix F. A list of the persons who were primarily responsible for the preparation for this EIS and their qualifications is available upon written request from:

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6 PUBLIC INVOLVEMENT, AGENCIES AND PERSONS CONSULTED

NEPA requires Federal agencies to make diligent efforts to involve other agencies and the public whenever possible (40 CFR 1506.6). In accordance with this requirement we have followed Service guidance to make a "reasonable and concerted effort to involve affected Federal agencies, states, government officials and agencies, non-governmental organizations, and the public in the NEPA planning, decision making, and implementation process" (USFWS 2013). This chapter provides a summary of the opportunities that have been made available for public involvement, including government, and non-governmental agencies or organizations in the development of this EIS.

6.1 PUBLIC INVOLVEMENT

Because of the significant public interest expected in our proposed action we developed a strategy to ensure that the public was provided meaningful opportunities to provide input and comment and to establish and maintain positive partnerships between the Service, our cooperating agency partners, tribes, elected officials, local governments and the general public, including low-income and minority groups and multiple stakeholders groups. The public involvement strategy for this EIS incorporated the following key elements:

- Notifying and informing interested parties, key stakeholders, the general public and population groups of concern about the project and opportunities to provide input.
- Coordination and engagement with multiple federal and state agencies, tribal governments and local governments through establishment of both cooperating agency status and through participation on Interdisciplinary Project Team (IPT) and tribal working groups.
- Using direct mail, email, newspaper notices/advertisements, Federal Register notices, News Releases, website, fact sheets, and information repositories as methods of communication.
- Continuation of the scoping process that was initiated in 2007 with a Notice of Intent (NOI) to Prepare an EIS. A second NOI to Prepare an EIS was published in the Federal Register on August 05, 2013. This notice announced the availability of preliminary draft Chapter 1&2 of the EIS for public review/comment and initiated a second phase of scoping.
- Public hearings/information sessions during scoping and during the draft EIS review/comment period.
- Informal meetings with representatives of the potentially affected public, local governments, tribes, agencies, and organizations.

6.1.1 Stakeholder Mailing List and Newsletters

The stakeholder electronic mail (email) list was a key tool for ensuring that interested and potentially affected parties received information on the EIS and appropriate and timely notice of opportunities for public involvement and the availability of draft and final documents. The mailing list was routinely updated over the course of the project with over 800 stakeholder names, addresses and email addresses obtained from meeting attendance lists, written comments and requests for information. Emails were the primary method of disseminating information to stakeholders through status updates, notification of upcoming events and the availability of documents for review. The emailing/mailing list includes:

- Federal, state and local government elected officials
- Federal and state agencies
- Tribal groups

- Community groups and non-governmental organizations (NGOs)
- Potentially affected land owners, businesses, and residents
- Leaders in and groups servicing the population groups of concern for environmental justice
- Individual interested stakeholders

6.1.2 News Releases/Federal Register Notices

News releases concerning this project were released by the FWS Region 2 Public Affairs Officer and Headquarters Office of Communication in Arlington Virginia. Prior to publishing the proposed rules in the Federal Register, we published a news release on June 7, 2013, informing the public of the proposal to return management of gray wolves to the states and keep the Mexican wolf as an endangered species. Subsequently on June 13, 2013 we published the two proposed rules in the Federal Register; *Proposed Revision To the Nonessential Experimental Population of the Mexican Wolf* (78 FR 35719) and *Removing the Gray Wolf (Canis lupus) from the List of Endangered and Threatened Wildlife and Maintaining Protections for the Mexican Wolf (Canis lupus baileyi) by Listing It as Endangered* (78 FR 35664). Following this the Service's Southwest Regional office published a news release on August 2, 2013 which solicited public input on the development of a draft Environmental Impact Statement on Mexican Wolves and notified the public of the imminent Notice of Intent to be published in the Federal Register. On August 5, 2013 we published in the Federal Register a Notice of Intent to prepare the Mexican wolf EIS, *Notice of Intent To Prepare an Environmental Impact Statement for the Proposed Revision to the Nonessential Experimental Population of the Mexican Wolf (Canis lupus baileyi)* (78 FR 47268).

On September 5, 2013 we published in the Federal Register extensions to the comment period for the two proposed rules, *Proposed Revision To the Nonessential Experimental Population of the Mexican Wolf* (78 FR 54613) and *Removing the Gray Wolf (Canis lupus) from the List of Endangered and Threatened Wildlife and Maintaining Protections for the Mexican Wolf (Canis lupus baileyi) by Listing It as Endangered* (78 FR 54614), and notified the public of the venues to be used for public hearings. Subsequently on September 24, 2013 the Service's Southwest Regional office published a news release announcing a public hearing to be held in Albuquerque on October 4, 2013 to receive comments on the two proposed rules. With the impending government shutdown in October, the Albuquerque hearing had to be cancelled and rescheduled. A news release on October 1, 2013 announced the cancellation of this hearing. With the reopening of the government on October 24, 2013, the Service's Southwest Regional office published a news release notifying the public of the comment period extension for both rules and announcing rescheduled hearings. This was followed by a notification in the Federal Register on October 28, 2013, *Extending the Public Comment Periods and Rescheduling Public Hearings Pertaining to the Gray Wolf (Canis lupus) and the Mexican Wolf (Canis lupus baileyi)* (78 FR 64192). The comment deadline for the two proposed rules was extended again, from October 28, 2013 to December 17, 2013 to allow the hearings to take place within the public comment periods.

With updates to the June 2013 proposed rule (78 FR 35719) and completion of a draft EIS in July of 2014, we published a news release on July 24, 2014, notifying the public of the revised proposed rule and the availability of a draft EIS on the proposed revisions; announcing the opening of a 60-day comment period with two public information meetings; and the scheduling of hearings. On July 25, 2014, we published a Notice of Availability (NOA) for the revised proposed rule, *Proposed Revision to the Nonessential Experimental Population of the Mexican Wolf* (79 FR 43358) in the Federal Register, announcing the availability of the draft EIS, the scheduled public information sessions and hearings, and the reopening of the public comment period. On the same day the Environmental Protection Agency's weekly Environmental Impact Statements; Notice of Availability published in the Federal Register (79 FR 43465) included notification of the draft EIS for the *Proposed Revision to the Nonessential Experimental Population of the Mexican Wolf* with a comment period ending on September 23, 2014.

On November 25, 2014 we published a Notice of Availability (NOA) for the final EIS for the *Proposed Revision to the Regulations for the Nonessential Experimental Population of the Mexican Wolf (Canis lupus baileyi)* and a draft Record of Decision (ROD) in the Federal Register. The availability of the final EIS and a 30-day review period was announced in the Environmental Protection Agency's weekly Environmental Impact Statements; Notice of Availability published in the Federal Register on November 28, 2014. The final EIS and draft ROD were made available electronically on *http://www.regulations.gov* in Docket No. FWS–R2–ES–2013–0056, on the Mexican Wolf Recovery Program's website at http://www.fws.gov/southwest/es/mexicanwolf/, or at the Southwest Region Forest Service's National Forest Supervisor Offices throughout Arizona and New Mexico. The final EIS and draft ROD were also made available for public inspection, by appointment, during normal business hours (8 a.m. to 4:30 p.m.) at the New Mexico Ecological Services Field Office, 2105 Osuna Road, NE, Albuquerque, NM 87113.

6.1.3 Website/Information Repositories

A webpage for NEPA planning was established on the FWS Southwest Region Ecological Services Mexican Gray Wolf Recovery Program website (http://www.fws.gov/southwest/es/mexicanwolf/). Information repositories were established in the Southwest Region Forest Service's National Forest Supervisor Offices throughout Arizona and New Mexico. The webpage and the information repositories were maintained during the duration of the EIS preparation. Materials placed on the webpage and in the repositories included notices, fact sheets (English and Spanish versions), project updates, the project schedule of milestones, the proposed 10(j) Rule, the preliminary draft Chapters 1 & 2 of the EIS, the draft and final EIS and the revised proposed 10(j) rule.

6.2 SCOPING

The Service initiated the scoping process by publishing a Notice of Intent (NOI) to prepare an EIS for the *Proposed Amendment of the Rule Establishing a Nonessential Experimental Population of the Arizona and New Mexico Population of the Gray Wolf ("Mexican Gray Wolf")* in the Federal Register (FR) on August 7, 2007 (72 FR 44065). Twelve public informational sessions were held in the communities and on the dates listed in the *Mexican Wolf EIS: Public Comment Process and Analysis for Scoping Phase* report (http://www.fws.gov/southwest/es/mexicanwolf/documents.cfm). The actions under consideration were in support of both the Mexican Wolf Reintroduction Project and the Mexican Wolf Recovery Program and included possible changes to the 1998 Final Rule. A new NOI to prepare an EIS for the *Proposed Revision to the Nonessential Experimental Population of the Mexican Wolf (Canis lupus baileyi)* with an accompanying news release was published in the Federal Register on August 5, 2013. In this NOI we announced the continuation of the scoping process for this EIS that we began in 2007.

6.2.1 Scoping 2007-2012

Twelve public scoping meetings were attended by 1,286 people. A web site was developed to serve as a "virtual meeting" where visitors had access to the same information presented at the public meetings. Links to the USFWS e-mail for public comments were included on the site. Written comments were solicited for the public record during the comment period, August 7 through December 31, 2007. We received a total of 13,598 comments (USFWS 2008). The range of comments was wide and many comments were general in nature, expressing support for, or disapproval of, the wolf reintroduction program. Systematic analysis of the thousands of comments received resulted in the emergence of twenty-six different issues. Following the completion of this comment period we determined that large scale changes (i.e. changes to the experimental population boundaries or changes to the management options for wolves within the MWEPA) to the Reintroduction Project as established under the 1998 Final Rule would be considered subsequent to the development of a revision to the 1982 Mexican Wolf Recovery Plan. A Recovery Team was convened in 2010 to begin the process of revising the Recovery Plan. At the same time we determined that it was appropriate to move forward with a proposed modification to the area within the BRWRA available for the direct initial release of captive wolves. A Preliminary Draft Environmental Assessment (PDEA) for the *Direct Initial Release of Captive Raised Mexican Wolves (Canis lupus baileyi) within the Secondary Recovery Zone of the Blue Range Wolf Recovery Area (BRWRA)* was prepared for internal Service review. During this same time period we developed a PDEA for the *Implementation of a Southwestern Gray Wolf (Canis lupus) Management Plan for Portions of Arizona, New Mexico and Texas.* As part of our NEPA scoping process, the PDEA with the draft management plan was mailed to federal and state agencies and tribes in mid-December, 2012. It was not released to the general public or to interest groups for review or comment. In mid-February, 2013 we decided to withdraw the proposed action for the PDEA on the Southwestern Gray Wolf Management Plan in response to early feedback in the agency/local government/tribal scoping review. Although the action was withdrawn, comments and feedback that were received from agency scoping were considered in the development of the proposed action of this EIS.

6.2.2 Scoping in 2013 and 2014

On June 13, 2013 we published a proposed rule in the Federal Register to revise our existing Mexican wolf nonessential experimental population designation in Arizona and New Mexico, *Proposed Revision To the Nonessential Experimental Population of the Mexican Wolf* (78 FR 35719). This action was performed in conjunction with our other proposed rule published the same day in the Federal Register to list the Mexican wolf as an endangered subspecies and delist the gray wolf, *Removing the Gray Wolf (Canis lupus) from the List of Endangered and Threatened Wildlife and Maintaining Protections for the Mexican Wolf (Canis lupus baileyi) by Listing It as Endangered* (78 FR 35664). A 90-day comment period was provided for both proposed rules ending on September 11, 2013.

On August 5, 2013 we published a Notice of Intent (NOI) to prepare the Mexican wolf EIS in the Federal Register, *Notice of Intent To Prepare an Environmental Impact Statement for the Proposed Revision to the Nonessential Experimental Population of the Mexican Wolf (Canis lupus baileyi)* (78 FR 47268). The NOI solicited comments from the public, government agencies, Tribes, industry, the scientific community, or any other interested parties concerning the scope of the EIS, pertinent issues to address, and alternatives that should be analyzed. The time frame for comments was 45 days, to be received on or before September 19, 2013. Specifically, we were interested in comments on the preliminary draft EIS statement of our purpose and need, our proposed action and alternatives, and the alternatives that we considered but were not bringing forward for further analysis in a draft EIS. To guide public input, we made available a fact sheet (in both English and Spanish) as well as the preliminary draft chapters 1 and 2 of the EIS on the NEPA planning webpage of the FWS Southwest Region Ecological Services Mexican Wolf Recovery Program website. In cooperation with the U.S. Forest Service Southwest Region, we established information repositories at the Supervisor Offices for the National Forests in New Mexico and Arizona. A news release announced the availability of the preliminary draft document for comment on the website and at the designated information repositories.

On September 5, 2013 we published notices in the Federal Register to extend the public comment period from September 11, 2013 to October 28, 2013 on both of the proposed rules; *Proposed Revision to the Nonessential Experimental Population of the Mexican Wolf* (78 FR 54613) and *Removing the Gray Wolf (Canis lupus) From the List of Endangered and Threatened Wildlife and Maintaining Protections for the Mexican Wolf (Canis lupus baileyi) by Listing It as Endangered* (78 FR 54614). We also announced that we would hold a public hearing on our proposed revised rule on Friday, October 4, 2013, in Albuquerque, New Mexico and that this hearing would also cover our proposal to remove the gray wolf from the List of Endangered and Threatened Wildlife and maintain protections for the Mexican wolf (*Canis lupus baileyi*) by listing it as endangered (78 FR 35664). As a result of delays caused by the lapse in federal appropriations during the month of October 2013, the service published another extension in the Federal Register on October 28, 2013, which rescheduled dates for the hearings and extended the deadlines for comments to December 17, 2013; *Extending the Public Comment Periods and Rescheduling Public Hearings Pertaining to the Gray Wolf (Canis lupus) and the Mexican Wolf (Canis lupus baileyi)* (78 FR 64192). Following the government reopening, an email to stakeholders and a news release, published on October 24, 2013 explained the rescheduling of future hearings.

Public Hearings

Two public hearings in the Southwest were held during the scoping period. The first was held in Albuquerque, New Mexico on November 20, 2013, and the second in Pinetop, Arizona on December 3, 2013. A formal notice of these hearings and the extension of the comment period appeared in the Federal Register on October 28, 2013, *Extending the Public Comment Periods and Rescheduling Public Hearings Pertaining to the Gray Wolf (Canis lupus) and the Mexican Wolf (Canis lupus baileyi)* (78 FR 64192), as well as by news release, email to stakeholders, and advertisements run in the Albuquerque Journal on November 9, 2013, and the Arizona Daily Sun and White Mountain Independent on November 12, 2013. The public hearing in Pinetop, Arizona was preceded by a public information session which followed a question and answer format in which attendees had the opportunity to pose questions to a panel of Service representatives. More than 500 people attended each hearing.

Comments

At the close of the comment periods, and with the inclusion of oral statements and written comments received at the hearings, there were approximately 132 comments received for Docket No. FWS-R2-ES-2013-0098 (preliminary draft of Chapters 1 and 2 of the EIS) and over 7000 comments received for Docket No. FWS-R2-ES-2013-0056 (*Proposed Revision to the Nonessential Experimental Population of the Mexican Wolf*). Many comments were non-substantive in nature, expressing either support for, or opposition to, the proposed action or more generally the Mexican wolf reintroduction and/or recovery program. The range of substantive comments was wide. Using a comment matrix we divided substantive comments into categories and subcategories for analysis and the determination of appropriate action. These categories were: Purpose and Need (9 subcategories), Proposed Action and Alternatives (15 subcategories), Impacts (18 subcategories), Process (17 subcategories). Analysis yielded the following issues and concerns:

- Process or Litigation
- I-10 Boundary
- I-40 Boundary
- PRZ/SRZ/Initial Release
- Livestock Interdiction/Depredation Compensation
- Take – Livestock Public Land, Private Land, Pets, Human Safety, Authorized Individuals/Personnel, Federal Agencies, State Agencies
- Genetics
- BRWRA Expansion
- State Authority under ESA Section 6
- Wild Ungulate Impacts
- Texas
- Wolf Dispersal

- Tribal Issues
- White Sands Missile Range
- Private Land Management Agreements
- Definition of Due Care Regarding: Trapping
- Definition of State Owned Land
- Definition of Breeding Pair
- Definition of Depredation/Depredation Incident
- 5-Year Evaluation of 10j
- EIS Purpose/Need or Alternatives
- Recovery/Recovery Plan
- Essential/Nonessential/T/E
- Peer Review
- Population Objective
- Comment from State /Federal Agency /Tribe/County-Local Govt/Public/Peer Reviewer

Substantive comments received during scoping, including the scoping conducted in the period between 2007 and 2012 were considered in the preparation of the draft EIS, including our development of the proposed action and alternatives and our analysis of potential environmental impacts.

Scoping with Agencies, Tribes, Local Governments and Stakeholder groups

As part of scoping we attended formal and informal meetings with representatives of the potentially affected public, local governments, tribes, agencies, and organizations. This outreach not only solicited input on the development of the proposed action, alternatives and potential impacts but also focused on how the proposed action and alternatives may or may not have disproportionate effects on the economically disadvantaged, and or racial/ethnic minority groups.

On July 26, 2013 the Service's Field Project Coordinator attended a wildlife committee meeting hosted by the Arizona Cattle Growers' Association in Arizona to discuss the proposed rule and the EIS process. He also attended a public hearing hosted by Mohave County on August 26, 2013 in Kingman, Arizona to present information and listen to concerns. On August 15, 2013 in St. Johns, Arizona, Apache County hosted a meeting on the topic of Memoranda of Understanding (MOUs) for cooperating agency status. Attendees included many county representatives from the southwest region. During the discussion the Mexican Wolf Recovery Coordinator and Service staff addressed concerns raised by the county representatives regarding obligations and responsibilities under a MOU for both the lead agency and for cooperating agencies. In September 2013, the Mexican Wolf Recovery Coordinator and service staff attended hearings hosted by: Cochise County in Bisbee, Arizona; Luna County in Deming, New Mexico; and six hearings sponsored by Arizona Game and Fish Department on the proposed rule and EIS held in Payson, Tucson and Pinetop, Arizona. A webinar was also presented by Service staff at the BLM office in Santa Fe on September 23, 2013 to BLM staff in various offices in New Mexico concerning both proposed rules. An additional hearing was hosted by Luna County in Deming, New Mexico on October 28, 2013, which was attended by Service staff. In addition to these hearings, Service staff attended grazing permittee and informational workshop meetings in Grants, New Mexico, and Sonoita, Arizona on October 30, 2013 and May 15, 2013 respectively to give presentations and listen to public concerns. The

Recovery Coordinator and Service staff met on February 5, 2014 at the Arizona Ecological Services Office in Phoenix, Arizona with several staff members of Arizona's Congressional Delegation, and on June 20, 2014 at the Service's Regional Office with staff members of New Mexico's Congressional Delegation to discuss the proposed rules and respond to questions and concerns raised. Following this, on February 12, 2014 the Recovery Coordinator gave a presentation and listened to concerns at a meeting for the Socorro Rotary Club in Socorro, New Mexico.

To collect the data needed for the analysis of environmental justice and socio-economic issues we sent out data collection letters to county and tribal leaders in potentially affected areas of Arizona and New Mexico. In these letters we provided the contact information for our lead analysts and we requested assistance in gathering information on economic activity in their county and tribal lands. We also requested a review and comment on draft summaries of the pertinent socio-economic baseline data provided to them as enclosures.

A kickoff meeting for the EIS development was held at the Bureau of Indian Affairs Southwest Regional Office, 1011 Indian School Road, Albuquerque, New Mexico, 87104, on August 8 through August 9, 2013. Approximately 45 representatives from federal and state agencies, tribes and local governments attended this meeting during which we reviewed and discussed: the proposed experimental population rule; the preliminary draft chapter 1(purpose and need) and chapter 2 (Proposed Action and Alternatives) of the EIS; the draft *Mexican Wolf Management Plan*; issues identified in previous public scoping; lead agency and cooperating agency roles and responsibilities; planning for public participation in the EIS; establishment of an Interdisciplinary Project Team (IPT); additional issues of importance to the cooperating agencies; and the project timeline. Informational materials and a final agenda were provided via email prior to the meeting. The second day also consisted of opportunities for sidebar discussions with individual representatives and tribes.

The Service hosted IPT meetings/teleconferences with cooperating agencies, tribes and representatives from stakeholder counties on December 10, 2013 and April 15, 2014 at the New Mexico Ecological Services Field Office in Albuquerque, New Mexico. The purpose and objective of the December 10 meeting was to discuss comments received during the public scoping period and provide opportunity for IPT input to the preliminary draft of chapters 1 and 2 of the EIS. Approximately 32 representatives attended. The purpose and objective of the April 15, 2014 meeting was to: review the synthesis of comments on the proposed 10(j) rule, review revisions to Purpose and Need and Alternatives of the EIS; discuss development of the draft EIS, and discuss public involvement and milestones to the Final EIS and the Record of Decision. A proposed alternative from a coalition of Arizona cooperating agencies and stakeholder groups was presented to the Service for consideration at this meeting. Approximately 30 representatives attended. On June 2nd, 12th and 23rd we held teleconferences with cooperating agencies, tribes and representatives from stakeholder counties to: discuss the status of alternative developments and receive further input on the "Arizona Cooperating Agency Alternative"; receive input and the development of the analysis of Human Health/Public Safety and to discuss county health, safety, and welfare ordinances; and put forward for discussion a proposal to revise the recovery permit to include parts of the Vermejo Park Ranch in northern New Mexico.

The Service also worked closely with the Arizona Game and Fish Department (AGFD) and New Mexico Department of Game and Fish (NMDGF) to collect data and develop the analysis of effects to species of fauna, wild prey, particularly wild ungulates, and economic impacts associated with hunting in Arizona and New Mexico. We held three meetings with AGFD and NMDGF at the New Mexico Ecological Services Field Office in Albuquerque, New Mexico on December 11, 2013, January 21, 2014, and February 10, 2014. A teleconference meeting was also held on February 20, 2014 to describe data requests related to hunting data for economic descriptions of affected environments. An additional meeting was held with NMDGF at their office in Santa Fe, New Mexico on June 19, 2014, focusing on concerns and comments regarding the draft rule, particularly language and definitions.

Throughout the scoping period we provided status update emails on the progress of the EIS to cooperating agencies and IPT representatives as well as pre and post meeting follow up emails with informational materials such as; agendas, notes and action items, alternatives submitted, presentations, and attendance lists to assist in the dissemination of information and contacts.

6.3 DRAFT EIS PUBLIC REVIEW AND COMMENT

The completion of the draft EIS in July 2014 initiated the next phase of this project. On July 24, 2014, we provided a news release to local and national news organizations announcing our update to the proposed rule and the availability of the draft EIS for public review and comment. On July 25, 2014, we published a Notice of Availability (NOA) for the revised proposed rule, *Proposed Revision to the Nonessential Experimental Population of the Mexican Wolf* (79 FR 43358) in the Federal Register, and announced the availability of the draft EIS, the scheduled public information sessions and hearings, and the opening of the 60-day public comment period running from July 25, 2014 through September 23, 2014. To assist the public in their review we made available our second fact sheet (in both English and Spanish) on the NEPA planning webpage of the FWS Southwest Region Ecological Services Mexican Wolf Recovery Program website (http://www.fws.gov/southwest/es/mexicanwolf/) which summarized the EIS development process to date as well as describing the proposed changes with instructions for commenting and announcement of timelines. We published legal notices announcing the availability of the revised proposed rule and the draft EIS for public review and the holding of public hearings on August 4, 2014 in the Albuquerque Journal, on August 5, 2014 in the Arizona Daily Sun and White Mountain Independent, on August 6, 2014 in the Herald, and on August 7, 2014 in the El Defensor Chieftain. The draft EIS and the revised proposed rule were made available for review by the public electronically at http://www.regulations.gov in Docket No. FWS-R2-ES-2013-0056, via hardcopies provided for in-house review at Supervisor Offices of the National Forests throughout Arizona and New Mexico as well as being posted on the FWS Southwest Region Ecological Services Mexican Wolf Recovery Program website. In addition to this, electronic PDF files of the draft EIS were emailed to cooperating agencies, tribes, and other stakeholders. Comments could be submitted electronically or by hard copy to the established Docket No. FWS-R2-ES-2013-0056, as explained in the NOA and the news release. Stakeholders were also sent a status update email with a schedule of the timelines, public hearings, and instructions on comment submission.

Public Hearings

Two public hearings were held during the draft EIS Public Review and Comment period. The first was held in Pinetop, Arizona on August 11, 2014, and the second in Truth or Consequences, New Mexico, on August 13, 2014. A formal notice of these hearings and the 60-day comment period appeared in the Federal Register on July 25, 2014, *Proposed Revision to the Nonessential Experimental Population of the Mexican Wolf* (79 FR 43358), as well as by news release, email to stakeholders, and legal notices run in the Albuquerque Journal, Arizona Daily Sun, El Defensor Chieftain, the Herald, and White Mountain Independent. Each public hearings was preceded by a two hour public information session during which attendees had the opportunity to pose questions to a panel of Service representatives in a question and answer format. Prior to the commencement of both the public information session and the formal public hearing, the Service provided a 20 minute presentation on the revised proposed rule and the draft EIS. More than 300 people attended each hearing, providing both oral testimony and submitting written comments. Transcripts of the hearings were made available on the Mexican Wolf Recovery Program website.

Comments

At the close of the comment period, and with the inclusion of 148 oral and 469 written comments received at the hearings, there were over 36,000 comments received for Docket No. FWS-R2-ES-2013-0056, *Proposed Revision to the Nonessential Experimental Population of the Mexican Wolf* (79 FR 43358, July 25, 2014). These comments were given a tracking number and made available for viewing at http://www.regulations.gov in Docket No. FWS-R2-ES-2013-0056.

Many comments were non-substantive in nature, expressing either support for, or opposition to, the proposed action or more generally the Mexican wolf reintroduction and/or recovery program. Many of the comments were also duplicative; either exact reproductions or by reiteration of the same points. The substantive comments covered a wide range of topics. We carefully screened all substantive comments using a comment matrix which divided them into categories and subcategories for analysis and response. Considering the large volume of comments a concerted effort was made to address and respond to all substantive comments in the most efficient manner, while still capturing the entire realm of issues, concerns and topics presented to us throughout this process. Our response to the substantive comments representing the consolidated list of major topics and concerns can be found in Appendix E.

Review meetings with Cooperating Agencies, Tribes, and Stakeholder groups

As part of the review of the draft EIS, we attended additional formal and informal meetings with representatives of the public, local governments, tribes, agencies, and organizations, as well as soliciting additional data from those in affected areas. On September 12, 2014 a meeting was held at the USFWS Regional Office in Albuquerque, New Mexico with AGFD focusing on their key concerns with the proposed rule regarding a population objective, a phased approach to management west of Highway 87, and a definition for unacceptable impacts to wild ungulate herds. Additional discussions with NMDGF on the proposed rule resulted in further clarifications to the definition of unacceptable impacts to wild ungulate herds. On September 24, 2014 the Mexican Wolf Recovery Coordinator and an Outreach Specialist attended a meeting in Tucson, Arizona with representatives from several Natural Resource Conservation Districts (NRCDs), school districts, fire districts, Cochise County, and stakeholder organizations in Arizona to hear their questions and concerns regarding the draft EIS.

6.4 AGENCIES AND PERSONS CONSULTED: COOPERATING AGENCIES, TRIBAL COORDINATION AND INTERDISCIPLINARY PROJECT TEAM (IPT)

6.4.1 Cooperating Agencies

In June, 2013 we sent out 84 letters inviting Federal and state agencies and Tribal and local governments to participate as cooperating agencies in the development of the EIS. Memoranda of Understanding (MOUs) were created to establish guidelines for the parties that desired to become formal cooperating agencies. A total of 28 federal and state agencies, local governments, and tribes formalized their participation as cooperating agencies by signing MOUs. The agencies, tribes and local governments which have been designated as cooperating agencies in the development of this EIS are:

Federal Agencies

- U.S. Department of Agriculture, Forest Service Southwestern Region (USFS)
- U.S. Department of Agriculture, Animal and Plant Health Inspection Service/Wildlife Services-Western Region (U.S.D.A. APHIS WS)
- U.S. Department of the Interior, Bureau of Land Management (BLM), Arizona and New Mexico State Offices
- U.S. Department of the Interior, Bureau of Indian Affairs, Southwest Region (BIA)

- U.S. National Park Service Intermountain Region (NPS)
- U.S. Army-Fort Huachuca, AZ
- U.S. Army-White Sands Missile Range, NM (WSMR)
- U.S. Customs and Border Protection (U.S. CBP)

State Agencies

- Arizona Game and Fish Department (AGFD)
- New Mexico Department of Game and Fish (NMDGF)
- New Mexico Department of Agriculture (NMDA)

Tribes/Nations/Pueblos

- Pueblo of Laguna, NM

Counties

- Eastern Arizona Counties Organization (EACO)
- The counties of Cochise, Gila, Graham, Greenlee, and Navajo in Arizona
- The counties of Chaves, Eddy, Grant, Hidalgo, Lincoln, Luna, McKinley, San Miguel, and Sierra in New Mexico

6.4.2 Tribal Coordination

In late June 2013 we notified the tribal governments of all the Native American tribes in Arizona and New Mexico of our intent to prepare an EIS. In the letters we identified those tribes whose tribal trust land contained suitable habitat for wolves and those which did not contain suitable habitat. We invited all tribes to continue to receive information and provide input to our decision. However, based on our assessment we invited only those tribes with suitable habitat to participate as a cooperating agency in the development of the EIS. We also invited these tribes to initiate consultation, pursuant to Executive Order 13175 (65 FR 67249, November 6, 2000).

At the EIS kick-off meeting held in August 2013, a tribal working group on the EIS was formed and informal discussions with the tribes were sought to receive their input on a range of issues and concerns including economic impacts, traditional and cultural perspectives, the ESA, tribal sovereignty, and environmental justice. Native American liaisons from the Bureau of Indian Affairs and the Service assisted with, and facilitated contacts, meetings and the dissemination of information regarding the EIS development process. In February 2014, letters were sent to Tribal leaders in affected areas of Arizona and New Mexico requesting that Tribes provide information on socio-economic activity and biological resources specific to tribal lands and requesting assistance in identifying areas for the analysis to determine whether disproportionately high adverse effects on tribes might occur from implementation of the proposed action and alternatives.

Tribal representatives attended IPT meetings on December 10, 2013 and April 15, 2014 as well as two Tribal Working Group meetings held at the New Mexico Ecological Services Field Office in Albuquerque, New Mexico on December 12, 2013 and April 16, 2014. The December meeting was attended by 11 Tribal representatives. The purpose and objectives of the meeting were to provide opportunity for input and to discuss the current status of EIS development, comments received during public scoping period, tribal involvement, concerns and issues, and the next steps and schedule. Questions submitted by Tribal members at the meeting that required further investigation were subsequently addressed. The April meeting was attended by 16 Tribal representatives. The purpose and objectives were to discuss: alternative development; data collection assistance needs; revisions to the proposed 10(j) rule under consideration; and issues and concerns on the Mexican wolf EIS and proposed 10(j) rule specific to the Tribes. The *Tribal Perspectives on Mexican Wolf Recovery* (MWRT Tribal Sub-Group 2014) developed by the Tribal Working Group of the Mexican Wolf Recovery Team was presented for discussion. Additional topics covered were wolf management within the MWEPA on non-trust tribal owned land and data collection and information needs for the EIS. The Service sent out pre and post follow up emails with informational materials such as agendas, notes and action items, GIS maps of wolf habitat on tribal lands, alternatives submitted, presentations, and attendance lists to assist in the dissemination of information and contacts.

On November 26, 2013 representatives from the Service met with Hopi leaders at the Second Mesa, Veteran's Memorial Center in Arizona to discuss the June 13, 2013 proposed rules to reclassify the Mexican wolf as an endangered subspecies and to revise the experimental population for the Mexican wolf and to address questions and concerns regarding the proposed EIS received from the Hopi Tribe in a letter dated September 27, 2013. Approximately 10 Tribal Council members and 10 members of the public attended this meeting. A consultation meeting with the Jicarilla Apache Nation was held on January 23, 2014 at the New Mexico Ecological Services Field Office in Albuquerque, New Mexico, attended by representatives from the Jicarilla Apache Nation tribal government, Jicarilla Game and Fish and tribal members. After an invocation by a tribal member, a presentation was given followed by a round table discussion addressing the Nation's concerns and the presentation of a letter and resolution by the Nation's President from the Legislative Council to the Service's Southwest Regional Director. On February 4, 2014 the Mexican Wolf Recovery Coordinator and Service staff met with the San Carlos Apache Tribal Council in Peridot, Arizona and gave a presentation describing the background, history and status of the Mexican wolf and updated them on the current status of the proposed rules and EIS process. She also attended the annual Native American Fish and Wildlife Society Southwest Regional Conference hosted by the Pueblo of Isleta in New Mexico on August 7, 2014, giving a presentation on the proposed rule and draft EIS as well as responding to questions from Tribal Fish and Wildlife biologists representing the numerous Tribes, Nations, and Pueblos of the United States.

6.4.3 Interdisciplinary Project Team

In addition to the cooperating agencies, numerous tribes, local governments and agencies in the affected area assisted in the preparation of this EIS by participating as part of working groups on the Interdisciplinary Project Team. This team consisted of representatives not only from cooperating agencies but also from agencies, tribes and counties who chose not to act as cooperating agencies but still expressed interest in the development of the EIS. These stakeholder agencies, tribes and local governments were provided notification, information and status updates via email and were considered as part of the IPT per CEQ guidance provided in a January 30, 2002 Memorandum for the Heads of Federal Agencies, *Cooperating Agencies in Implementing the Procedural Requirements of the National Environmental Policy Act* (CEQ 2002).

6.4.4 Persons Consulted

A list of persons consulted in the development of this EIS is available upon request from:

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New Mexico Ecological Services Field Office
2105 Osuna NE
Albuquerque, NM 87113

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APPENDICIES

APPENDIX A: SPECIAL STATUS SPECIES

Common Name	Scientific Name	Distribution	Status	Relationship to Mexican Wolves
Bald eagle	*Haliaeetus leucocephalus alascanus*	AZ, NM	AZ: Species of Greatest Conservation Need NM: state-listed threatened USFS: sensitive USFWS: delisted	Scavenger
Golden eagle	*Aquila chrysaetos*	AZ, NM	AZ: Species of Greatest Conservation Need NM: USFS: USFWS:	Scavenger
California condor	*Gymnogyps californianus*	Northern AZ	AZ: Species of Greatest Conservation Need NM: USFS: USFWS: endangered	Scavenger
Masked bobwhite quail	*Colinus virginianus ridgwayi*	Southern AZ	AZ: Species of Greatest Conservation Need NM: - USFS: USFWS: endangered	Non-ungulate wild prey
Scaled quail	*Callipepla squamata*	Southcentral AZ, Northern New Mexico	AZ: Species of Greatest Conservation Need NM: USFS: USFWS:	Non-ungulate wild prey
Mearn's (Montezuma) quail	*Cyrtonyx montezumae*	Central AZ and Southcentral NM	AZ: Species of Greatest Conservation Need NM: USFS: Management Indicator Species Gila NF Coronado NF USFWS:	Non-ungulate wild prey
Gould's turkey	*Meleagris gallopavo Mexicana*	Southern AZ, South-western NM	AZ: Species of Greatest Conservation Need NM: state listed threatened USFS: Sensitive USFWS:	Non-ungulate wild prey
Merriam's turkey	*Meleagris gallopavo merriami*	Central and Northern AZ and NM	AZ: NM: USFS: Management Indicator Species	Non-ungulate wild prey

			Apache-Sitgreaves NF Cibola NF Coconino NF Coronado NF Kaibab NF Prescott NF Tonto NFUSFWS:	
Rio Grande turkey	*Meleagris gallopavo intermedia*	NM	AZ: NM: USFS: Management Indicator Species Cibola NF USFWS:	Non-ungulate wild prey
Ocelot	*Leopardus pardalis*	Southern AZ	AZ: Species of Greatest Conservation Need NM: USFS: USFWS: endangered	Predator
Jaguar	*Panthera onca*	Southern AZ and NM	AZ: Species of Greatest Conservation Need NM: USFS: USFWS: endangered	Predator
American Black Bear	*Ursus americanus*	AZ, NM	AZ: NM: USFS: Management Indicator Species Cibola NF Coronado NF USFWS:	Predator/scavenger
Rocky mountain bighorn sheep	*Ovis canadensis canadensis*	AZ, Southwestern NM	AZ: Species of Greatest Conservation Need NM: USFS: USFWS:	Wild ungulate prey
Desert bighorn sheep	*Ovis canadensis mexicana*	Southern AZ, southern NM	AZ: Species of Greatest Conservation Need NM: USFS: Management Indicator Species Coronado NF USFWS:	Wild ungulate prey

Sonoran Pronghorn	*Antilocapra americana sonoriensis*	Southwestern AZ	AZ: Species of Greatest Conservation Need NM: - USFS: USFWS: endangered	Wild ungulate prey
American Pronghorn	*Antilocapra americana americana*	AZ, NM	AZ: Species of Greatest Conservation Need NM: USFS: Management Indicator Species Apache-Sitgreaves NF Coconino NF Coronado NF Kaibab NF Prescott NF USFWS:	Wild ungulate prey
Coues' White-tailed deer	*Odocoileus virginianus couesi*	Southern and Central AZ	AZ: Species of Greatest Conservation Need NM: USFS: Management Indicator Species Coronado NFUSFWS:	Wild ungulate prey
Rocky Mountain elk	*Cervus elaphus nelsoni*	AZ, NM	AZ: NM: USFS: Management Indicator Species Apache-Sitgreaves NF Cibola NF Coconino NF Kaibab NF Lincoln NF Tonto NFUSFWS:	Wild ungulate prey
Rocky Mountain mule deer	*Odocoileus hemionus hemionous*	AZ, NM	AZ: NM: USFS: Management Indicator Species Apache-Sitgreaves NF Cibola NF Coconino NF Gila NF Kaibab NF Lincoln NF Prescott NFUSFWS:	Wild ungulate prey
Red fox	*Vulpes vulpes*	Northeastern AZ, Northern NM	AZ: Species of Greatest Conservation Need NM: USFS: USFWS:	Predator

Kit fox	*Vulpes macrotis*	AZ, NM	AZ: Species of Greatest Conservation Need NM: USFS: USFWS:	Scavenger
Swift fox	*Vulpes velox*	Eastern NM	AZ: NM: USFS: sensitive USFWS:	Scavenger
Long-tailed weasel	*Mustela frenata*	Mogollon Rim, southern sky-islands in AZ, NM	AZ: Species of Greatest Conservation Need NM: USFS: USFWS:	Predator/scavenger
American beaver	*Castor canadensis*	AZ, NM	AZ: Species of Greatest Conservation Need USFS: Management Indicator Species Gila NF USFWS:	Non-ungulate wild prey
Southeastern river otter	*Lontra canadensis lataxina*	AZ, NM	AZ: Species of Greatest Conservation Need NM: USFS: USFWS:	Non-ungulate wild prey
Southwestern river otter	*Lontra canadensis sonora*	AZ, NM	AZ: Species of Greatest Conservation Need NM: USFS: sensitive USFWS:	Non-ungulate wild prey
Black-footed ferret	*Mustela nigripes*	Northwestern AZ	AZ: Species of Greatest Conservation Need NM: USFS: USFWS: endangered	Predator
Black-tailed prairie dog	*Cynomys ludovicianus*	AZ, NM	AZ: Species of Greatest Conservation Need NM: USFS: sensitive USFWS:	Non-ungulate wild prey
Gunnison's prairie dog	*Cynomys gunnisoni*	Northeastern AZ, northwestern NM	AZ: Species of Greatest Conservation Need NM: USFS: sensitive USFWS:	Non-ungulate wild prey

Southwestern cottontail	*Sylvilagus nuttallii pinetis*	Northern AZ, northern NM	AZ: Species of Greatest Conservation Need NM: USFS: USFWS:	Non-ungulate wild prey
North Kaibab Mountain cottontail	*Sylvilagus nuttallii grangeri*	Northern AZ	AZ: Species of Greatest Conservation Need NM: USFS: USFWS:	Non-ungulate wild prey
White-sided jackrabbit	*Lepus callotis gaillardia*	Southern NM	AZ: NM: state-listed threatened. USFS: USFWS:	Non-ungulate wild prey
Antelope jackrabbit	*Lepus alleni*	Southern AZ	AZ: Species of Greatest Conservation Need NM: USFS: USFWS:	Non-ungulate wild prey
Western Spotted skunk	*Spilogale gracilis*	AZ, NM	AZ: Species of Greatest Conservation Need NM: USFS: USFWS:	Non-ungulate wild prey
Hog-nosed skunk	*Conepatus leuconotus*	AZ, NM	AZ: Species of Greatest Conservation Need NM: USFS: USFWS:	Non-ungulate wild prey
Hooded skunk	*Mephitis macroura milleri*	AZ, NM	AZ: NM: USFS: sensitive USFWS:	Non-ungulate wild prey
Guadalupe pocket gopher	*Thomomys bottae guadalupensis*	NM	AZ: NM: USFS: sensitive USFWS:	Non-ungulate wild prey
Cebolleta Southern pocket gopher	*Thomomys bottae paguatae*	NM	AZ: NM: USFS: sensitive USFWS:	Non-ungulate wild prey
Southern pocket gopher	*Thomomys umbrinus intermedius*	Southern AZ, Southern NM	AZ: Species of Greatest Conservation Need NM: USFS: USFWS:	Non-ungulate wild prey
Northern	*Thomomys*	AZ, NM	AZ: Species of Greatest	Non-ungulate wild

pocket gopher	*talpoides*		Conservation Need NM: USFS: USFWS:	prey
Southern (pajarito) pocket gopher	*Thomomys umbrinus quercinus*	Southern AZ, NM	AZ: NM: state-listed threatened USFS: USFWS:	Non-ungulate wild prey
Harquahala Southern pocket gopher	*Thomomys bottae subsimilis*	Southwestern AZ	AZ: Species of Greatest Conservation Need NM: USFS: USFWS:	Non-ungulate wild prey
Harris' Antelope squirrel	*Ammospermophilus harrisii*	AZ	AZ: Species of Greatest Conservation Need NM: USFS: USFWS:	Non-ungulate wild prey
Prospect Valley White-tailed Antelope squirrel	*Ammospermophilus leucurus tersus*	AZ	AZ: Species of Greatest Conservation Need NM: USFS: USFWS:	Non-ungulate wild prey
Arizona gray squirrel	*Sciurus arizonensis*	AZ	AZ: Species of Greatest Conservation Need NM: USFS: sensitive Gila NF USFWS:	Non-ungulate wild prey
Chiricahua fox squirrel	*Sciurus nayaritensis chiracahuae*	Southern AZ	AZ: Species of Greatest Conservation Need NM: USFS: sensitive USFWS:	Non-ungulate wild prey
Red squirrel	*Tamiasciurus hudsonicus*	AZ, NM	AZ: NM: USFS: Management Indicator Species Apache-Sitgreaves NF Coconino NF Kaibab NF Lincoln NF USFWS:	Non-ungulate wild prey
Mt Graham red squirrel	*Tamiasciurus hudsonicus grahamens*	Southern AZ	AZ: Species of Greatest Conservation Need NM: USFS: Management	Non-ungulate wild prey

			Indicator Species Coronado NFUSFWS: endangered	
Abert's squirrel	*Sciurus aberti*	AZ, NM	AZ: NM: USFS: Management Indicator Species Apache-Sitgreaves NF Coconino NF Kaibab NF Prescott NF Tonto NF USFWS:	Non-ungulate wild prey
Abert's Chuska squirrel	*Sciurus aberti chuscensis*	Northern AZ,	AZ: Species of Greatest Conservation Need NM: USFS: Management Indicator Species USFWS:	Non-ungulate wild prey
Uinta chipmunk	*Tamias umbrinus*	Northern AZ	AZ: Species of Greatest Conservation Need NM: USFS: USFWS:	Non-ungulate wild prey
Gray-collared chipmunk	*Tamias cinereicollis*	AZ, NM	AZ: Species of Greatest Conservation Need NM: USFS: USFWS:	Non-ungulate wild prey
Colorado chipmunk	*Tamias quadrivittatus*	Northeastern AZ, northern and central NM	AZ: Species of Greatest Conservation Need NM: state-listed threatened USFS: USFWS:	Non-ungulate wild prey
Penasco least chipmunk	*Tamias minimus atristriatus*	AZ, NM	AZ: Species of Greatest Conservation Need NM: state-listed endangered USFS: sensitive USFWS:	Non-ungulate wild prey
White Mountains chipmunk	*Neotamias minimus arizonensis*	Northern AZ	AZ: NM: USFS: sensitive USFWS:	Non-ungulate wild prey
White Mountains ground squirrel	*Ictidomys tridecemlineatus monticola*	Northern AZ	AZ: NM: USFS: sensitive	Non-ungulate wild prey

			USFWS:	
Spotted ground squirrel	*Spermophilus spilosoma*	Eastern AZ, NM	AZ: Species of Greatest Conservation Need NM: USFS: USFWS:	Non-ungulate wild prey
Golden-mantled ground squirrel	*Spermophilus lateralis*	AZ, northwestern NM	AZ: Species of Greatest Conservation Need NM: USFS: USFWS:	Non-ungulate wild prey
Thirteen-lined ground squirrel	*Spermophilus tridecemlineatus*	AZ, NM	AZ: Species of Greatest Conservation Need NM: USFS: USFWS:	Non-ungulate wild prey
Chisel-toothed Kangaroo rat	*Dipodomys microps celsus*	Northwestern AZ	AZ: Species of Greatest Conservation Need NM: USFS: USFWS:	Non-ungulate wild prey
Banner-tailed Kangaroo rat	*Dipodomys spectabilis clarenci*	Northern AZ/ NM	AZ: Species of Greatest Conservation Need NM: USFS: USFWS:	Non-ungulate wild prey
Yavapai Arizona Cotton rat	*Sigmodon arizonae jacksoni*	AZ	AZ: Species of Greatest Conservation Need NM: USFS: USFWS:	Non-ungulate wild prey
Yellow-nosed Cotton rat	*Sigmodon ochrognathus*	AZ, NM	AZ: Species of Greatest Conservation Need NM: USFS: USFWS:	Non-ungulate wild prey
Tawny-bellied Cotton rat	*Sigmodon fulviventer*	AZ, NM	AZ: Species of Greatest Conservation Need NM: USFS: USFWS:	Non-ungulate wild prey
Colorado River Cotton rat	*Sigmodon arizonae plenus*	Southern and central AZ, southwestern NM	AZ: Species of Greatest Conservation Need NM: USFS: USFWS:	Non-ungulate wild prey
Hispid Cotton rat	*Sigmodon hispidus*	Southeastern AZ, NM	AZ: Species of Greatest Conservation Need NM:	Non-ungulate wild prey

			USFS: USFWS:	
Yuma Hispid Cotton rat	*Sigmodon hispidus eremicus*	AZ	AZ: Species of Greatest Conservation Need NM: USFS: USFWS:	Non-ungulate wild prey
Arizona Cotton rat	*Sigmodon arizonae cienegae*	Southern and central AZ, southwestern NM	AZ: Species of Greatest Conservation Need NM: USFS: USFWS:	Non-ungulate wild prey
Desert woodrat	*Neotoma lepida*	AZ, NM	AZ: Species of Greatest Conservation Need NM: USFS: USFWS:	Non-ungulate wild prey
Stephen's woodrat	*Neotoma stephensi*	AZ, NM	AZ: Species of Greatest Conservation Need NM: USFS: USFWS:	Non-ungulate wild prey
Northern Pygmy mouse	*Baiomys taylori ater*	Southeastern AZ, Southwestern NM	AZ: NM: USFS: sensitive USFWS:	Non-ungulate wild prey
Long-tailed Pocket mouse	*Chaetodipus formosus*	AZ	AZ: Species of Greatest Conservation Need NM: USFS: USFWS:	Non-ungulate wild prey
Fulvous Harvest mouse	*Reithrodontomys fulvescens*	Southeast AZ	AZ: Species of Greatest Conservation Need NM: USFS: USFWS:	Non-ungulate wild prey
Northern Grasshopper mouse	*Onychomys leucogaster*	AZ, NM	AZ: Species of Greatest Conservation Need NM: USFS: USFWS:	Non-ungulate wild prey
Apache Pocket mouse	*Perognathus apache melanotis*	Eastern AZ, Western NM	AZ: Species of Greatest Conservation Need NM: USFS: USFWS:	Non-ungulate wild prey
Springerville Pocket mouse	*Perognathus flavus goodpasteri*	Northern AZ	AZ: Species of Greatest Conservation Need NM:	Non-ungulate wild prey

			USFS: sensitive USFWS:	
Wupatki Arizona Pocket mouse	*Perognathus amplus cineris*	Northern AZ	AZ: Species of Greatest Conservation Need NM: USFS: USFWS:	Non-ungulate wild prey
Little Pocket mouse	*Perognathus longimembris*	AZ	AZ: Species of Greatest Conservation Need NM: USFS: USFWS:	Non-ungulate wild prey
Rock mouse	*Peromyscus nasutus (difficilis)*	Southeastern AZ, NM	AZ: Species of Greatest Conservation Need NM: USFS: USFWS:	Non-ungulate wild prey
Arizona Pocket mouse	*Perognathus amplus*	AZ, NM	AZ: Species of Greatest Conservation Need NM: USFS: USFWS:	Non-ungulate wild prey
New Mexico Meadow Jumping mouse	*Zapus hudsonius luteus*	Northern AZ, NM	AZ: Species of Greatest Conservation Need NM: state-listed endangered USFS: sensitive USFWS: endangered	Non-ungulate wild prey
Plains harvest mouse	*Reithrodontomys montanus*	Southeastern AZ, Southern NM	AZ: Species of Greatest Conservation Need NM: USFS: USFWS:	Non-ungulate wild prey
Rock pocket mouse	*Chaetodipus intermedius*	AZ, NM	AZ: Species of Greatest Conservation Need NM: USFS: USFWS:	Non-ungulate wild prey
Southern Grasshopper mouse	*Onychomys torridus*	AZ, NM	AZ: Species of Greatest Conservation Need NM: USFS: USFWS:	Non-ungulate wild prey
Canyon mouse	*Peromyscus crinitus*	AZ, NM	AZ: Species of Greatest Conservation Need NM: USFS: USFWS:	Non-ungulate wild prey
Mesquite	*Peromyscus*	Southern and	AZ:	Non-ungulate wild

(Merriam's) mouse	*merriami*	Southcentral AZ	NM: USFS: sensitive USFWS:	prey
Navajo Mogollon vole	*Microtus mogollonensis navaho*	Northern AZ	AZ: NM: USFS: sensitive USFWS:	Non-ungulate wild prey
White-bellied Long-tailed vole	*Microtus longicaudus leucophaeus*	Southern AZ	AZ: Species of Greatest Conservation Need NM: USFS: sensitive USFWS:	Non-ungulate wild prey
Hualapai Mexican vole	*Microtus mexicanus hualpaiensis*	AZ	AZ: Species of Greatest Conservation Need NM: USFS: Management Indicator Species Lincoln NFUSFWS: endangered	Non-ungulate wild prey
Southern red-backed vole	*Clethrionomys gapperi*	Northern AZ, NM	AZ: Species of Greatest Conservation Need NM: USFS: USFWS:	Non-ungulate wild prey
Arizona Montane vole	*Microtus montanus arizonensis*	East-central AZ, NM	AZ: Species of Greatest Conservation Need NM: state-listed endangered USFS: sensitive USFWS:	Non-ungulate wild prey
New Mexico shrew	*Sorex neomexicanus*	NM	AZ: NM: USFS: sensitive USFWS:	Non-ungulate wild prey
Merriam's shrew	*Sorex merriami*	AZ, NM	AZ: Species of Greatest Conservation Need NM: USFS: USFWS:	Non-ungulate wild prey
Arizona shrew	*Sorex arizonae*	Southeastern AZ, Southwestern NM	AZ: species of Greatest Conservation Need NM: state-listed endangered USFS: sensitive USFWS:	Non-ungulate wild prey
Cinereus (masked) shrew	*Sorex cinereus cinereus*	Northern NM	AZ: NM: USFS: sensitive USFWS:	Non-ungulate wild prey

Preble's shrew	*Sorex preblei*	Northern NM	AZ: NM: USFS: sensitive USFWS:	Non-ungulate wild prey
Cockrum's Desert shrew	*Notiosorex cockrumi*	AZ	AZ: Species of Greatest Conservation Need NM: USFS: USFWS:	Non-ungulate wild prey
American Water shrew	*Sorex palustris*	Northern AZ, Northern NM	AZ: Species of Greatest Conservation Need NM: USFS: sensitive USFWS:	Non-ungulate wild prey
Dwarf shrew	*Sorex nanus*	Northern AZ, Northern NM	AZ: Species of Greatest Conservation Need NM: USFS: USFWS:	Non-ungulate wild prey
North American least shrew	*Cryptotis parva*	NM	AZ: NM: state-listed endangered USFS: USFWS:	Non-ungulate wild prey
end				

APPENDIX B: COUNTY AND TRIBAL SOCIAL AND ECONOMIC CONDITIONS

These descriptions were assembled with assistance and input of the affected counties and tribes. They serve as a baseline for the potentially affected populations and help to inform the economics, public health and safety, and environmental justice sections. Counties are listed alphabetically, followed by tribes.

Counties

Apache County, AZ

Apache County is located in the northeast corner in the State of Arizona and is 11,174 square miles in size.[1] Over one-half of the County's land area is comprised of the Navajo Nation.[2] The U.S. Census Bureau estimated the 2011 population of the county to be 70,906 persons.[3] County population grew a total of only 2.1 percent over the previous decade compared to a national average of 8.9 percent.[4] Over 70 percent of the population is Native American with Whites making up the majority of the remainder.[5] 6.1 percent of the total population is Hispanic.[6] Census defined urban clusters in the county include Eagar, St. Johns, Window Rock, Ft. Defiance, and Chinle.

Economic prosperity in Apache County is less than the national average. In 2011 Apache County had an annual unemployment rate of 18.9 percent compared to national average of 8.9 percent. Average earnings per job in the county in 2011 were $38,656 compared to a national average of $54,897 and per capita income was $26,355 compared to the national average of $42,433.[7]

Total employment in Apache County in 2011 was 29,706 jobs. This represented an 18.8 percent increase from 2001. There were 6,433 non-service jobs, 11,823 government jobs, and an estimated 11,081 jobs in the services-related industries. Since 2001, government jobs declined by nearly ten percent, service-related jobs increased by 24 percent, and non-service jobs increased by 140 percent. The significant increase in non-service jobs was driven by a huge increase in the number of farming jobs. In 2001 the Bureau of Economic Analysis (BEA) reported 516 farming jobs and in 2011 BEA reported the number of jobs in the farming sector rose to 4,303, an increase of nearly 734 percent.[8]

Federal lands constitute 10.6 percent of the land base in Apache County.[9] The Forest Service manages 6.8 percent of the land, the Bureau of Land Management manages 1.4 percent of the land, and the Park Service manages 2.5 percent of the land.[10] Over the ten years from 2000 to 2010, Apache County

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[1] http://www.co.apache.az.us/Departments/CountyManager/History.html, Accessed 5/8/2013. (Apache County (1))

[2] Apache County (1)

[3] U.S. Department of Commerce. 2012. (1)

[4] U.S. Department of Commerce. 2012. (1)

[5] U.S. Department of Commerce. 2012. Census Bureau. (2)

[6] U.S. Department of Commerce. 2012. Census Bureau. (2)

[7] U.S. Department of Commerce. 2012. Bureau of Economic Analysis. (3)

[8] U.S. Department of Commerce. 2012. Bureau of Economic Analysis. (4)

[9] U.S. Geological Survey, Gap Analysis Program. 2012. (1)

[10] U.S. Geological Survey, Gap Analysis Program. 2012. (1)

experienced a 60 percent increase in its level of private lands development (compared to a national average of 12 percent).[11] In 2010, approximately 20 percent of Apache County's Wildland-Urban Interface (WUI) had been developed.[12]

In 2007 the Census of Agriculture reported that the total number of cattle and calve farms in Apache was 2,146.[13] This represented nearly a ten-fold increase from the reported number of farms in 2002 (227).[14] While the number of farms increased significantly the total number of cattle and calves did not. In 2007 there were 37,309 cattle and calves compared to a 2002 census of 32,549.[15] The number of sheep and lambs in Apache county in 2007 was 48,926[16] The number of farms grew from 51 in 2002 to 2,328 in 2007.[17]

In Apache County the game management units (GMU) with elk hunting are 1, 2A, 2B, 2C, 3A and 27, the number of permits sold in 2012 for hunts including any of these GMUs was 4,430, while the estimated number of elk harvested in these 2012 hunts was 1,613. Game management unis 1, 2B, and 2C are completely within the county.[18]

In 2011 Apache County had a total of 1,486 jobs related to the travel and tourism industry in the private sector.[19] This represents about 5 percent of the total jobs in the county. Since 1998, the county has lost 657 jobs in this sector.[20] This county contains a part of the Apache-Sitgreaves National Forest.[21] Navajo Nation attractions include the Navajo National Zoo and Botanical Park and Four Corners Monument.[22]

Bernalillo County, NM

Bernalillo County is located in the central New Mexico State, contains Albuquerque, and is 1,169 square miles in size.[23] The U.S. Census Bureau estimated the 2011 population of the county to be 655,306 persons.[24] County population grew a total of 17.7 percent over the previous decade compared to a

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[11] Theobald, DM. 2013.

[12] Theobald, DM. 2013.

[13] USDA, National Agriculture Statistics Service, 2007. (1)

[14] USDA, National Agriculture Statistics Service, 2007. (1)

[15] USDA, National Agriculture Statistics Service, 2007. (1)

[16] USDA, National Agriculture Statistics Service, 2007. (2)

[17] USDA, National Agriculture Statistics Service, 2007. (2)

[18] Arizona Game and Fish Department. Final results of the 2012 general, junior and muzzleloader elk questionnaire. Amber A. Munig, Big Game Management Supervisor. June 19, 2013.

[19] U.S. Department of Commerce. 2012. Census Bureau. (5)

[20] U.S. Department of Commerce. 2012. Census Bureau. (5)

[21] http://www.fs.usda.gov/asnf/, Accessed 7/11/2013 10:26 am.

[22] http://www.navajozoo.org/, Accessed 7/11/2013 10:30 am.

[23] http://www.city-data.com/county/Bernalillo_County-NM.html, Accessed 5/17/2013 6:45 am.

[24] U.S. Department of Commerce. 2012. (1)

national average of 8.9 percent.[25] Five percent of the population is Native American with Whites making up the majority of the remainder.[26] 47.3 percent of the total population is Hispanic.[27]

Economic prosperity in Bernalillo County is mixed when compared with the national averages. In 2011 Bernalillo County had an annual unemployment rate of 7.6 percent compared to national average of 8.9 percent. Average earnings per job in the county in 2011 were $49,015 compared to a national average of $54,897 and per capita income was $36,994 compared to the national average of $42,433.[28]

Total employment in Bernalillo County in 2011 was 413,754 jobs. This represented a 5.5 percent increase from 2001. There were 40,282 non-service jobs, 74,847 government jobs, and an estimated 298,625 jobs in the services-related industries. Since 2001, government jobs increased by 14 percent, service-related jobs increased by eight percent, and non-service jobs decreased by 18 percent. In 2001 the Bureau of Economic Analysis (BEA) reported 821 farming jobs and in 2011 BEA reported the number of jobs in the farming sector fell to 705, a decrease of 14 percent.[29]

Federal lands constitute 15.1 percent of the land base in Bernalillo County.[30] The Forest Service manages 9.8 percent of the land, the Bureau of Land Management manages 0.9 percent of the land, and the Park Service manages 0.4 percent of the land.[31] Over the ten years from 2000 to 2010, Bernalillo County experienced an 11 percent increase in its level of private lands development (compared to a national average of 12 percent).[32] In 2010, approximately 42 percent of Bernalillo County's Wildland-Urban Interface (WUI) had been developed.[33]

In 2007 the Census of Agriculture reported that the total number of cattle and calve farms in Bernalillo was 175.[34] This represented a 12 percent increase from the reported number of farms in 2002 (156).[35] In 2007 there were 6,644 cattle and calves compared to a 2002 census of 10,235.[36] The number of sheep and lambs in Bernalillo County in 2007 was 298 and 1780 in 2002.[37] The number of farms shrank from 65 in 2002 to 52 in 2007.[38]

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[25] U.S. Department of Commerce. 2012. (1)

[26] U.S. Department of Commerce. 2012. Census Bureau. (2)

[27] U.S. Department of Commerce. 2012. Census Bureau. (2)

[28] U.S. Department of Commerce. 2012. Bureau of Economic Analysis. (3)

[29] U.S. Department of Commerce. 2012. Bureau of Economic Analysis. (4)

[30] U.S. Geological Survey, Gap Analysis Program. 2012. (1)

[31] U.S. Geological Survey, Gap Analysis Program. 2012. (1)

[32] Theobald, DM. 2013.

[33] Theobald, DM. 2013.

[34] USDA, National Agriculture Statistics Service, 2007. (1)

[35] USDA, National Agriculture Statistics Service, 2007. (1)

[36] USDA, National Agriculture Statistics Service, 2007. (1)

[37] USDA, National Agriculture Statistics Service, 2007. (2)

[38] USDA, National Agriculture Statistics Service, 2007. (2)

In Bernalillo County the game management unit (GMU) with elk hunting is 9. The number of total licenses sold or converted in 2012 for this GMU was 1,577, while the estimated number of elk harvested in 2012 was 402. No game management units were completely within the county.[39]

In 2011 Bernalillo County had a total of 42,910 jobs related to the travel and tourism industry in the private sector.[40] This represents about 10.4 percent of the total jobs in the county. Since 1998, the county has gained 5,090 jobs in this sector.[41] Bernalillo County attractions in Albuquerque include historic old town, the BioPark Zoo and Aquarium.[42][43][44]

Catron County, NM

Catron County is located in central New Mexico State on the border with Arizona State and is 6,929 square miles in size.[45] The U.S. Census Bureau estimated the 2011 population of the county to be 3,687 persons.[46] County population grew a total of only 4.1 percent over the previous decade compared to a national average of 8.9 percent.[47] Five percent of the population is Native American with Whites making up the majority of the remainder.[48] 17.3 percent of the total population is Hispanic.[49]

Economic prosperity in Catron County is less when compared to the national averages. In 2011 Catron County had an annual unemployment rate of 8.4 percent less than the national average of 8.9 percent. Average earnings per job in the county in 2011 were $25,020 compared to a national average of $54,897 and per capita income was $29,724 compared to the national average of $42,433.[50]

Total employment in Catron County in 2011 was 2,027 jobs. This represented a 35.0 percent increase from 2001. There were 685 non-service jobs, 325 government jobs, and an estimated 772 jobs in the services-related industries. Since 2001, government jobs declined by seven percent, service-related jobs increased by 84 percent, and non-service jobs increased by 32 percent. In 2001 the Bureau of Economic Analysis (BEA) reported 304 farming jobs and in 2011 BEA reported the number of jobs in the farming sector fell to 281, a decrease of eight percent.[51]

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[39] NMDGF 2012.

[40] U.S. Department of Commerce. 2012. Census Bureau. (5)

[41] U.S. Department of Commerce. 2012. Census Bureau. (5)

[42] http://www.albuquerqueoldtown.com/, Accessed 7/12/2013 2:50 pm.

[43] http://www.cabq.gov/culturalservices/biopark/zoo, Accessed 7/12/2013 2:52pm.

[44] http://www.cabq.gov/culturalservices/biopark/aquarium, Accessed 7/12/2013 2:52 pm.

[45] http://www.city-data.com/county/Catron_County-NM.html, Accessed 5/17/2013 6:49 am.

[46] U.S. Department of Commerce. 2012. (1)

[47] U.S. Department of Commerce. 2012. (1)

[48] U.S. Department of Commerce. 2012. Census Bureau. (2)

[49] U.S. Department of Commerce. 2012. Census Bureau. (2)

[50] U.S. Department of Commerce. 2012. Bureau of Economic Analysis. (3)

[51] U.S. Department of Commerce. 2012. Bureau of Economic Analysis. (4)

Federal lands constitute 62.7 percent of the land base in Catron County.[52] The Forest Service manages 49.5 percent of the land, the Bureau of Land Management manages 13.2 percent of the land, and the Park Service manages zero percent of the land.[53] Over the ten years from 2000 to 2010, Catron County experienced a 271 percent increase in its level of private lands development (compared to a national average of 12 percent).[54] In 2010, approximately 10 percent of Catron County's Wildland-Urban Interface (WUI) had been developed.[55]

In 2007 the Census of Agriculture reported that the total number of cattle and calve farms in Catron was 194.[56] This represented 26 percent increase from the reported number of farms in 2002 (154).[57] In 2007 there were 26,605 cattle and calves compared to a 2002 census of 28,100.[58] There is no data on the number of sheep and lambs in Catron County in 2007 and 2002.[59] The number of farms grew from 2 in 2002 to 3 in 2007.[60]

In Catron County the game management units (GMU) with elk hunting are 12, 13, 15, 16A-E, 21A-B, and 23. The number of total licenses sold or converted in 2012 for these GMUs was 8,917, while the estimated number of elk harvested in 2012 was 3,227. Game management units 15, 16A, and 16D are completely within the county.[61]

In 2011 Catron County had a total of 58 jobs related to the travel and tourism industry in the private sector.[62] This represents about 2.9 percent of the total jobs in the county. Since 1998, the county has lost 19 jobs in this sector.[63] This county contains a part of the Apache-Sitgreaves National Forest.[64] Catron County also contains a part of Gila National Forest and the Gila Wilderness Area. Hunting and fishing are popular recreation activities in the county.[65]

Chaves County, NM

Chaves County is located in the south eastern New Mexico State and is 6,075 square miles in size.[66] The U.S. Census Bureau estimated the 2011 population of the county to be 64,949 persons.[67] County

[52] U.S. Geological Survey, Gap Analysis Program. 2012. (1)

[53] U.S. Geological Survey, Gap Analysis Program. 2012. (1)

[54] Theobald, DM. 2013.

[55] Theobald, DM. 2013.

[56] USDA, National Agriculture Statistics Service, 2007. (1)

[57] USDA, National Agriculture Statistics Service, 2007. (1)

[58] USDA, National Agriculture Statistics Service, 2007. (1)

[59] USDA, National Agriculture Statistics Service, 2007. (2)

[60] USDA, National Agriculture Statistics Service, 2007. (2)

[61] NMDGF 2012.

[62] U.S. Department of Commerce. 2012. Census Bureau. (5)

[63] U.S. Department of Commerce. 2012. Census Bureau. (5)

[64] http://www.fs.usda.gov/asnf/, Accessed 7/11/2013 10:26 am.

[65] http://www.catroncounty.us/, 7/11/2013 10:46 am.

[66] http://www.city-data.com/county/Chaves_County-NM.html, Accessed 5/17/2013 6:51 am.

population grew a total of only 5.8 percent over the previous decade compared to a national average of 8.9 percent.[68] Two percent of the population is Native American with Whites making up the majority of the remainder.[69] 51.2 percent of the total population is Hispanic.[70]

Economic prosperity in Chaves County is mixed when compared to the national averages. In 2011 Chaves County had an annual unemployment rate of 7.0 percent compared to national average of 8.9 percent. Average earnings per job in the county in 2011 were $43,169 compared to a national average of $54,897 and per capita income was $30,956 compared to the national average of $42,433.[71]

Total employment in Chaves County in 2011 was 29,413 jobs. This represented a 7.6 percent increase from 2001. There were 5,718 non-service jobs, 4,563 government jobs, and an estimated 19,132 jobs in the services-related industries. Since 2001, government jobs declined by seven percent, service-related jobs increased by 20 percent, and non-service jobs decreased by 11 percent. In 2001 the Bureau of Economic Analysis (BEA) reported 1,596 farming jobs and in 2011 BEA reported the number of jobs in the farming sector fell to 1,324, a decrease of 17 percent.[72]

Federal lands constitute 31.7 percent of the land base in Chaves County.[73] The Forest Service manages 1.0 percent of the land; the Bureau of Land Management manages 30.0 percent of the land, and no data on the Park Service.[74] Over the ten years from 2000 to 2010, Chaves County experienced a 39 percent increase in its level of private lands development (compared to a national average of 12 percent).[75] In 2010, there was no data on what percentage of Chaves County's Wildland-Urban Interface (WUI) had been developed.[76]

In 2007 the Census of Agriculture reported that the total number of cattle and calve farms in Chaves was 287.[77] This represented a five percent decrease from the reported number of farms in 2002 (301).[78] In 2007 there were 179,352 cattle and calves compared to a 2002 census of 179,494.[79] The number of sheep

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[67] U.S. Department of Commerce. 2012. (1)

[68] U.S. Department of Commerce. 2012. (1)

[69] U.S. Department of Commerce. 2012. Census Bureau. (2)

[70] U.S. Department of Commerce. 2012. Census Bureau. (2)

[71] U.S. Department of Commerce. 2012. Bureau of Economic Analysis. (3)

[72] U.S. Department of Commerce. 2012. Bureau of Economic Analysis. (4)

[73] U.S. Geological Survey, Gap Analysis Program. 2012. (1)

[74] U.S. Geological Survey, Gap Analysis Program. 2012. (1)

[75] Theobald, DM. 2013.

[76] Theobald, DM. 2013.

[77] USDA, National Agriculture Statistics Service, 2007. (1)

[78] USDA, National Agriculture Statistics Service, 2007. (1)

[79] USDA, National Agriculture Statistics Service, 2007. (1)

and lambs in Chaves County in 2007 was 16,981 and 36,930 in 2002.[80] The number of farms shrank from 49 in 2002 to 45 in 2007.[81]

In Chaves County the game management units (GMU) with elk hunting are 30 and 34, the number of total licenses sold or converted in 2012 was 2,428, while the estimated number of elk killed in 2012 was 1,135. No game management units were completely within the county.[82]

In 2011 Chaves County had a total of 3,029 jobs related to the travel and tourism industry in the private sector.[83] This represents about 10.3 percent of the total jobs in the county. Since 1998, the county has gained 288 jobs in this sector.[84] Important economic engines for this county are irrigated farm land, dairy production, and oil extraction.[85]

Cibola County, NM

Cibola County is located in central New Mexico State on the border with Arizona State, and is 4,542 square miles in size.[86] The U.S. Census Bureau estimated the 2011 population of the county to be 27,316 persons.[87] County population grew a total of 6.7 percent over the previous decade compared to a national average of 8.9 percent.[88] 43 percent of the population is Native American with Whites making up the majority of the remainder.[89] 36.3 percent of the total population is Hispanic.[90]

Economic prosperity in Cibola County is mixed when compared with the national averages. In 2011 Cibola County had an annual unemployment rate of 7.1 percent compared to national average of 8.9 percent. Average earnings per job in the county in 2011 were $40,837 compared to a national average of $54,897 and per capita income was $26,510 compared to the national average of $42,433.[91]

Total employment in Cibola County in 2011 was 10,029 jobs. This represented a 14.4 percent increase from 2001. There were 1,006 non-service jobs, 3,233 government jobs, and an estimated 5,203 jobs in the services-related industries. Since 2001, government jobs increased by two percent, service-related jobs increased by one percent, and non-service jobs increased by zero percent. In 2001 the Bureau of Economic Analysis (BEA) reported 186 farming jobs and in 2011 BEA reported the number of jobs in the farming sector rose to 355, an increase of 91 percent.[92]

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80 USDA, National Agriculture Statistics Service, 2007. (2)

81 USDA, National Agriculture Statistics Service, 2007. (2)

82 NMDGF 2012.

83 U.S. Department of Commerce. 2012. Census Bureau. (5)

84 U.S. Department of Commerce. 2012. Census Bureau. (5)

85 http://co.chaves.nm.us/index.php/2012-05-03-17-38-19/chaves-county, Accessed 1/9/2014 11:32 am.

86 http://www.city-data.com/county/Cibola_County-NM.html, Accessed 5/17/2013 7:01 am.

87 U.S. Department of Commerce. 2012. (1)

88 U.S. Department of Commerce. 2012. (1)

89 U.S. Department of Commerce. 2012. Census Bureau. (2)

90 U.S. Department of Commerce. 2012. Census Bureau. (2)

91 U.S. Department of Commerce. 2012. Bureau of Economic Analysis. (3)

92 U.S. Department of Commerce. 2012. Bureau of Economic Analysis. (4)

Federal lands constitute 29.0 percent of the land base in Cibola County.[93] The Forest Service manages 10.5 percent of the land, the Bureau of Land Management manages 14.7 percent of the land, and the Park Service manages 3.4 percent of the land.[94] Over the ten years from 2000 to 2010, Cibola County experienced a 55 percent increase in its level of private lands development (compared to a national average of 12 percent).[95] In 2010, approximately one percent of Cibola County's Wildland-Urban Interface (WUI) had been developed.[96]

In 2007 the Census of Agriculture reported that the total number of cattle and calve farms in Cibola was 173.[97] This represented an 88 percent increase from the reported number of farms in 2002 (92).[98] In 2007 there were 16,323 cattle and calves compared to a 2002 census of 16,168.[99] The number of sheep and lambs in Cibola County in 2007 was 4,838 and 15,142 in 2002.[100] The number of farms grew from 11 in 2002 to 64 in 2007.[101]

In Cibola County the game management units (GMU) with elk hunting are 9, 10, 12, and 13. The number of total licenses sold or converted in 2012 for these GMUs was 4,379, while the estimated number of elk harvested in 2012 was 1,319. No game management units were completely within the county.[102]

In 2011 Cibola County had a total of 1,589 jobs related to the travel and tourism industry in the private sector.[103] This represents about 15.8 percent of the total jobs in the county. Since 1998, the county has gained 280 jobs in this sector.[104] Cibola County attractions include the Wild Spirit Wolf Sanctuary, Pueblo of Acoma, and the San Estevan del Rey Mission.[105][106][107]

Cochise County, AZ

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93 U.S. Geological Survey, Gap Analysis Program. 2012. (1)

94 U.S. Geological Survey, Gap Analysis Program. 2012. (1)

95 Theobald, DM. 2013.

96 Theobald, DM. 2013.

97 USDA, National Agriculture Statistics Service, 2007. (1)

98 USDA, National Agriculture Statistics Service, 2007. (1)

99 USDA, National Agriculture Statistics Service, 2007. (1)

100 USDA, National Agriculture Statistics Service, 2007. (2)

101 USDA, National Agriculture Statistics Service, 2007. (2)

102 NMDGF 2012.

103 U.S. Department of Commerce. 2012. Census Bureau. (5)

104 U.S. Department of Commerce. 2012. Census Bureau. (5)

105 http://www.wildspiritwolfsanctuary.org/, Accessed 7/12/2013 2:35 pm.

106 http://www.puebloofacoma.org/, Accessed 7/12/2013 2:37 pm.

107 http://www.nps.gov/history/nr/travel/american_latino_heritage/San_Estevan_del_Rey_Mission_Church.html, Accessed 7/12/2013 2:39 pm.

Cochise County is located in the southeast corner in the State of Arizona and is 6,218 square miles in size.[108] Cochise is one of only three counties in Arizona without an Indian reservation.[109] The U.S. Census Bureau estimated the 2011 population of the county to be 130,464 persons.[110] County population grew a total of 10.8 percent over the previous decade compared to a national average of 8.9 percent.[111] Only one percent of the population is Native American with Whites making up the majority of the remainder.[112] 32.1 percent of the total population is Hispanic.[113]

Economic prosperity in Cochise County is similar to that of the national average except for per capita income. In 2011 Cochise County had an annual unemployment rate of 8.8 percent compared to national average of 8.9 percent. Average earnings per job in the county in 2011 were $54,502 compared to a national average of $54,897 and per capita income was $36,488 compared to the national average of $42,433.[114]

Total employment in Cochise County in 2011 was 57,565 jobs. This represented a 12 percent increase from 2001. There were 5,690 non-service jobs, 18,330 government jobs, and an estimated 33,785 jobs in the services-related industries. Since 2001, government jobs increased by nearly ten percent, service-related jobs increased by 20 percent, and non-service jobs decreased by 14 percent. In 2001 the Bureau of Economic Analysis (BEA) reported 1,997 farming jobs and in 2011 BEA reported the number of jobs in the farming sector rose to 2,165, an increase of nearly 8 percent.[115]

Federal lands constitute 25.9 percent of the land base in Cochise County.[116] The Forest Service manages 12.5 percent of the land, the Bureau of Land Management manages 10.1 percent of the land, and the Park Service manages 0.4 percent of the land.[117] Over the ten years from 2000 to 2010, Cochise County experienced a 45 percent increase in its level of private lands development (compared to a national average of 12 percent).[118] In 2010, approximately seven percent of Cochise County's Wildland-Urban Interface (WUI) had been developed.[119]

In 2007 the Census of Agriculture reported that the total number of cattle and calve farms in Cochise was 489.[120] This represented a five percent increase from the reported number of farms in 2002 (467).[121] In

[108] http://www.city-data.com/county/Cochise_County-AZ.html, Accessed 5/16/2013 3:30 pm

[109] http://www.usacitiesonline.com/azcochisecounty.htm, Accessed 5/16/2013 3:46 pm.

[110] U.S. Department of Commerce. 2012. (1)

[111] U.S. Department of Commerce. 2012. (1)

[112] U.S. Department of Commerce. 2012. Census Bureau. (2)

[113] U.S. Department of Commerce. 2012. Census Bureau. (2)

[114] U.S. Department of Commerce. 2012. Bureau of Economic Analysis. (3)

[115] U.S. Department of Commerce. 2012. Bureau of Economic Analysis. (4)

[116] U.S. Geological Survey, Gap Analysis Program. 2012. (1)

[117] U.S. Geological Survey, Gap Analysis Program. 2012. (1)

[118] Theobald, DM. 2013.

[119] Theobald, DM. 2013.

[120] USDA, National Agriculture Statistics Service, 2007. (1)

[121] USDA, National Agriculture Statistics Service, 2007. (1)

2007 there were 58,516 cattle and calves compared to a 2002 census of 69,118.[122] The number of sheep and lambs in Cochise County in 2007 was 1,000.[123] The number of farms decreased from 43 in 2002 to 32 in 2007.[124]

In Cochise County the game management units (GMU) with elk hunting are 28, 29, 30A, 30B, 31, 32, 33, 34B, and 35A the number of permits sold in 2012 for hunts including any of these GMUs was 10, while the estimated number of elk harvested in these 2012 hunts was 2. Game management units 29, 30A, and 30B are completely within the county.[125]

In 2011 Cochise County had a total of 5,969 jobs related to the travel and tourism industry in the private sector.[126] This represents about 10 percent of the total jobs in the county. Since 1998, the county has gained 1,407 jobs in this sector.[127] Cochise County is home to the ghost towns of Fairbank and Bisbee, and the historic city of Tombstone.[128] Kartchner Caverns Sate Park is another local attraction.[129]

Coconino County, AZ

Coconino County is located in the northern Arizona and is 18,661 square miles in size.[130] The U.S. Census Bureau estimated the 2011 population of the county to be 132,978 persons.[131] County population grew a total of 14.3 percent over the previous decade compared to a national average of 8.9 percent.[132] Over 27 percent of the population is Native American with Whites making up the majority of the remainder.[133] 13.4 percent of the total population is Hispanic.[134]

Economic prosperity in Coconino County is less than the national average. In 2011 Coconino County had an annual unemployment rate of 9.2 percent compared to national average of 8.9 percent. Average earnings per job in the county in 2011 were $40,598 compared to a national average of $54,897 and per capita income was $35,074 compared to the national average of $42,433.[135]

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[122] USDA, National Agriculture Statistics Service, 2007. (1)

[123] USDA, National Agriculture Statistics Service, 2007. (2)

[124] USDA, National Agriculture Statistics Service, 2007. (2)

[125] Arizona Game and Fish Department. Final results of the 2012 general, junior and muzzleloader elk questionnaire. Amber A. Munig, Big Game Management Supervisor. June 19, 2013.

[126] U.S. Department of Commerce. 2012. Census Bureau. (5)

[127] U.S. Department of Commerce. 2012. Census Bureau. (5)

[128] http://gosw.about.com/od/arizonatravelguide/a/cochisecounty.htm, Accessed 7/11/2013 9:33 am.

[129] http://www.explorecochise.com/ , Accessed 7/11/2013 9:51 am.

[130] http://www.city-data.com/county/Coconino_County-AZ.html, Accessed 5/16/2013 3:50 pm.

[131] U.S. Department of Commerce. 2012. (1)

[132] U.S. Department of Commerce. 2012. (1)

[133] U.S. Department of Commerce. 2012. Census Bureau. (2)

[134] U.S. Department of Commerce. 2012. Census Bureau. (2)

[135] U.S. Department of Commerce. 2012. Bureau of Economic Analysis. (3)

Total employment in Coconino County in 2011 was 81,813 jobs. This represented a 17.0 percent increase from 2001. There were 9,940 non-service jobs, 16,676 government jobs, and an estimated 55,197 jobs in the services-related industries. Since 2001, government jobs increased by nearly six percent, service-related jobs increased by 19 percent, and non-service jobs increased by 27 percent. In 2001 the Bureau of Economic Analysis (BEA) reported 305 farming jobs and in 2011 BEA reported the number of jobs in the farming sector rose to 1,626, an increase of nearly 433 percent.[136]

Federal lands constitute 39.9 percent of the land base in Coconino County.[137] The Forest Service manages 27.0 percent of the land, the Bureau of Land Management manages 5.2 percent of the land, and the Park Service manages 6.7 percent of the land.[138] Over the ten years from 2000 to 2010, Coconino County experienced a 27.7 percent increase in its level of private lands development (compared to a national average of 12 percent).[139] In 2010, approximately 19 percent of Coconino County's Wildland-Urban Interface (WUI) had been developed.[140]

In 2007 the Census of Agriculture reported that the total number of cattle and calve farms in Coconino was 1,020.[141] This represented nearly a ten-fold increase from the reported number of farms in 2002 (103).[142] In 2007 there were 47,517 cattle and calves compared to a 2002 census of 32,783.[143] The number of sheep and lambs in Coconino County in 2007 was 29,799 and there is no data for 2002.[144] The number of farms grew from 23 in 2002 to 834 in 2007.[145]

In Coconino County the game management units (GMU) with elk hunting are 3C, 4A, 4B, 5A, 5BN, 5BS, 6A, 6B, 7E, 7W, 8, 9, 10, 11M, 12AE, 12AW, and X, the number of permits sold in 2012 for hunts including any of these GMUs was 17,027, while the estimated number of elk harvested in these 2012 hunts was 5,914. Game management units 5BN, 5BS, 7E, 7W, 9, 11M, 12AE, 12AW, and 12B are completely within the county.[146]

In 2011 Coconino County had a total of 14,378 jobs related to the travel and tourism industry in the private sector.[147] This represents about 17.6 percent of the total jobs in the county. Since 1998, the county has gained 1,640 jobs in this sector.[148] Grand Canyon National Park is the largest tourist attraction

[136] U.S. Department of Commerce. 2012. Bureau of Economic Analysis. (4)

[137] U.S. Geological Survey, Gap Analysis Program. 2012. (1)

[138] U.S. Geological Survey, Gap Analysis Program. 2012. (1)

[139] Theobald, DM. 2013.

[140] Theobald, DM. 2013.

[141] USDA, National Agriculture Statistics Service, 2007. (1)

[142] USDA, National Agriculture Statistics Service, 2007. (1)

[143] USDA, National Agriculture Statistics Service, 2007. (1)

[144] USDA, National Agriculture Statistics Service, 2007. (2)

[145] USDA, National Agriculture Statistics Service, 2007. (2)

[146] Arizona Game and Fish Department. Final results of the 2012 general, junior and muzzleloader elk questionnaire. Amber A. Munig, Big Game Management Supervisor. June 19, 2013.

[147] U.S. Department of Commerce. 2012. Census Bureau. (5)

[148] U.S. Department of Commerce. 2012. Census Bureau. (5)

in the county.[149] This county also contains a part of the Apache-Sitgreaves National Forest.[150] Other local attractions include the Wupatki National Monument and Meteor Crater.[151]

Dona Ana County, NM

Dona Ana County is in the State of New Mexico and borders Mexico and the State or Texas, and is 3,814 square miles in size.[152] The U.S. Census Bureau estimated the 2011 population of the county to be 205,637 persons.[153] County population grew a total of 17.7 percent over the previous decade compared to a national average of 8.9 percent.[154] Only one percent of the population is Native American with Whites making up the majority of the remainder.[155] 65.5 percent of the total population is Hispanic.[156]

Economic prosperity in Dona Ana County is mixed when compared with the national averages. In 2011 Dona Ana County had an annual unemployment rate of 7.6 percent compared to national average of 8.9 percent. Average earnings per job in the county in 2011 were $43,984 compared to a national average of $54,897 and per capita income was $30,592 compared to the national average of $42,433.[157]

Total employment in Dona Ana County in 2011 was 92,253 jobs. This represented a 21.8 percent increase from 2001. There were 13,601 non-service jobs, 21,724 government jobs, and an estimated 56,928 jobs in the services-related industries. Since 2001, government jobs increased by 11 percent, service-related jobs increased by 31 percent, and non-service jobs increased by 11 percent. In 2001 the Bureau of Economic Analysis (BEA) reported 3,210 farming jobs and in 2011 BEA reported the number of jobs in the farming sector fell to 3,105, a decrease of three percent.[158]

Federal lands constitute 74.6 percent of the land base in Dona Ana County.[159] Data on the Forest Service managed lands is not available, the Bureau of Land Management manages 45.6 percent of the land, and the Park Service manages 1.9 percent of the land.[160] Over the ten years from 2000 to 2010, Dona Ana County experienced a 25 percent increase in its level of private lands development (compared to a national average of 12 percent).[161] In 2010, approximately 29 percent of Dona Ana County's Wildland-Urban Interface (WUI) had been developed.[162]

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[149] http://www.nps.gov/grca/index.htm, accessed 7/11/2012 9:23 am.

[150] http://www.fs.usda.gov/asnf/, accessed 7/11/2013 10:26 am.

[151] http://www.coconino.az.gov/index.aspx?NID=473, accessed 7/11/2013 10:37 am.

[152] http://www.city-data.com/county/Dona_Ana_County-NM.html, accessed 7:53 am 5/17/2013.

[153] U.S. Department of Commerce. 2012. (1)

[154] U.S. Department of Commerce. 2012. (1)

[155] U.S. Department of Commerce. 2012. Census Bureau. (2)

[156] U.S. Department of Commerce. 2012. Census Bureau. (2)

[157] U.S. Department of Commerce. 2012. Bureau of Economic Analysis. (3)

[158] U.S. Department of Commerce. 2012. Bureau of Economic Analysis. (4)

[159] U.S. Geological Survey, Gap Analysis Program. 2012. (1)

[160] U.S. Geological Survey, Gap Analysis Program. 2012. (1)

[161] Theobald, DM. 2013.

[162] Theobald, DM. 2013.

In 2007 the Census of Agriculture reported that the total number of cattle and calve farms in Dona Ana was 160.[163] This represented an 11 percent decrease from the reported number of farms in 2002 (180).[164] In 2007 there were 110,928 cattle and calves compared to a 2002 census of 80,368.[165] The number of sheep and lambs in Dona Ana County in 2007 was 781 and 1,560 in 2002.[166] The number of farms shrank from 57 in 2002 to 49 in 2007.[167]

In Doña Ana County the game management unit (GMU) with elk hunting is 21B. The number of total licenses sold or converted in 2012 in this GMU was 324, while the estimated number of elk harvested in 2012 was 145. No game management units were completely within the county.[168]

In 2011 Dona Ana County had a total of 9,519 jobs related to the travel and tourism industry in the private sector.[169] This represents about 10.3 percent of the total jobs in the county. Since 1998, the county has gained 3,027 jobs in this sector.[170] Dona Ana County attractions include the San Albino Basilica, and Western Playland amusement park.[171][172]

Eddy County, NM

Eddy County is located in the southeast corner in the State of New Mexico on the border with the State of Texas, and is 4,198 square miles in size.[173] The U.S. Census Bureau estimated the 2011 population of the county to be 53,228 persons.[174] County population grew a total of only 3.0 percent over the previous decade compared to a national average of 8.9 percent.[175] One percent of the population is Native American with Whites making up the majority of the remainder.[176] 43.5 percent of the total population is Hispanic.[177]

Economic prosperity in Eddy County is greater than the national average. In 2011 Eddy County had an annual unemployment rate of 4.6 percent compared to national average of 8.9 percent. Average earnings

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163 USDA, National Agriculture Statistics Service, 2007. (1)

164 USDA, National Agriculture Statistics Service, 2007. (1)

165 USDA, National Agriculture Statistics Service, 2007. (1)

166 USDA, National Agriculture Statistics Service, 2007. (2)

167 USDA, National Agriculture Statistics Service, 2007. (2)

168 NMDGF 2012.

169 U.S. Department of Commerce. 2012. Census Bureau. (5)

170 U.S. Department of Commerce. 2012. Census Bureau. (5)

171 http://www.sanalbino.org/, accessed 7/12/2013 2:42 pm.

172 http://westernplayland.com/, accessed 7/12/2013 2:50 pm.

173 City-Data.com 2013 http://www.city-data.com/county/Eddy_County-NM.html

174 US Census 2012a

175 US Census 2012a

176 US Census 2012b

177 US Census 2012b

per job in the county in 2011 were $57,416 compared to a national average of $54,897 and per capita income was $42,411 compared to the national average of $42,433.[178]

Total employment in Eddy County in 2011 was 32,238 jobs. This represented a 28.0 percent increase from 2001. There were 10,437 non-service jobs, 4,010 government jobs, and an estimated 18,507 jobs in the services-related industries. Since 2001, government jobs increased by 11 percent, service-related jobs increased by 23 percent, and non-service jobs increased by 59 percent. In 2001 the Bureau of Economic Analysis (BEA) reported 975 farming jobs and in 2011 BEA reported the number of jobs in the farming sector fell to 838, a decrease of 14 percent.[179]

Federal lands constitute 58.5 percent of the land base in Eddy County.[180] The Forest Service manages 5.0 percent of the land, the Bureau of Land Management manages 50.8 percent of the land, and the Park Service manages 1.9 percent of the land.[181] Over the ten years from 2000 to 2010, Eddy County experienced a 23 percent increase in its level of private lands development (compared to a national average of 12 percent).[182] In 2010 there was no available data on what percent of Eddy County's Wildland-Urban Interface (WUI) had been developed.[183]

In 2007 the Census of Agriculture reported that the total number of cattle and calve farms in Eddy was 222.[184] This represented a six percent increase from the reported number of farms in 2002 (210).[185] In 2007 there were 49,107 cattle and calves compared to a 2002 census of 58,381.[186] The number of sheep and lambs in Eddy County in 2007 was 2,243 and 1,547 in 2002.[187] The number of farms grew from 27 in 2002 to 29 in 2007.[188]

In Eddy County the game management unit with elk hunting is 30, the number of total licenses sold or converted in 2012 was 30, while the estimated number of elk killed in 2012 was 17. No game management units were completely within the county.

In 2011 Eddy County had a total of 2,807 jobs related to the travel and tourism industry in the private sector.[189] This represents about 8.7 percent of the total jobs in the county. Since 1998, the county has gained 243 jobs in this sector.[190]

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[178] USBEA 2012a

[179] USBEA 2012b

[180] U.S. Geological Survey, Gap Analysis Program. 2012. (1)

[181] U.S. Geological Survey, Gap Analysis Program. 2012. (1)

[182] Theobald, DM. 2013.

[183] Theobald, DM. 2013.

[184] USDA, National Agriculture Statistics Service, 2007. (1)

[185] USDA, National Agriculture Statistics Service, 2007. (1)

[186] USDA, National Agriculture Statistics Service, 2007. (1)

[187] USDA, National Agriculture Statistics Service, 2007. (2)

[188] USDA, National Agriculture Statistics Service, 2007. (2)

[189] U.S. Department of Commerce. 2012. Census Bureau. (5)

[190] U.S. Department of Commerce. 2012. Census Bureau. (5)

Gila County, AZ

Gila County is located in central Arizona State and is 4,796 square miles in size.[191] The U.S. Census Bureau estimated the 2011 population of the county to be 53,380 persons.[192] County population grew a total of only 4.0 percent over the previous decade compared to a national average of 8.9 percent.[193] Over 14 percent of the population is Native American with Whites making up the majority of the remainder.[194] 18.8 percent of the total population is Hispanic.[195]

Economic prosperity in Gila County is less than the national average. In 2011 Gila County had an annual unemployment rate of 10.5 percent compared to national average of 8.9 percent. Average earnings per job in the county in 2011 were $39,027 compared to a national average of $54,897 and per capita income was $32,515 compared to the national average of $42,433.[196]

Total employment in Gila County in 2011 was 21,367 jobs. This represented a 4.6 percent increase from 2001. There were 3,447 non-service jobs, 5,044 government jobs, and an estimated 11,552 jobs in the services-related industries. Since 2001, government jobs increased by two percent, service-related jobs increased by 7 percent, and non-service jobs decreased by 13 percent. In 2001 the Bureau of Economic Analysis (BEA) reported 257 farming jobs and in 2011 BEA reported the number of jobs in the farming sector rose to 274, an increase of seven percent[197]

Federal lands constitute 57.2 percent of the land base in Gila County.[198] The Forest Service manages 55.0 percent of the land, the Bureau of Land Management manages 2.2 percent of the land, and the Park Service manages zero percent of the land.[199] Over the ten years from 2000 to 2010, Gila County experienced a 19 percent increase in its level of private lands development (compared to a national average of 12 percent).[200] In 2010, approximately 33 percent of Gila County's Wildland-Urban Interface (WUI) had been developed.[201]

In 2007 the Census of Agriculture reported that the total number of cattle and calve farms in Gila was 197.[202] This is almost a doubling from the reported number of farms in 2002 (106).[203] In 2007 there were

[191] http://www.city-data.com/county/Gila_County-AZ.html, accessed 5/16/2013 4:00 pm.

[192] U.S. Department of Commerce. 2012. (1)

[193] U.S. Department of Commerce. 2012. (1)

[194] U.S. Department of Commerce. 2012. Census Bureau. (2)

[195] U.S. Department of Commerce. 2012. Census Bureau. (2)

[196] U.S. Department of Commerce. 2012. Bureau of Economic Analysis. (3)

[197] U.S. Department of Commerce. 2012. Bureau of Economic Analysis. (4)

[198] U.S. Geological Survey, Gap Analysis Program. 2012. (1)

[199] U.S. Geological Survey, Gap Analysis Program. 2012. (1)

[200] Theobald, DM. 2013.

[201] Theobald, DM. 2013.

[202] USDA, National Agriculture Statistics Service, 2007. (1)

[203] USDA, National Agriculture Statistics Service, 2007. (1)

8,587 cattle and calves compared to a 2002 census of 9,170.[204] The number of sheep and lambs in Gila County in 2007 was 285 and there is no data for 2002.[205] The number of farms grew from 2 in 2002 to 11 in 2007.[206]

In Gila County the game management units (GMU) with elk hunting are 5A, 6A, 22, 23, 24A, and 24B, the number of permits sold in 2012 for hunts including any of these GMUs was 4,830, while the estimated number of elk harvested in these 2012 hunts was 1,569. Only game management unit 23 is completely within the county.[207]

In 2011 Gila County had a total of 2,548 jobs related to the travel and tourism industry in the private sector.[208] This represents about 11.9 percent of the total jobs in the county. Since 1998, the county has lost 159 jobs in this sector.[209] Gila County contains Roosevelt Dam which is the world's highest masonry dam and half of the county consists of Gila National Forest.[210]

Graham County, AZ

Graham County is located in southeastern Arizona State and is 4,641 square miles in size.[211] The U.S. Census Bureau estimated the 2011 population of the county to be 36,720 persons.[212] County population grew a total of 9.6 percent over the previous decade compared to a national average of 8.9 percent.[213] Over 14 percent of the population is Native American with Whites making up the majority of the remainder.[214] 30.14 percent of the total population is Hispanic.[215]

Economic prosperity in Graham County is less than the national average. In 2011 Graham County had an annual unemployment rate of 10.4 percent compared to national average of 8.9 percent. Average earnings per job in the county in 2011 were $39,856 compared to a national average of $54,897 and per capita income was $25,745 compared to the national average of $42,433.[216]

Total employment in Graham County in 2011 was 11,343 jobs. This represented an 18.2 percent increase from 2001. There were 1,599 non-service jobs, 2,817 government jobs, and an estimated 6,934 jobs in the services-related industries. Since 2001, government jobs increased by 17 percent, service-related jobs

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[204] USDA, National Agriculture Statistics Service, 2007. (1)

[205] USDA, National Agriculture Statistics Service, 2007. (2)

[206] USDA, National Agriculture Statistics Service, 2007. (2)

[207] Arizona Game and Fish Department. Final results of the 2012 general, junior and muzzleloader elk questionnaire. Amber A. Munig, Big Game Management Supervisor. June 19, 2013.

[208] U.S. Department of Commerce. 2012. Census Bureau. (5)

[209] U.S. Department of Commerce. 2012. Census Bureau. (5)

[210] http://www.gilacountyaz.gov/, accessed 7/11/2013 9:28am.

[211] http://www.city-data.com/county/Graham_County-AZ.html accessed 5/16/2013 4:19 pm.

[212] U.S. Department of Commerce. 2012. (1)

[213] U.S. Department of Commerce. 2012. (1)

[214] U.S. Department of Commerce. 2012. Census Bureau. (2)

[215] U.S. Department of Commerce. 2012. Census Bureau. (2)

[216] U.S. Department of Commerce. 2012. Bureau of Economic Analysis. (3)

increased by 19 percent, and non-service jobs increased by zero percent. In 2001 the Bureau of Economic Analysis (BEA) reported 542 farming jobs and in 2011 BEA reported the number of jobs in the farming sector fell to 519, a decrease of four percent.[217]

Federal lands constitute 37.5 percent of the land base in Graham County.[218] The Forest Service manages 12.8 percent of the land, the Bureau of Land Management manages 24.7 percent of the land, and there was no data for the Park Service.[219] Over the ten years from 2000 to 2010, Graham County experienced a 46 percent increase in its level of private lands development (compared to a national average of 12 percent).[220] In 2010, approximately three percent of Graham County's Wildland-Urban Interface (WUI) had been developed.[221]

In 2007 the Census of Agriculture reported that the total number of cattle and calve farms in Graham was 117.[222] This represented a 44 percent increase from the reported number of farms in 2002 (123).[223] In 2007 there were 10,556 cattle and calves there is no data for the 2002 census.[224] The number of sheep and lambs in Graham County in 2007 was 119 and 15 in 2002.[225] The number of farms grew from four in 2002 to seven in 2007.[226]

In Graham County the game management units (GMU) with elk hunting are 28, 31, and 32, the number of permits sold in 2012 for hunts including any of these GMUs was 10, while the estimated number of elk harvested in these 2012 hunts was 2. No game management units are completely within the county.[227]

In 2011 Graham County had a total of 988 jobs related to the travel and tourism industry in the private sector.[228] This represents about 8.7 percent of the total jobs in the county. Since 1998, the county has lost 130 jobs in this sector.[229] A few of the attractions in Graham County are the Mt. Graham International Observatory, Roper Lake State Park and the Gila Box National Conservation Area.[230]

Grant County, NM

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[217] U.S. Department of Commerce. 2012. Bureau of Economic Analysis. (4)

[218] U.S. Geological Survey, Gap Analysis Program. 2012. (1)

[219] U.S. Geological Survey, Gap Analysis Program. 2012. (1)

[220] Theobald, DM. 2013.

[221] Theobald, DM. 2013.

[222] USDA, National Agriculture Statistics Service, 2007. (1)

[223] USDA, National Agriculture Statistics Service, 2007. (1)

[224] USDA, National Agriculture Statistics Service, 2007. (1)

[225] USDA, National Agriculture Statistics Service, 2007. (2)

[226] USDA, National Agriculture Statistics Service, 2007. (2)

[227] Arizona Game and Fish Department. Final results of the 2012 general, junior and muzzleloader elk questionnaire. Amber A. Munig, Big Game Management Supervisor. June 19, 2013.

[228] U.S. Department of Commerce. 2012. Census Bureau. (5)

[229] U.S. Department of Commerce. 2012. Census Bureau. (5)

[230] http://www.visitgrahamcounty.com/daytrips.html, accessed 7/11/2013 9:54 am

Grant County is located in the southwest corner in the State of New Mexico on the border with the State of Arizona, and is 3,968 square miles in size.[231] The U.S. Census Bureau estimated the 2011 population of the county to be 29,684 persons.[232] County population shrank by 4.3 percent over the previous decade compared to a national average growth of 8.9 percent.[233] Only two percent of the population is Native American with Whites making up the majority of the remainder.[234] 48.0 percent of the total population is Hispanic.[235]

Economic prosperity in Grant County is mixed when compared to the national averages. In 2011 Grant County had an annual unemployment rate of 7.8 percent compared to national average of 8.9 percent. Average earnings per job in the county in 2011 were $39,476 compared to a national average of $54,897 and per capita income was $33,544 compared to the national average of $42,433.[236]

Total employment in Grant County in 2011 was 13,395 jobs. This represented a 7.1 percent decrease from 2001. There were 2,721 non-service jobs, 3,760 government jobs, and an estimated 7,148 jobs in the services-related industries. Since 2001, government jobs increased by five percent, service-related jobs decreased by 11 percent, and non-service jobs increased by one percent. In 2001 the Bureau of Economic Analysis (BEA) reported 374 farming jobs and in 2011 BEA reported the number of jobs in the farming sector fell to 344, a decrease of 8 percent.[237]

Federal lands constitute 47.4 percent of the land base in Grant County.[238] The Forest Service manages 33.9 percent of the land, the Bureau of Land Management manages 13.4 percent of the land, and no data is available on the Park Service.[239] Over the ten years from 2000 to 2010, Grant County experienced a 48 percent increase in its level of private lands development (compared to a national average of 12 percent).[240] In 2010, approximately 8 percent of Grant County's Wildland-Urban Interface (WUI) had been developed.[241]

In 2007 the Census of Agriculture reported that the total number of cattle and calve farms in Grant was 211.[242] This represented a ten percent increase from the reported number of farms in 2002 (192).[243] In 2007 there were 25,399 cattle and calves compared to a 2002 census of 35,529.[244] The number of sheep

231 http://www.city-data.com/county/Grant_County-NM.html, accessed 5/17/2013 8:19 am.

232 U.S. Department of Commerce. 2012. (1)

233 U.S. Department of Commerce. 2012. (1)

234 U.S. Department of Commerce. 2012. Census Bureau. (2)

235 U.S. Department of Commerce. 2012. Census Bureau. (2)

236 U.S. Department of Commerce. 2012. Bureau of Economic Analysis. (3)

237 U.S. Department of Commerce. 2012. Bureau of Economic Analysis. (4)

238 U.S. Geological Survey, Gap Analysis Program. 2012. (1)

239 U.S. Geological Survey, Gap Analysis Program. 2012. (1)

240 Theobald, DM. 2013.

241 Theobald, DM. 2013.

242 USDA, National Agriculture Statistics Service, 2007. (1)

243 USDA, National Agriculture Statistics Service, 2007. (1)

244 USDA, National Agriculture Statistics Service, 2007. (1)

and lambs in Grant County in 2007 was 103 and 61 in 2002.[245] The number of farms grew from eight in 2002 to nine in 2007.[246]

In Grant County the game management units (GMU) with elk hunting are 16B, 21B, 23, and 24. The number of total licenses sold or converted in 2012 for these GMUs was 1,546, while the estimated number of elk harvested in 2012 was 427. No game management units were completely within the county.[247]

In 2011 Grant County had a total of 1,019 jobs related to the travel and tourism industry in the private sector.[248] This represents about 7.6 percent of the total jobs in the county. Since 1998, the county has lost 249 jobs in this sector.[249] Grant County attractions include Fort Bayard, the Aldo Leopold Wilderness Area in the Gila National Forest, and the Big Burros National Forest.[250][251][252]

Greenlee County, AZ

Greenlee County is located in south eastern in the State of Arizona and is 1,838 square miles in size.[253] The U.S. Census Bureau estimated the 2011 population of the county to be 8,472 persons.[254] County population shrank by 0.9 percent over the previous decade compared to a national average of growing by 8.9 percent.[255] Only 1.8 percent of the population is Native American with Whites making up the majority of the remainder.[256] 46.4 percent of the total population is Hispanic.[257]

Economic prosperity in Greenlee County is mixed when compared with the national averages. In 2011 Greenlee County had an annual unemployment rate of 8.2 percent compared to national average of 8.9 percent. Average earnings per job in the county in 2011 were $64,518 compared to a national average of $54,897 and per capita income was $31.991 compared to the national average of $42,433.[258]

Total employment in Greenlee County in 2011 was 4,496 jobs. This represented a 4.9 percent decrease from 2001. There were 444 non-service jobs, 578 government jobs, and an estimated 805 jobs in the services-related industries. Since 2001, government jobs increased by five percent, service-related jobs

[245] USDA, National Agriculture Statistics Service, 2007. (2)

[246] USDA, National Agriculture Statistics Service, 2007. (2)

[247] NMDGF 2012.

[248] U.S. Department of Commerce. 2012. Census Bureau. (5)

[249] U.S. Department of Commerce. 2012. Census Bureau. (5)

[250] http://www.fortbayard.org/, accessed 7/12/2013 2:27 pm.

[251] http://www.fs.usda.gov/recarea/gila/recarea/?recid=4826, accessed 7/12/2012 2:29 pm.

[252] http://www.fs.fed.us/, accessed 7/12/2013 2:30 pm.

[253] http://www.city-data.com/county/Greenlee_County-AZ.html, accessed 5/16/2013 4:25 pm

[254] U.S. Department of Commerce. 2012. (1)

[255] U.S. Department of Commerce. 2012. (1)

[256] U.S. Department of Commerce. 2012. Census Bureau. (2)

[257] U.S. Department of Commerce. 2012. Census Bureau. (2)

[258] U.S. Department of Commerce. 2012. Bureau of Economic Analysis. (3)

increased by two percent, and non-service jobs decreased by 42 percent. In 2001 the Bureau of Economic Analysis (BEA) reported 219 farming jobs and in 2011 BEA reported the number of jobs in the farming sector fell to 139, an decrease of nearly 37 percent.[259]

Federal lands constitute 77.2 percent of the land base in Greenlee County.[260] The Forest Service manages 63.3 percent of the land, the Bureau of Land Management manages 13.9 percent of the land, and there is no data for the Park Service.[261] Over the ten years from 2000 to 2010, Greenlee County experienced a 42 percent increase in its level of private lands development (compared to a national average of 12 percent).[262] In 2010, approximately 9 percent of Greenlee County's Wildland-Urban Interface (WUI) had been developed.[263]

In 2007 the Census of Agriculture reported that the total number of cattle and calve farms in Greenlee was 58.[264] This represented a 27 percent decrease from the reported number of farms in 2002 (79).[265] In 2007 there were 9,933 cattle and calves compared to a 2002 census of 7,581.[266] The number of sheep and lambs in Greenlee County in 2007 was 463 and 124 in 2002.[267] The number of farms grew from 5 in 2002 to 7 in 2007.[268]

In Greenlee County the game management units (GMU) with elk hunting are 27, and 28, the number of permits sold in 2012 for hunts including any of these GMUs was 1,040, while the estimated number of elk harvested in these 2012 hunts was 481. No game management units are completely within the county.[269]

In 2011 Greenlee County had a total of 189 jobs related to the travel and tourism industry in the private sector.[270] This represents about 4.2 percent of the total jobs in the county. Since 1998, the county has lost 72 jobs in this sector.[271] This county contains a part of the Apache-Sitgreaves National Forest.[272] Other

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[259] U.S. Department of Commerce. 2012. Bureau of Economic Analysis. (4)

[260] U.S. Geological Survey, Gap Analysis Program. 2012. (1)

[261] U.S. Geological Survey, Gap Analysis Program. 2012. (1)

[262] Theobald, DM. 2013.

[263] Theobald, DM. 2013.

[264] USDA, National Agriculture Statistics Service, 2007. (1)

[265] USDA, National Agriculture Statistics Service, 2007. (1)

[266] USDA, National Agriculture Statistics Service, 2007. (1)

[267] USDA, National Agriculture Statistics Service, 2007. (2)

[268] USDA, National Agriculture Statistics Service, 2007. (2)

[269] Arizona Game and Fish Department. Final results of the 2012 general, junior and muzzleloader elk questionnaire. Amber A. Munig, Big Game Management Supervisor. June 19, 2013.

[270] U.S. Department of Commerce. 2012. Census Bureau. (5)

[271] U.S. Department of Commerce. 2012. Census Bureau. (5)

[272] http://www.fs.usda.gov/asnf/, accessed 7/11/2013 10:26 am.

attractions in Greenlee County include the Coronado Trail, and numerous rail road history related locations.[273]

Hidalgo County, NM

Hidalgo County is located in the State of New Mexico and borders both Mexico and the State of Arizona, and is 3,446 square miles in size.[274] The U.S. Census Bureau estimated the 2011 population of the county to be 4,953 persons.[275] County population shrank by 16.5 percent over the previous decade compared to a national average of 8.9 percent.[276] Only 0.5 percent of the population is Native American with Whites making up the majority of the remainder.[277] 56.5 percent of the total population is Hispanic.[278]

Economic prosperity in Hidalgo County is mixed when compared with the national averages. In 2011 Hidalgo County had an annual unemployment rate of 6.6 percent compared to national average of 8.9 percent. Average earnings per job in the county in 2011 were $40,819 compared to a national average of $54,897 and per capita income was $33,106 compared to the national average of $42,433.[279]

Total employment in Hidalgo County in 2011 was 2,612 jobs. This represented a 14.8 percent increase from 2001. There were 251 non-service jobs, 717 government jobs, and an estimated 919 jobs in the services-related industries. Since 2001, government jobs increased by 33 percent, service-related jobs increased by 23 percent, and non-service jobs decreased by 13 percent. In 2001 the Bureau of Economic Analysis (BEA) reported 285 farming jobs and in 2011 BEA reported the number of jobs in the farming sector fell to 218, a decrease of nearly 24 percent.[280]

Federal lands constitute 41.6 percent of the land base in Hidalgo County.[281] The Forest Service manages 3.5 percent of the land, the Bureau of Land Management manages 38.1 percent of the land, and there is no data on Park Service managed land.[282] Over the ten years from 2000 to 2010, Hidalgo County experienced a 65 percent increase in its level of private lands development (compared to a national average of 12 percent).[283] In 2010 there is no data on what percent of Hidalgo County's Wildland-Urban Interface (WUI) had been developed.[284]

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[273] http://www.co.greenlee.az.us/pointsofinterest.aspx, accessed 7/11/2013 10:33 am.

[274] http://www.city-data.com/county/Hidalgo_County-NM.html, accessed 5/17/2013 8:26 am.

[275] U.S. Department of Commerce. 2012. (1)

[276] U.S. Department of Commerce. 2012. (1)

[277] U.S. Department of Commerce. 2012. Census Bureau. (2)

[278] U.S. Department of Commerce. 2012. Census Bureau. (2)

[279] U.S. Department of Commerce. 2012. Bureau of Economic Analysis. (3)

[280] U.S. Department of Commerce. 2012. Bureau of Economic Analysis. (4)

[281] U.S. Geological Survey, Gap Analysis Program. 2012. (1)

[282] U.S. Geological Survey, Gap Analysis Program. 2012. (1)

[283] Theobald, DM. 2013.

[284] Theobald, DM. 2013.

In 2007 the Census of Agriculture reported that the total number of cattle and calve farms in Hidalgo was 99.[285] This represented an eight percent increase from the reported number of farms in 2002 (92).[286] In 2007 there were 22,851 cattle and calves compared to a 2002 census of 27,459.[287] There is no data on the sheep and lambs in Hidalgo County in 2007 and 2002.[288] The number of farms grew from 2 in 2002 to 3 in 2007.[289]

In Hidalgo County the game management unit (GMU) with elk hunting is 23. The number of total licenses sold or converted in 2012 for this GMU was 413, while the estimated number of elk harvested in 2012 was 91. No game management units were completely within the county.[290]

In 2011 Hidalgo County had a total of 322 jobs related to the travel and tourism industry in the private sector.[291] This represents about 12.3 percent of the total jobs in the county. Since 1998, the county has lost 80 jobs in this sector.[292] Activities in Hidalgo County include bird watching and visiting the ghost towns of Shakespeare and Steins.[293]

Lincoln County, NM

Lincoln County is located in the south central New Mexico State and is 4,831 square miles in size.[294] The U.S. Census Bureau estimated the 2011 population of the county to be 20,476 persons.[295] County population grew a total of only 5.5 percent over the previous decade compared to a national average of 8.9 percent.[296] Only 1.2 percent of the population is Native American with Whites making up the majority of the remainder.[297] 29.4 percent of the total population is Hispanic.[298]

Economic prosperity in Lincoln County is mixed when compared with the national averages. In 2011 Lincoln County had an annual unemployment rate of 5.7 percent compared to national average of 8.9 percent. Average earnings per job in the county in 2011 were $29,915 compared to a national average of $54,897 and per capita income was $32,987 compared to the national average of $42,433.[299]

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[285] USDA, National Agriculture Statistics Service, 2007. (1)

[286] USDA, National Agriculture Statistics Service, 2007. (1)

[287] USDA, National Agriculture Statistics Service, 2007. (1)

[288] USDA, National Agriculture Statistics Service, 2007. (2)

[289] USDA, National Agriculture Statistics Service, 2007. (2)

[290] NMDGF 2012.

[291] U.S. Department of Commerce. 2012. Census Bureau. (5)

[292] U.S. Department of Commerce. 2012. Census Bureau. (5)

[293] http://www.hidalgocounty.org/index.php/visitors1/area-attractions/, accessed 7/12/2013 10:10 am.

[294] http://www.city-data.com/county/Lincoln_County-NM.html, accessed 5/17/2013 8:37 am.

[295] U.S. Department of Commerce. 2012. (1)

[296] U.S. Department of Commerce. 2012. (1)

[297] U.S. Department of Commerce. 2012. Census Bureau. (2)

[298] U.S. Department of Commerce. 2012. Census Bureau. (2)

[299] U.S. Department of Commerce. 2012. Bureau of Economic Analysis. (3)

Total employment in Lincoln County in 2011 was 11,256 jobs. This represented a 12.2 percent increase from 2001. There were 1,767 non-service jobs, 1,260 government jobs, and an estimated 8,246 jobs in the services-related industries. Since 2001, government jobs declined by seven percent, service-related jobs increased by 22 percent, and non-service jobs increased by two percent. In 2001 the Bureau of Economic Analysis (BEA) reported 465 farming jobs and in 2011 BEA reported the number of jobs in the farming sector fell to 407, a decrease of 13 percent.[300]

Federal lands constitute 35.4 percent of the land base in Lincoln County.[301] The Forest Service manages 12.8 percent of the land, the Bureau of Land Management manages 16.8 percent of the land, and there is no data on Park Service managed land.[302] Over the ten years from 2000 to 2010, Lincoln County experienced a 30 percent increase in its level of private lands development (compared to a national average of 12 percent).[303] In 2010, approximately 33 percent of Lincoln County's Wildland-Urban Interface (WUI) had been developed.[304]

In 2007 the Census of Agriculture reported that the total number of cattle and calve farms in Lincoln was 198.[305] This represented a five percent increase from the reported number of farms in 2002 (188).[306] In 2007 there were 31,874 cattle and calves compared to a 2002 census of 30,558.[307] The number of sheep and lambs in Lincoln County in 2007 was 13,099 and 25,795 in 2002.[308] The number of farms shrank from 43 in 2002 to 27 in 2007.[309]

In Lincoln County the game management units (GMU) with elk hunting are 18, 34, 36, 37, and 38. The number of total licenses sold or converted in 2012 for these GMUs was 4,221, while the estimated number of elk harvested in 2012 was 1,894. Only game management unit 37 is completely within the county.[310]

In 2011 Lincoln County had a total of 1,946 jobs related to the travel and tourism industry in the private sector.[311] This represents about 17.3 percent of the total jobs in the county. Since 1998, the county has gained 617 jobs in this sector.[312] Lincoln County is home to two state monuments, Historic Lincoln State

[300] U.S. Department of Commerce. 2012. Bureau of Economic Analysis. (4)

[301] U.S. Geological Survey, Gap Analysis Program. 2012. (1)

[302] U.S. Geological Survey, Gap Analysis Program. 2012. (1)

[303] Theobald, DM. 2013.

[304] Theobald, DM. 2013.

[305] USDA, National Agriculture Statistics Service, 2007. (1)

[306] USDA, National Agriculture Statistics Service, 2007. (1)

[307] USDA, National Agriculture Statistics Service, 2007. (1)

[308] USDA, National Agriculture Statistics Service, 2007. (2)

[309] USDA, National Agriculture Statistics Service, 2007. (2)

[310] NMDGF 2012.

[311] U.S. Department of Commerce. 2012. Census Bureau. (5)

[312] U.S. Department of Commerce. 2012. Census Bureau. (5)

Monument and Fort Stanton State Monument. Ski Apache is a popular winter destination. The county is also home to the Valley of Fire Recreation Area and Snowy River Cave Recreation Area.[313]

Luna County, NM

Luna County is located in the State of New Mexico on the border with Mexico and is 2,965 square miles in size.[314] The U.S. Census Bureau estimated the 2011 population of the county to be 25,250 persons.[315] County population grew a total of only 0.9 percent over the previous decade compared to a national average of 8.9 percent.[316] Only 1.1 percent of the population is Native American with Whites making up the majority of the remainder.[317] 60.8 percent of the total population is Hispanic.[318]

Economic prosperity in Luna County is less than the national average. In 2011 Luna County had an annual unemployment rate of 17.9 percent compared to national average of 8.9 percent. Average earnings per job in the county in 2011 were $43,431 compared to a national average of $54,897 and per capita income was $29,954 compared to the national average of $42,433.[319]

Total employment in Luna County in 2011 was 10,118 jobs. This represented a 21.2 percent increase from 2001. There were 1,749 non-service jobs, 2,283 government jobs, and an estimated 4,392 jobs in the services-related industries. Since 2001, government jobs increased by 29 percent, service-related jobs increased by 29 percent, and non-service jobs decreased by two percent. In 2001 the Bureau of Economic Analysis (BEA) reported 400 farming jobs and in 2011 BEA reported the number of jobs in the farming sector fell to 372, a decrease of seven percent.[320]

Federal lands constitute 40.1 percent of the land base in Luna County.[321] There is no data on Forest Service managed land, the Bureau of Land Management manages 40.0 percent of the land, and there is no data on Park Service managed land.[322] Over the ten years from 2000 to 2010, Luna County experienced a 27 percent increase in its level of private lands development (compared to a national average of 12 percent).[323] In 2010, approximately two percent of Luna County's Wildland-Urban Interface (WUI) had been developed.[324]

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[313] http://www.lincolncountynm.net/visitors/index.php, accessed 7/12/2013 10:07 am.

[314] http://www.city-data.com/county/Luna_County-NM.html, accessed 5/17/2013 8:40 am.

[315] U.S. Department of Commerce. 2012. (1)

[316] U.S. Department of Commerce. 2012. (1)

[317] U.S. Department of Commerce. 2012. Census Bureau. (2)

[318] U.S. Department of Commerce. 2012. Census Bureau. (2)

[319] U.S. Department of Commerce. 2012. Bureau of Economic Analysis. (3)

[320] U.S. Department of Commerce. 2012. Bureau of Economic Analysis. (4)

[321] U.S. Geological Survey, Gap Analysis Program. 2012. (1)

[322] U.S. Geological Survey, Gap Analysis Program. 2012. (1)

[323] Theobald, DM. 2013.

[324] Theobald, DM. 2013.

In 2007 the Census of Agriculture reported that the total number of cattle and calve farms in Luna was 77.[325] This represented a 13 percent decrease from the reported number of farms in 2002 (89).[326] In 2007 there were 23,857 cattle and calves compared to a 2002 census of 32,190.[327] The number of sheep and lambs in Luna County in 2007 was 21 and there was no data for 2002.[328] The number of farms grew from 1 in 2002 to 3 in 2007.[329]

In Luna County the game management units (GMU) with elk hunting are 21B, 23, and 24. The number of total licenses sold or converted in 2012 for these GMUs was 809, while the estimated number of elk harvested in 2012 was 247. No game management units were completely within the county.[330]

In 2011 Luna County had a total of 1,062 jobs related to the travel and tourism industry in the private sector.[331] This represents about 10.5 percent of the total jobs in the county. Since 1998, the county has gained 311 jobs in this sector.[332] Luna County's main attractions are local wineries, and state parks, including Pancho Villa, Rockhound, Spring Canyon.[333]

Maricopa County, AZ

Maricopa County is located in the south central Arizona State and is 9,224 square miles in size.[334] The U.S. Census Bureau estimated the 2011 population of the county to be 3,798,374 persons.[335] County population grew a total of 23.6 percent over the previous decade compared to a national average of 8.9 percent.[336] Only two percent of the population is Native American with Whites making up the majority of the remainder.[337] 29.4 percent of the total population is Hispanic.[338]

Economic prosperity in Maricopa County is comparable to the national average. In 2011 Maricopa County had an annual unemployment rate of 8.4 percent compared to national average of 8.9 percent. Average earnings per job in the county in 2011 were $53,112 compared to a national average of $54,897 and per capita income was $38,870 compared to the national average of $42,433.[339]

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[325] USDA, National Agriculture Statistics Service, 2007. (1)

[326] USDA, National Agriculture Statistics Service, 2007. (1)

[327] USDA, National Agriculture Statistics Service, 2007. (1)

[328] USDA, National Agriculture Statistics Service, 2007. (2)

[329] USDA, National Agriculture Statistics Service, 2007. (2)

[330] NMDGF 2012.

[331] U.S. Department of Commerce. 2012. Census Bureau. (5)

[332] U.S. Department of Commerce. 2012. Census Bureau. (5)

[333] http://www.lunacountynm.us/Local%20Attractions.html, accessed 7/12/2013 10:01 am.

[334] http://www.city-data.com/county/Maricopa_County-AZ.html, accessed 5/16/2013 4:38 pm.

[335] U.S. Department of Commerce. 2012. (1)

[336] U.S. Department of Commerce. 2012. (1)

[337] U.S. Department of Commerce. 2012. Census Bureau. (2)

[338] U.S. Department of Commerce. 2012. Census Bureau. (2)

[339] U.S. Department of Commerce. 2012. Bureau of Economic Analysis. (3)

Total employment in Maricopa County in 2011 was 2,180,128 jobs. This represented a 14.9 percent increase from 2001. There were 241,424 non-service jobs, 226,099 government jobs, and an estimated 1,712,605 jobs in the services-related industries. Since 2001, government jobs increasing by 16 percent, service-related jobs increased by 24 percent, and non-service jobs decreased by 25 percent. In 2001 the Bureau of Economic Analysis (BEA) reported 8,437 farming jobs and in 2011 BEA reported the number of jobs in the farming sector fell to 5,672, a decrease of nearly 33 percent.[340]

Federal lands constitute 52.9 percent of the land base in Maricopa County.[341] The Forest Service manages 11.0 percent of the land, the Bureau of Land Management manages 29.1 percent of the land, and the Park Service shows no data.[342] Over the ten years from 2000 to 2010, Maricopa County experienced a 34 percent increase in its level of private lands development (compared to a national average of 12 percent).[343] In 2010, approximately 12 percent of Maricopa County's Wildland-Urban Interface (WUI) had been developed.[344]

In 2007 the Census of Agriculture reported that the total number of cattle and calve farms in Maricopa was 578.[345] This represented ten percent increase from the reported number of farms in 2002 (525).[346] In 2007 there were 167,262 cattle and calves compared to a 2002 census of 203,382.[347] There is no data for the number of sheep and lambs in Maricopa County in 2007 or in 2002.[348] The number of farms shrank from 96 in 2002 to 74 in 2007.[349]

In Maricopa County the game management units (GMU) with elk hunting are 20B, 21, 22, 24B, 25M, 26M, 39, 40B, 41, 42, and 44A, the number of permits sold in 2012 for hunts including any of these GMUs was 330, while the estimated number of elk harvested in these 2012 hunts was 173. Only game management unit 25M is completely within the county.[350]

In 2011 Maricopa County had a total of 234,773 jobs related to the travel and tourism industry in the private sector.[351] This represents about 10.8 percent of the total jobs in the county. Since 1998, the

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[340] U.S. Department of Commerce. 2012. Bureau of Economic Analysis. (4)

[341] U.S. Geological Survey, Gap Analysis Program. 2012. (1)

[342] U.S. Geological Survey, Gap Analysis Program. 2012. (1)

[343] Theobald, DM. 2013.

[344] Theobald, DM. 2013.

[345] USDA, National Agriculture Statistics Service, 2007. (1)

[346] USDA, National Agriculture Statistics Service, 2007. (1)

[347] USDA, National Agriculture Statistics Service, 2007. (1)

[348] USDA, National Agriculture Statistics Service, 2007. (2)

[349] USDA, National Agriculture Statistics Service, 2007. (2)

[350] Arizona Game and Fish Department. Final results of the 2012 general, junior and muzzleloader elk questionnaire. Amber A. Munig, Big Game Management Supervisor. June 19, 2013.

[351] U.S. Department of Commerce. 2012. Census Bureau. (5)

county has gained 52,629 jobs in this sector.[352] Maricopa County is home to the Wildlife World Zoo & Aquarium and Papago Park.[353][354]

McKinley County, NM

McKinley County is located in north western New Mexico State on the border with Arizona and is 5,456 square miles in size.[355] The U.S. Census Bureau estimated the 2011 population of the county to be 71,290 persons.[356] County population shrank by 4.7 percent over the previous decade compared to a national average of an 8.9 percent growth rate.[357] 74 percent of the population is Native American with Whites making up the majority of the remainder.[358] 13.6 percent of the total population is Hispanic.[359]

Economic prosperity in McKinley County is less than the national average. In 2011 McKinley County had an annual unemployment rate of 9.2 percent compared to national average of 8.9 percent. Average earnings per job in the county in 2011 were $35,125 compared to a national average of $54,897 and per capita income was $24,585 compared to the national average of $42,433.[360]

Total employment in McKinley County in 2011 was 30,142 jobs. This represented a 13.3 percent increase from 2001. There were 5,197 non-service jobs, 7,977 government jobs, and an estimated 17,159 jobs in the services-related industries. Since 2001, government jobs increased by six percent, service-related jobs increased by 12 percent, and non-service jobs increased by 82 percent. In 2001 the Bureau of Economic Analysis (BEA) reported 238 farming jobs and in 2011 BEA reported the number of jobs in the farming sector rose to 2,733, an increase of 1,048 percent.[361]

Federal lands constitute 13.2 percent of the land base in McKinley County.[362] The Forest Service manages 5.5 percent of the land, the Bureau of Land Management manages 7.1 percent of the land, and the Park Service manages 0.1 percent of the land.[363] Over the ten years from 2000 to 2010, McKinley County experienced a 48 percent increase in its level of private lands development (compared to a national average of 12 percent).[364] In 2010, approximately three percent of McKinley County's Wildland-Urban Interface (WUI) had been developed.[365]

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352 U.S. Department of Commerce. 2012. Census Bureau. (5)

353 http://www.wildlifeworld.com/, accessed 7/12/2013 11:05am.

354 http://phoenix.gov/parks/trails/locations/papago/, accessed 7/12/2013 11:09 am.

355 http://www.city-data.com/county/McKinley_County-NM.html, accessed 5/17/2013 8:44 am.

356 U.S. Department of Commerce. 2012. (1)

357 U.S. Department of Commerce. 2012. (1)

358 U.S. Department of Commerce. 2012. Census Bureau. (2)

359 U.S. Department of Commerce. 2012. Census Bureau. (2)

360 U.S. Department of Commerce. 2012. Bureau of Economic Analysis. (3)

361 U.S. Department of Commerce. 2012. Bureau of Economic Analysis. (4)

362 U.S. Geological Survey, Gap Analysis Program. 2012. (1)

363 U.S. Geological Survey, Gap Analysis Program. 2012. (1)

364 Theobald, DM. 2013.

365 Theobald, DM. 2013.

In 2007 the Census of Agriculture reported that the total number of cattle and calve farms in McKinley was 1,421.[366] This represented a 1,533 percent increase from the reported number of farms in 2002 (87).[367] In 2007 there were 33,863 cattle and calves compared to a 2002 census of 20,951.[368] The number of sheep and lambs in McKinley County in 2007 was 41,991 and 20,216 in 2002.[369] The number of farms grew from 30 in 2002 to 1,412 in 2007.[370]

In McKinley County the game management units (GMU) with elk hunting are 7, 9, 10, and 12. The number of total licenses sold or converted in 2012 for these GMUs was 3,417, while the estimated number of elk harvested in 2012 was 1,066. No game management units were completely within the county.[371]

In 2011 McKinley County had a total of 4,016 jobs related to the travel and tourism industry in the private sector.[372] This represents about 13.3 percent of the total jobs in the county. Since 1998, the county has gained 652 jobs in this sector.[373] McKinley County attractions include the Cibola, Mount Taylor, and Zuni National Forests.[374]

Mohave County, AZ

Mohave County is located in northwestern in the Arizona State and is 13,470 square miles in size.[375] The U.S. Census Bureau estimated the 2011 population of the county to be 200,690 persons.[376] County population grew a total of 29.5 percent over the previous decade compared to a national average of 8.9 percent.[377] Only two percent of the population is Native American with Whites making up the majority of the remainder.[378] 14.7 percent of the total population is Hispanic.[379]

Economic prosperity in Mohave County is less than the national average. In 2011 Mohave County had an annual unemployment rate of 11.0 percent compared to national average of 8.9 percent. Average earnings per job in the county in 2011 were $38,589 compared to a national

[366] USDA, National Agriculture Statistics Service, 2007. (1)

[367] USDA, National Agriculture Statistics Service, 2007. (1)

[368] USDA, National Agriculture Statistics Service, 2007. (1)

[369] USDA, National Agriculture Statistics Service, 2007. (2)

[370] USDA, National Agriculture Statistics Service, 2007. (2)

[371] NMDGF 2012.

[372] U.S. Department of Commerce. 2012. Census Bureau. (5)

[373] U.S. Department of Commerce. 2012. Census Bureau. (5)

[374] http://www.fs.fed.us/, accessed 7/12/2013 2:15 pm.

[375] http://www.city-data.com/county/Mohave_County-AZ.html, accessed 5/16/2013 4:43 pm.

[376] U.S. Department of Commerce. 2012. (1)

[377] U.S. Department of Commerce. 2012. (1)

[378] U.S. Department of Commerce. 2012. Census Bureau. (2)

[379] U.S. Department of Commerce. 2012. Census Bureau. (2)

average of $54,897 and per capita income was $26,694 compared to the national average of $42,433.[380]

Total employment in Mohave County in 2011 was 62,316 jobs. This represented an 11.3 percent increase from 2001. There were 7,856 non-service jobs, 8,452 government jobs, and an estimated 46,008 jobs in the services-related industries. Since 2001, government jobs increased by nearly nine percent, service-related jobs increased by 23 percent, and non-service jobs increased by 28 percent. In 2001 the Bureau of Economic Analysis (BEA) reported 417 farming jobs and in 2011 BEA reported the number of jobs in the farming sector rose to 537, an increase of 29 percent.[381]

Federal lands constitute 71.4 percent of the land base in Mohave County.[382] The Forest Service manages 0.1 percent of the land, the Bureau of Land Management manages 55.7 percent of the land, and the Park Service manages 3.4 percent of the land.[383] Over the ten years from 2000 to 2010, Mohave County experienced a 46 percent increase in its level of private lands development (compared to a national average of 12 percent).[384] In 2010, approximately 4 percent of Mohave County's Wildland-Urban Interface (WUI) had been developed.[385]

In 2007 the Census of Agriculture reported that the total number of cattle and calve farms in Mohave was 198.[386] This represented 42 percent increase from the reported number of farms in 2002 (139).[387] In 2007 there was no data on cattle and calves in the 2002 census there were 15,488.[388] The number of sheep and lambs in Mohave County in 2007 was 500 and 86 in 2002.[389] The number of farms grew from 9 in 2002 to 25 in 2007.[390]

In Mohave County the game management units (GMU) with elk hunting are 13A, 13B, 15A, 15BE, 15BW, 15C, 15D, 16A, 16B, 18A and 18B, the number of permits sold in 2012 for hunts including any of these GMUs was 1,062, while the estimated number of elk harvested in these

U.S. Department of Commerce. 2012. Bureau of Economic Analysis. (3)

381 U.S. Department of Commerce. 2012. Bureau of Economic Analysis. (4)

382 U.S. Geological Survey, Gap Analysis Program. 2012. (1)

383 U.S. Geological Survey, Gap Analysis Program. 2012. (1)

384 Theobald, DM. 2013.

385 Theobald, DM. 2013.

386 USDA, National Agriculture Statistics Service, 2007. (1)

387 USDA, National Agriculture Statistics Service, 2007. (1)

388 USDA, National Agriculture Statistics Service, 2007. (1)

389 USDA, National Agriculture Statistics Service, 2007. (2)

390 USDA, National Agriculture Statistics Service, 2007. (2)

2012 hunts was 148. Game management unit 13A, 13B, 15A, 15BE, 15BW, 15C, 15D, and 16B are completely within the county.[391]

In 2011 Mohave County had a total of 8,196 jobs related to the travel and tourism industry in the private sector.[392] This represents about 13.2 percent of the total jobs in the county. Since 1998, the county has gained 1,883 jobs in this sector.[393] Grand Canyon is one of the largest tourist attractions in the county.[394] Other attractions are Topock Marsh, Hoover Dam and the London Bridge.[395][396][397]

Navajo County, AZ

Navajo County is located in northeastern Arizona State and is 9,959 square miles in size.[398] The U.S. Census Bureau estimated the 2011 population of the county to be 107,418 persons.[399] County population grew a total of 10.2 percent over the previous decade compared to a national average of 8.9 percent.[400] Almost 43 percent of the population is Native American with Whites making up the majority of the remainder.[401] 10.7 percent of the total population is Hispanic.[402]

Economic prosperity in Navajo County is less than the national average. In 2011 Navajo County had an annual unemployment rate of 15.8 percent compared to national average of 8.9 percent. Average earnings per job in the county in 2011 were $38,875 compared to a national average of $54,897 and per capita income was $26,091 compared to the national average of $42,433.[403]

Total employment in Navajo County in 2011 was 38,538 jobs. This represented a 10.5 percent increase from 2001. There were 6,477 non-service jobs, 10,080 government jobs, and an estimated 21,981 jobs in the services-related industries. Since 2001, government jobs declined by ten percent, service-related jobs increased by 20 percent, and non-service jobs increased by 25 percent. In 2001 the Bureau of Economic

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[391] Arizona Game and Fish Department. Final results of the 2012 general, junior and muzzleloader elk questionnaire. Amber A. Munig, Big Game Management Supervisor. June 19, 2013.

[392] U.S. Department of Commerce. 2012. Census Bureau. (5)

[393] U.S. Department of Commerce. 2012. Census Bureau. (5)

[394] http://www.nps.gov/grca/index.htm, accessed 7/11/2013 9:25 am.

[395] http://www.ohranger.com/havasu-nwr/poi/topock-marsh-fishing-area, accessed 7/12/2013 11:20 am.

[396] http://www.usbr.gov/lc/hooverdam/, accessed 7/12/2013 11:22 am.

[397] http://www.golakehavasu.com/about-us/about-havasu/london_bridge1.aspx, accessed 7/12/2013 11:25 am.

[398] http://www.city-data.com/county/Navajo_County-AZ.html, accessed 5/16/2013 4:50 pm.

[399] U.S. Department of Commerce. 2012. (1)

[400] U.S. Department of Commerce. 2012. (1)

[401] U.S. Department of Commerce. 2012. Census Bureau. (2)

[402] U.S. Department of Commerce. 2012. Census Bureau. (2)

[403] U.S. Department of Commerce. 2012. Bureau of Economic Analysis. (3)

Analysis (BEA) reported 556 farming jobs and in 2011 BEA reported the number of jobs in the farming sector rose to 3,129, an increase of nearly 463 percent.[404]

Federal lands constitute 9.5 percent of the land base in Navajo County.[405] The Forest Service manages 7.6 percent of the land, the Bureau of Land Management manages 1.4 percent of the land, and the Park Service manages 0.4 percent of the land.[406] Over the ten years from 2000 to 2010, Navajo County experienced a 44 percent increase in its level of private lands development (compared to a national average of 12 percent).[407] In 2010, approximately 26 percent of Navajo County's Wildland-Urban Interface (WUI) had been developed.[408]

In 2007 the Census of Agriculture reported that the total number of cattle and calve farms in Navajo was 1,756.[409] This represented an increase of 748 percent from the reported number of farms in 2002 (207).[410] In 2007 there were 27,500 cattle and calves compared to a 2002 census of 22,179.[411] The number of sheep and lambs in Navajo County in 2007 was 29,597 and no data in 2002.[412] The number of farms grew from 28 in 2002 to 1,521 in 2007, a 5332 percent increase.[413]

In Navajo County the game management units (GMU) with elk hunting are 2A, 3A, 3B, 3C, 4A, 4B, and 5A, the number of permits sold in 2012 for hunts including any of these GMUs was 4,375, while the estimated number of elk harvested in these 2012 hunts was 1,450. No game management units are completely within the county.[414]

In 2011 Navajo County had a total of 4,416 jobs related to the travel and tourism industry in the private sector.[415] This represents about 11.5 percent of the total jobs in the county. Since 1998, the county has gained 883 jobs in this sector.[416] This county contains a part of the Apache-Sitgreaves National Forest.[417] Also located in Navajo County is the ghost town of Brigham City and a historic Wigwam Village Motel.[418][419]

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404 U.S. Department of Commerce. 2012. Bureau of Economic Analysis. (4)

405 U.S. Geological Survey, Gap Analysis Program. 2012. (1)

406 U.S. Geological Survey, Gap Analysis Program. 2012. (1)

407 Theobald, DM. 2013.

408 Theobald, DM. 2013.

409 USDA, National Agriculture Statistics Service, 2007. (1)

410 USDA, National Agriculture Statistics Service, 2007. (1)

411 USDA, National Agriculture Statistics Service, 2007. (1)

412 USDA, National Agriculture Statistics Service, 2007. (2)

413 USDA, National Agriculture Statistics Service, 2007. (2)

414 Arizona Game and Fish Department. Final results of the 2012 general, junior and muzzleloader elk questionnaire. Amber A. Munig, Big Game Management Supervisor. June 19, 2013.

415 U.S. Department of Commerce. 2012. Census Bureau. (5)

416 U.S. Department of Commerce. 2012. Census Bureau. (5)

417 http://www.fs.usda.gov/asnf/, accessed 7/11/2013 10:26 am.

418 http://brighamcityproject.blogspot.com/, accessed 7/12/2013 11:13am.

Otero County, NM

Otero County is located in southern New Mexico State on the border with Texas and is 6,628 square miles in size.[420] The U.S. Census Bureau estimated the 2011 population of the county to be 63,494 persons.[421] County population grew a total of only 1.9 percent over the previous decade compared to a national average of 8.9 percent.[422] 6.7 percent of the population is Native American with Whites making up the majority of the remainder.[423] 34.3 percent of the total population is Hispanic.[424]

Economic prosperity in Otero County is mixed when compared to the national averages. In 2011 Otero County had an annual unemployment rate of 6.6 percent compared to national average of 8.9 percent. Average earnings per job in the county in 2011 were $49,661 compared to a national average of $54,897 and per capita income was $30,787 compared to the national average of $42,433.[425]

Total employment in Otero County in 2011 was 28,642 jobs. This represented a 7.4 percent increase from 2001. There were 2,968 non-service jobs, 11,244 government jobs, and an estimated 14,956 jobs in the services-related industries. Since 2001, government jobs increased by eight percent, service-related jobs increased by 13 percent, and non-service jobs decreased by two percent. In 2001 the Bureau of Economic Analysis (BEA) reported 770 farming jobs and in 2011 BEA reported the number of jobs in the farming sector rose to 585, a decrease of 24 percent.[426]

Federal lands constitute 70.0 percent of the land base in Otero County.[427] The Forest Service manages 13.2 percent of the land, the Bureau of Land Management manages 36.1 percent of the land, and the Park Service manages 2.2 percent of the land.[428] Over the ten years from 2000 to 2010, Otero County experienced a 30 percent increase in its level of private lands development (compared to a national average of 12 percent).[429] In 2010, approximately 51 percent of Otero County's Wildland-Urban Interface (WUI) had been developed.[430]

In 2007 the Census of Agriculture reported that the total number of cattle and calve farms in Otero was 185.[431] This represented an eight percent decrease from the reported number of farms in 2002 (200).[432] In

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419 http://www.nps.gov/nr/travel/route66/wigwam_village_hotel6_holbrook.html, accessed 7/12/2013 11:16 am.

420 http://www.city-data.com/county/Otero_County-NM.html, accessed 5/17/2013 8:46 am

421 U.S. Department of Commerce. 2012. (1)

422 U.S. Department of Commerce. 2012. (1)

423 U.S. Department of Commerce. 2012. Census Bureau. (2)

424 U.S. Department of Commerce. 2012. Census Bureau. (2)

425 U.S. Department of Commerce. 2012. Bureau of Economic Analysis. (3)

426 U.S. Department of Commerce. 2012. Bureau of Economic Analysis. (4)

427 U.S. Geological Survey, Gap Analysis Program. 2012. (1)

428 U.S. Geological Survey, Gap Analysis Program. 2012. (1)

429 Theobald, DM. 2013.

430 Theobald, DM. 2013.

431 USDA, National Agriculture Statistics Service, 2007. (1)

432 USDA, National Agriculture Statistics Service, 2007. (1)

2007 there were 16,657 cattle and calves compared to a 2002 census of 16,833.[433] The number of sheep and lambs in Otero County in 2007 was 5,343 and 9,168 in 2002.[434] The number of farms shrank from 56 in 2002 to 34 in 2007.[435]

In Otero County the game management units (GMU) with elk hunting are 28, 30, 34, and 36. The number of total licenses sold or converted in 2012 for these GMUs was 3,797, while the estimated number of elk harvested in 2012 was 1,775. Only game management unit 28 is completely within the county.[436]

In 2011 Otero County had a total of 4,186 jobs related to the travel and tourism industry in the private sector.[437] This represents about 14.6 percent of the total jobs in the county. Since 1998, the county has gained 1,133 jobs in this sector.[438] Otero County attractions include four national forests, the White Sands National Monument and the National Solar Observatory.[439][440][441]

Pima County, AZ

Pima County is located on the border with Mexico in the State of Arizona and is 9,189 square miles in size.[442] The U.S. Census Bureau estimated the 2011 population of the county to be 974,181 persons.[443] County population grew a total of 15.5 percent over the previous decade compared to a national average of 8.9 percent.[444] Three percent of the population is Native American with Whites making up the majority of the remainder.[445] 34.1 percent of the total population is Hispanic.[446]

Economic prosperity in Pima County is less than the national average. In 2011 Pima County had an annual unemployment rate of 8.3 percent compared to national average of 8.9 percent. Average earnings per job in the county in 2011 were $46,384 compared to a national average of $54,897 and per capita income was $35,695 compared to the national average of $42,433.[447]

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[433] USDA, National Agriculture Statistics Service, 2007. (1)

[434] USDA, National Agriculture Statistics Service, 2007. (2)

[435] USDA, National Agriculture Statistics Service, 2007. (2)

[436] NMDGF 2012.

[437] U.S. Department of Commerce. 2012. Census Bureau. (5)

[438] U.S. Department of Commerce. 2012. Census Bureau. (5)

[439] http://www.fs.fed.us/, accessed 7/12/2013 1:51 pm.

[440] http://www.nps.gov/whsa/index.htm, accessed 7/12/2013 1:49 pm.

[441] http://www.nso.edu/, accessed 7/12/2013 1:46 pm.

[442] http://www.city-data.com/county/Pima_County-AZ.html, accessed 5/16/2013 5:04 pm.

[443] U.S. Department of Commerce. 2012. (1)

[444] U.S. Department of Commerce. 2012. (1)

[445] U.S. Department of Commerce. 2012. Census Bureau. (2)

[446] U.S. Department of Commerce. 2012. Census Bureau. (2)

[447] U.S. Department of Commerce. 2012. Bureau of Economic Analysis. (3)

Total employment in Pima County in 2011 was 479,306 jobs. This represented a 9.0 percent increase from 2001. There were 52,487 non-service jobs, 83,145 government jobs, and an estimated 343,674 jobs in the services-related industries. Since 2001, government jobs increased by three percent, service-related jobs increased by 18 percent, and non-service jobs decreased by 23 percent. In 2001 the Bureau of Economic Analysis (BEA) reported 1,192 farming jobs and in 2011 BEA reported the number of jobs in the farming sector fell to 1,086, a decrease of nine percent.[448]

Federal lands constitute 30.9 percent of the land base in Pima County.[449] The Forest Service manages 5.6 percent of the land, the Bureau of Land Management manages 7.3 percent of the land, and the Park Service manages 7.2 percent of the land.[450] Over the ten years from 2000 to 2010, Pima County experienced a 26 percent increase in its level of private lands development (compared to a national average of 12 percent).[451] In 2010, approximately 17 percent of Pima County's Wildland-Urban Interface (WUI) had been developed.[452]

In 2007 the Census of Agriculture reported that the total number of cattle and calve farms in Pima was 250.[453] This represented 35 percent increase from the reported number of farms in 2002 (185).[454] In 2007 there were 19,701 cattle and calves compared to a 2002 census of 26,010.[455] The number of sheep and lambs in Pima County in 2007 was 759 and 520 in 2002.[456] The number of farms shrank from 28 in 2002 to 27 in 2007.[457]

In Pima County the game management units (GMU) with elk hunting are 32, 33, 34A, 34B, 36A, 36B, 36C, 37A, 38M, 40A and 46, there were zero permits sold in 2012 for hunts including any of these GMUs, while the estimated number of elk harvested in these 2012 hunts was zero. Game management units 36A, 36C, 37A, 38M, and 46A are completely within the county.[458]

In 2011 Pima County had a total of 58,155 jobs related to the travel and tourism industry in the private sector.[459] This represents about 12.1 percent of the total jobs in the county. Since 1998, the county has

[448] U.S. Department of Commerce. 2012. Bureau of Economic Analysis. (4)

[449] U.S. Geological Survey, Gap Analysis Program. 2012. (1) (1)

[450] U.S. Geological Survey, Gap Analysis Program. 2012. (1) (1)

[451] Theobald, DM. 2013.

[452] Theobald, DM. 2013.

[453] USDA, National Agriculture Statistics Service, 2007. (1)

[454] USDA, National Agriculture Statistics Service, 2007. (1)

[455] USDA, National Agriculture Statistics Service, 2007. (1)

[456] USDA, National Agriculture Statistics Service, 2007. (2)

[457] USDA, National Agriculture Statistics Service, 2007. (2)

[458] Arizona Game and Fish Department. Final results of the 2012 general, junior and muzzleloader elk questionnaire. Amber A. Munig, Big Game Management Supervisor. June 19, 2013.

[459] U.S. Department of Commerce. 2012. Census Bureau. (5)

gained 10,033 jobs in this sector.[460] A sampling of the attraction in Pima County is the Colossal Cave Mountain Park, Old Tucson Studios, Pima Air and Space Museum, and Tanque Verde Falls.[461][462]

Pinal County, AZ

Pinal County is located in south central Arizona State and is 5,375 square miles in size.[463] The U.S. Census Bureau estimated the 2011 population of the county to be 351,709 persons.[464] County population grew a total of 95.7 percent over the previous decade compared to a national average of 8.9 percent.[465] Five percent of the population is Native American with Whites making up the majority of the remainder.[466] 28.8 percent of the total population is Hispanic.[467]

Economic prosperity in Pinal County is less than the national average. In 2011 Pinal County had an annual unemployment rate of 10.3 percent compared to national average of 8.9 percent. Average earnings per job in the county in 2011 were $44,252 compared to a national average of $54,897 and per capita income was $24,797 compared to the national average of $42,433.[468]

Total employment in Pinal County in 2011 was 75,214 jobs. This represented a 46.1 percent increase from 2001. There were 10,816 non-service jobs, 20,712 government jobs, and an estimated 43,686 jobs in the services-related industries. Since 2001, government jobs increased by 26 percent, service-related jobs increased by 78 percent, and non-service jobs increased by 11 percent. In 2001 the Bureau of Economic Analysis (BEA) reported 2,348 farming jobs and in 2011 BEA reported the number of jobs in the farming sector fell to 2,213, a decrease of six percent.[469]

Federal lands constitute 19.5 percent of the land base in Pinal County.[470] The Forest Service manages 6.4 percent of the land, the Bureau of Land Management manages 11.2 percent of the land, and the Park Service manages zero percent of the land.[471] Over the ten years from 2000 to 2010, Pinal County experienced a 76 percent increase in its level of private lands development (compared to a national

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460 U.S. Department of Commerce. 2012. Census Bureau. (5)

461 http://www.pimacountyattractions.com/Attractions.html, accessed 7/11/2013, 9:58 am.

462 http://www.experience-az.com/adventures/hike/tanqueverdefalls/tanqueverdefalls.html, accessed 7/12/2013 11:35 am.

463 http://www.city-data.com/county/Pinal_County-AZ.html, accessed 5/16/2013 5:10 pm.

464 U.S. Department of Commerce. 2012. (1)

465 U.S. Department of Commerce. 2012. (1)

466 U.S. Department of Commerce. 2012. Census Bureau. (2)

467 U.S. Department of Commerce. 2012. Census Bureau. (2)

468 U.S. Department of Commerce. 2012. Bureau of Economic Analysis. (3)

469 U.S. Department of Commerce. 2012. Bureau of Economic Analysis. (4)

470 U.S. Geological Survey, Gap Analysis Program. 2012. (1)

471 U.S. Geological Survey, Gap Analysis Program. 2012. (1)

average of 12 percent).[472] In 2010, approximately 10 percent of Pinal County's Wildland-Urban Interface (WUI) had been developed.[473]

In 2007 the Census of Agriculture reported that the total number of cattle and calve farms in Pinal was 265.[474] This represented 17 percent increase from the reported number of farms in 2002 (226).[475] In 2007 there were 397,517 cattle and calves compared to a 2002 census of 241,360.[476] The number of sheep and lambs in Pinal County in 2002 was 9,841 and in 2002 there was no data.[477] The number of farms grew from 32 in 2002 to 35 in 2007.[478]

In Pinal County the game management units (GMU) with elk hunting are 24A, 24B, 26M, 31, 32, 33, 37A, 37B, 39, and 40A, the number of permits sold in 2012 for hunts including any of these GMUs was five, while the estimated number of elk harvested in these 2012 hunts was zero. No game management units are completely within the county.[479]

In 2011 Pinal County had a total of 8,725 jobs related to the travel and tourism industry in the private sector.[480] This represents about 11.6 percent of the total jobs in the county. Since 1998, the county has gained 2,679 jobs in this sector.[481] Pinal County includes the following attractions: Boyce Thompson Arboretum State Park, and the Oracle and Picacho Peak State Parks.[482]

Santa Cruz County, AZ

Santa Cruz County is located on the border with Mexico in the State of Arizona and is 1,239 square miles in size.[483] The U.S. Census Bureau estimated the 2011 population of the county to be 46,727 persons.[484] County population grew a total of 21.7 percent over the previous decade compared to a national average of 8.9 percent.[485] Only one percent of the population is Native American with Whites making up the majority of the remainder.[486] 82.3 percent of the total population is Hispanic.[487]

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472 Theobald, DM. 2013.

473 Theobald, DM. 2013.

474 USDA, National Agriculture Statistics Service, 2007. (1)

475 USDA, National Agriculture Statistics Service, 2007. (1)

476 USDA, National Agriculture Statistics Service, 2007. (1)

477 USDA, National Agriculture Statistics Service, 2007. (2)

478 USDA, National Agriculture Statistics Service, 2007. (2)

479 Arizona Game and Fish Department. Final results of the 2012 general, junior and muzzleloader elk questionnaire. Amber A. Munig, Big Game Management Supervisor. June 19, 2013.

480 U.S. Department of Commerce. 2012. Census Bureau. (5)

481 U.S. Department of Commerce. 2012. Census Bureau. (5)

482 http://pinalcountyaz.gov/Visitors/Pages/Home.aspx, accessed 7/11/2013 10:23 am.

483 http://www.city-data.com/county/Santa_Cruz_County-AZ.html, accessed 5/16/2013 5:35 pm.

484 U.S. Department of Commerce. 2012. (1)

485 U.S. Department of Commerce. 2012. (1)

486 U.S. Department of Commerce. 2012. Census Bureau. (2)

Economic prosperity in Santa Cruz County is less than the national average. In 2011 Santa Cruz County had an annual unemployment rate of 17.0 percent compared to national average of 8.9 percent. Average earnings per job in the county in 2011 were $45,673 compared to a national average of $54,897 and per capita income was $25,563 compared to the national average of $42,433.[488]

Total employment in Santa Cruz County in 2011 was 18,278 jobs. This represented a 16.2 percent increase from 2001. There were 1,464 non-service jobs, 4,023 government jobs, and an estimated 12,414 jobs in the services-related industries. Since 2001, government jobs increased by 21 percent, service-related jobs increased by 16 percent, and non-service jobs decreased by 19 percent. In 2001 the Bureau of Economic Analysis (BEA) reported 242 farming jobs and in 2011 BEA reported the number of jobs in the farming sector fell to 197, a decrease of nearly 19 percent.[489]

Federal lands constitute 55.9 percent of the land base in Santa Cruz County.[490] The Forest Service manages 53.7 percent of the land, the Bureau of Land Management manages 2.1 percent of the land, and the Park Service manages zero percent of the land.[491] Over the ten years from 2000 to 2010, Santa Cruz County experienced a 54 percent increase in its level of private lands development (compared to a national average of 12 percent).[492] In 2010, approximately zero percent of Santa Cruz County's Wildland-Urban Interface (WUI) had been developed.[493]

In 2007 the Census of Agriculture reported that the total number of cattle and calve farms in Santa Cruz was 134.[494] This represented a 23 percent increase from the reported number of farms in 2002 (109).[495] In 2007 there were 14,458 cattle and calves compared to a 2002 census of 11,593.[496] The number of sheep and lambs in Santa Cruz County in 2007 was 191 and 78 in 2002.[497] The number of farms grew from 10 in 2002 to 13 in 2007.[498]

In Santa Cruz County the game management units (GMU) with elk hunting are 34A. 34B, 35A, 35B and 36B, there were zero permits sold in 2012 for hunts including any of these GMUs was , the estimated number of elk harvested in these 2012 hunts was aero. Only game management unit 35B is completely within the county.[499]

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[487] U.S. Department of Commerce. 2012. Census Bureau. (2)

[488] U.S. Department of Commerce. 2012. Bureau of Economic Analysis. (3)

[489] U.S. Department of Commerce. 2012. Bureau of Economic Analysis. (4)

[490] U.S. Geological Survey, Gap Analysis Program. 2012. (1)

[491] U.S. Geological Survey, Gap Analysis Program. 2012. (1)

[492] Theobald, DM. 2013.

[493] Theobald, DM. 2013.

[494] USDA, National Agriculture Statistics Service, 2007. (1)

[495] USDA, National Agriculture Statistics Service, 2007. (1)

[496] USDA, National Agriculture Statistics Service, 2007. (1)

[497] USDA, National Agriculture Statistics Service, 2007. (2)

[498] USDA, National Agriculture Statistics Service, 2007. (2)

[499] Arizona Game and Fish Department. Final results of the 2012 general, junior and muzzleloader elk questionnaire. Amber A. Munig, Big Game Management Supervisor. June 19, 2013.

In 2011 Santa Cruz County had a total of 2,077 jobs related to the travel and tourism industry in the private sector.[500] This represents about 11.4 percent of the total jobs in the county. Since 1998, the county has lost 216 jobs in this sector.[501] Santa Cruz attractions include Pena Blanca Lake, Patagonia State Park and popular activities include bird watching and hiking.[502]

Sierra County, NM

Sierra County is located in southwestern New Mexico State and is 4,236 square miles in size.[503] The U.S. Census Bureau estimated the 2011 population of the county to be 11,925 persons.[504] County population shrank 10.1 percent over the previous decade compared to a national average growth rate of 8.9 percent.[505] Only 1.9 percent of the population is Native American with Whites making up the majority of the remainder.[506] 27.1 percent of the total population is Hispanic.[507]

Economic prosperity in Sierra County is mixed when compared with the national average. In 2011 Sierra County had an annual unemployment rate of 6.4 percent compared to national average of 8.9 percent. Average earnings per job in the county in 2011 were $32,649 compared to a national average of $54,897 and per capita income was $33,666 compared to the national average of $42,433.[508]

Total employment in Sierra County in 2011 was 5,282 jobs. This represented a 17.6 percent increase from 2001. There were 1,060 non-service jobs, 916 government jobs, and an estimated 2,435 jobs in the services-related industries. Since 2001, government jobs declined by five percent, service-related jobs increased by 17 percent, and non-service jobs increased by nine percent. In 2001 the Bureau of Economic Analysis (BEA) reported 389 farming jobs and in 2011 BEA reported the number of jobs in the farming sector fell to 385, a decrease of one percent.[509]

Federal lands constitute 63.2 percent of the land base in Sierra County.[510] The Forest Service manages 13.9 percent of the land, the Bureau of Land Management manages 28.8 percent of the land, and there was no data on Park Service managed land.[511] Over the ten years from 2000 to 2010, Sierra County experienced a 26 percent increase in its level of private lands development (compared to a national

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[500] U.S. Department of Commerce. 2012. Census Bureau. (5)

[501] U.S. Department of Commerce. 2012. Census Bureau. (5)

[502] http://www.co.santa-cruz.az.us/attractions.html, accessed 7/11/2013 10:09am.

[503] http://www.city-data.com/county/Sierra_County-NM.html, accessed 5/17/2013 9:10 am.

[504] U.S. Department of Commerce. 2012. (1)

[505] U.S. Department of Commerce. 2012. (1)

[506] U.S. Department of Commerce. 2012. Census Bureau. (2)

[507] U.S. Department of Commerce. 2012. Census Bureau. (2)

[508] U.S. Department of Commerce. 2012. Bureau of Economic Analysis. (3)

[509] U.S. Department of Commerce. 2012. Bureau of Economic Analysis. (4)

[510] U.S. Geological Survey, Gap Analysis Program. 2012. (1)

[511] U.S. Geological Survey, Gap Analysis Program. 2012. (1)

average of 12 percent).[512] In 2010, approximately six percent of Sierra County's Wildland-Urban Interface (WUI) had been developed.[513]

In 2007 the Census of Agriculture reported that the total number of cattle and calve farms in Sierra was 144.[514] This represented a 35 percent increase from the reported number of farms in 2002 (107).[515] In 2007 there were 23,878 cattle and calves compared to a 2002 census of 21,704.[516] The number of sheep and lambs in Sierra County in 2007 was 128 and 115 in 2002.[517] The number of farms shrank from 20 in 2002 to 12 in 2007.[518]

In Sierra County the game management units (GMU) with elk hunting are 16B-C, 17, and 21A-B. The number of total licenses sold or converted in 2012 for these GMUs was 2,845, while the estimated number of elk harvested in 2012 was 870. No game management units were completely within the county.[519]

In 2011 Sierra County had a total of 726 jobs related to the travel and tourism industry in the private sector.[520] This represents about 13.7 percent of the total jobs in the county. Since 1998, the county has gained 156 jobs in this sector.[521] Sierra County attractions include Caballo Lake and Percha Dam State Parks, the historic towns of Chloride and Hillsboro, Elephant Butte Dam and Lake, and the Truth or Consequences hot springs.[522]

Socorro County, NM

Socorro County is located in central New Mexico State and is 6,648 square miles in size.[523] The U.S. Census Bureau estimated the 2011 population of the county to be 17,926 persons.[524] County population shrank by 0.8 percent over the previous decade compared to a national average growth rate of 8.9 percent.[525] 11 percent of the population is Native American with Whites making up the majority of the remainder.[526] 47.9 percent of the total population is Hispanic.[527]

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512 Theobald, DM. 2013.

513 Theobald, DM. 2013.

514 USDA, National Agriculture Statistics Service, 2007. (1)

515 USDA, National Agriculture Statistics Service, 2007. (1)

516 USDA, National Agriculture Statistics Service, 2007. (1)

517 USDA, National Agriculture Statistics Service, 2007. (2)

518 USDA, National Agriculture Statistics Service, 2007. (2)

519 NMDGF 2012.

520 U.S. Department of Commerce. 2012. Census Bureau. (5)

521 U.S. Department of Commerce. 2012. Census Bureau. (5)

522 http://www.sierracountynewmexico.info/attractions-all/, accessed 7/11/2013 10:52am.

523 http://www.city-data.com/county/Socorro_County-NM.html, accessed 5/17/2013 9:13 am.

524 U.S. Department of Commerce. 2012. (1)

525 U.S. Department of Commerce. 2012. (1)

526 U.S. Department of Commerce. 2012. Census Bureau. (2)

Economic prosperity in Socorro County is mixed when compared with the national averages. In 2011 Socorro County had an annual unemployment rate of 5.6 percent compared to national average of 8.9 percent. Average earnings per job in the county in 2011 were $39,741 compared to a national average of $54,897 and per capita income was $31,102 compared to the national average of $42,433.[528]

Total employment in Socorro County in 2011 was 8,263 jobs. This represented a 15.9 percent increase from 2001. There were 1,046 non-service jobs, 2,994 government jobs, and an estimated 3,003 jobs in the services-related industries. Since 2001, government jobs increased by 12 percent, service-related jobs increased by 19 percent, and non-service jobs decreased by five percent. In 2001 the Bureau of Economic Analysis (BEA) reported 612 farming jobs and in 2011 BEA reported the number of jobs in the farming sector rose to 650, an increase of six percent.[529]

Federal lands constitute 53.5 percent of the land base in Socorro County.[530] The Forest Service manages 14.4 percent of the land, the Bureau of Land Management manages 21.6 percent of the land, and the Park Service manages zero percent of the land.[531] Over the ten years from 2000 to 2010, Socorro County experienced a 24 percent increase in its level of private lands development (compared to a national average of 12 percent).[532] In 2010, approximately one percent of Socorro County's Wildland-Urban Interface (WUI) had been developed.[533]

In 2007 the Census of Agriculture reported that the total number of cattle and calve farms in Socorro was 254.[534] This represented a 23 percent increase from the reported number of farms in 2002 (206).[535] In 2007 there were 44,134 cattle and calves compared to a 2002 census of 45,900.[536] The number of sheep and lambs in Socorro County in 2007 was 666 and 1,348 in 2002.[537] The number of farms grew from 29 in 2002 to 35 in 2007.[538]

In Socorro County the game management units (GMU) with elk hunting are 13, 16E, 17, 18, 21B, and 38. The number of total licenses sold or converted in 2012 for these GMUs was 3,207, while the estimated number of elk harvested in 2012 was 1,083. No game management units were completely within the county.[539]

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527 U.S. Department of Commerce. 2012. Census Bureau. (2)

528 U.S. Department of Commerce. 2012. Bureau of Economic Analysis. (3)

529 U.S. Department of Commerce. 2012. Bureau of Economic Analysis. (4)

530 U.S. Geological Survey, Gap Analysis Program. 2012. (1)

531 U.S. Geological Survey, Gap Analysis Program. 2012. (1)

532 Theobald, DM. 2013.

533 Theobald, DM. 2013.

534 USDA, National Agriculture Statistics Service, 2007. (1)

535 USDA, National Agriculture Statistics Service, 2007. (1)

536 USDA, National Agriculture Statistics Service, 2007. (1)

537 USDA, National Agriculture Statistics Service, 2007. (2)

538 USDA, National Agriculture Statistics Service, 2007. (2)

539 NMDGF 2012.

In 2011 Socorro County had a total of 815 jobs related to the travel and tourism industry in the private sector.[540] This represents about 9.9 percent of the total jobs in the county. Since 1998, the county has gained 815 jobs in this sector.[541] Socorro is home of the Trinity Site, the location of the first detonation of a nuclear device.[542] The San Miguel Mission is also in the county.[543]

Torrance County, NM

Torrance County is located in central New Mexico State and is 3,346 square miles in size.[544] The U.S. Census Bureau estimated the 2011 population of the county to be 16,391 persons.[545] County population shrank by 3.1 percent over the previous decade compared to a national average of 8.9 percent.[546] Only 1.9 percent of the population is Native American with Whites making up the majority of the remainder.[547] 38.6 percent of the total population is Hispanic.[548]

Economic prosperity in Torrance County is lower when compared with the national average. In 2011 Torrance County had an annual unemployment rate of 9.7 percent compared to national average of 8.9 percent. Average earnings per job in the county in 2011 were $31,754 compared to a national average of $54,897 and per capita income was $31,078 compared to the national average of $42,433.[549]

Total employment in Torrance County in 2011 was 5,289 jobs. This represented a 1.9 percent decrease from 2001. There were 1,150 non-service jobs, 1,180 government jobs, and an estimated 2,665 jobs in the services-related industries. Since 2001, government jobs declined by two percent, service-related jobs decreased by eight percent, and non-service jobs decreased by three percent. In 2001 the Bureau of Economic Analysis (BEA) reported 754 farming jobs and in 2011 BEA reported the number of jobs in the farming sector fell to 649, a decrease of 14 percent.[550]

Federal lands constitute 7.9 percent of the land base in Torrance County.[551] The Forest Service manages 7.2 percent of the land, the Bureau of Land Management manages 0.6 percent of the land, and the Park Service manages zero percent of the land.[552] Over the ten years from 2000 to 2010, Torrance County experienced a 42 percent increase in its level of private lands development (compared to a national

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[540] U.S. Department of Commerce. 2012. Census Bureau. (5)

[541] U.S. Department of Commerce. 2012. Census Bureau. (5)

[542] http://www.socorrocounty.net/culture-recreation/history-of-socorro-county, accessed 7/11/2013 10:17 am.

[543] http://www.sdc.org/~smiguel/, accessed 7/12/2013 1:06 pm.

[544] http://www.city-data.com/county/Torrance_County-NM.html, accessed 5/17/2013 9:16 am.

[545] U.S. Department of Commerce. 2012. (1)

[546] U.S. Department of Commerce. 2012. (1)

[547] U.S. Department of Commerce. 2012. Census Bureau. (2)

[548] U.S. Department of Commerce. 2012. Census Bureau. (2)

[549] U.S. Department of Commerce. 2012. Bureau of Economic Analysis. (3)

[550] U.S. Department of Commerce. 2012. Bureau of Economic Analysis. (4)

[551] U.S. Geological Survey, Gap Analysis Program. 2012. (1)

[552] U.S. Geological Survey, Gap Analysis Program. 2012. (1)

average of 12 percent).[553] In 2010, approximately two percent of Torrance County's Wildland-Urban Interface (WUI) had been developed.[554]

In 2007 the Census of Agriculture reported that the total number of cattle and calve farms in Torrance was 320.[555] This represented a four percent increase from the reported number of farms in 2002 (309).[556] In 2007 there were 40,379 cattle and calves compared to a 2002 census of 48,913.[557] The number of sheep and lambs in Torrance County in 2007 was 7,014 and 9,342 in 2002.[558] The number of farms grew from 23 in 2002 to 29 in 2007.[559]

In Torrance County the game management units (GMU) with elk hunting are 18, 38, and 43. The number of total licenses sold or converted in 2012 for these GMUs was 173, while the estimated number of elk harvested in 2012 was 45. No game management units were completely within the county.[560]

In 2011 Torrance County had a total of 477 jobs related to the travel and tourism industry in the private sector.[561] This represents about 9.0 percent of the total jobs in the county. Since 1998, the county has lost 147 jobs in this sector.[562] Torrance County contains the Salinas Pueblo Missions National Monument and the Cibola, Gallinas, and Manzano National Forests.[563][564]

Valencia County, NM

Valencia County is located in central New Mexico State and is 1,069 square miles in size.[565] The U.S. Census Bureau estimated the 2011 population of the county to be 75,640 persons.[566] County population grew a total of 14.3 percent over the previous decade compared to a national average of 8.9 percent.[567] Four percent of the population is Native American with Whites making up the majority of the remainder.[568] 57.7 percent of the total population is Hispanic.[569]

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[553] Theobald, DM. 2013.

[554] Theobald, DM. 2013.

[555] USDA, National Agriculture Statistics Service, 2007. (1)

[556] USDA, National Agriculture Statistics Service, 2007. (1)

[557] USDA, National Agriculture Statistics Service, 2007. (1)

[558] USDA, National Agriculture Statistics Service, 2007. (2)

[559] USDA, National Agriculture Statistics Service, 2007. (2)

[560] NMDGF 2012.

[561] U.S. Department of Commerce. 2012. Census Bureau. (5)

[562] U.S. Department of Commerce. 2012. Census Bureau. (5)

[563] http://www.nps.gov/sapu/index.htm, accessed 7/12/2013 12:50 pm.

[564] http://www.fs.fed.us/, accessed 7/12/2013 12:56 pm.

[565] http://www.city-data.com/county/Valencia_County-NM.html, accessed 5/17/2013 9:18 am.

[566] U.S. Department of Commerce. 2012. (1)

[567] U.S. Department of Commerce. 2012. (1)

[568] U.S. Department of Commerce. 2012. Census Bureau. (2)

[569] U.S. Department of Commerce. 2012. Census Bureau. (2)

Economic prosperity in Valencia County is less than the national average. In 2011 Valencia County had an annual unemployment rate of 8.8 percent compared to national average of 8.9 percent. Average earnings per job in the county in 2011 were $34,699 compared to a national average of $54,897 and per capita income was $29,528 compared to the national average of $42,433.[570]

Total employment in Valencia County in 2011 was 21,990 jobs. This represented a 19.5 percent increase from 2001. There were 3,180 non-service jobs, 4,370 government jobs, and an estimated 14,325 jobs in the services-related industries. Since 2001, government jobs did not change, service-related jobs increased by 35 percent, and non-service jobs decreased by six percent. In 2001 the Bureau of Economic Analysis (BEA) reported 954 farming jobs and in 2011 BEA reported the number of jobs in the farming sector rose to 997, an increase of five percent.[571]

Federal lands constitute 6.5 percent of the land base in Valencia County.[572] The Forest Service manages 2.3 percent of the land, the Bureau of Land Management manages 4.2 percent of the land, and there is no data on Park Service managed land.[573] Over the ten years from 2000 to 2010, Valencia County experienced a 26 percent increase in its level of private lands development (compared to a national average of 12 percent).[574] In 2010, there is no data on what percent of Valencia County's Wildland-Urban Interface (WUI) had been developed.[575]

In 2007 the Census of Agriculture reported that the total number of cattle and calve farms in Valencia was 348.[576] This represented a 31 percent increase from the reported number of farms in 2002 (265).[577] In 2007 there were 28,022 cattle and calves compared to a 2002 census of 24,592.[578] The number of sheep and lambs in Valencia County in 2007 was 1,188 and 956 in 2002.[579] The number of farms shrank from 99 in 2002 to 67 in 2007.[580]

In Valencia County the game management units (GMU) with elk hunting are 9 and 13. The number of total licenses sold or converted in 2012 for these GMUs was 2,797, while the estimated number of elk harvested in 2012 was 771. No game management units were completely within the county.[581]

In 2011 Valencia County had a total of 1,757 jobs related to the travel and tourism industry in the private sector.[582] This represents about 8.0 percent of the total jobs in the county. Since 1998, the county has

570 U.S. Department of Commerce. 2012. Bureau of Economic Analysis. (3)

571 U.S. Department of Commerce. 2012. Bureau of Economic Analysis. (4)

572 U.S. Geological Survey, Gap Analysis Program. 2012. (1)

573 U.S. Geological Survey, Gap Analysis Program. 2012. (1)

574 Theobald, DM. 2013.

575 Theobald, DM. 2013.

576 USDA, National Agriculture Statistics Service, 2007. (1)

577 USDA, National Agriculture Statistics Service, 2007. (1)

578 USDA, National Agriculture Statistics Service, 2007. (1)

579 USDA, National Agriculture Statistics Service, 2007. (2)

580 USDA, National Agriculture Statistics Service, 2007. (2)

581 NMDGF 2012.

582 U.S. Department of Commerce. 2012. Census Bureau. (5)

gained 408 jobs in this sector.[583] Natural attractions in Valencia County include the Cibola and Manzano National Forests and the Ladd S. Gordon Waterfowl Complex.[584][585]

Yavapai County, AZ

Yavapai County is located in central Arizona State and is 8,128 square miles in size.[586] The U.S. Census Bureau estimated the 2011 population of the county to be 210,838 persons.[587] County population grew a total of 25.9 percent over the previous decade compared to a national average of 8.9 percent.[588] Only two percent of the population is Native American with Whites making up the majority of the remainder.[589] 13.4 percent of the total population is Hispanic.[590]

Economic prosperity in Yavapai County is less than the national average. In 2011 Yavapai County had an annual unemployment rate of 9.7 percent compared to national average of 8.9 percent. Average earnings per job in the county in 2011 were $35,341 compared to a national average of $54,897 and per capita income was $30,109 compared to the national average of $42,433.[591]

Total employment in Yavapai County in 2011 was 79,564 jobs. This represented a 12.3 percent increase from 2001. There were 11,032 non-service jobs, 11,084 government jobs, and an estimated 57,448 jobs in the services-related industries. Since 2001, government jobs increased by 6 percent, service-related jobs increased by 22 percent, and non-service jobs decreased by 17 percent. In 2001 the Bureau of Economic Analysis (BEA) reported 1,025 farming jobs and in 2011 BEA reported the number of jobs in the farming sector rose to 875, a decrease of nearly 15 percent.[592]

Federal lands constitute 46.0 percent of the land base in Yavapai County.[593] The Forest Service manages 33.8 percent of the land, the Bureau of Land Management manages 12.1 percent of the land, and the Park Service manages 3.4 percent of the land.[594] Over the ten years from 2000 to 2010, Yavapai County experienced a 31 percent increase in its level of private lands development (compared to a national average of 12 percent).[595] In 2010, approximately 21 percent of Yavapai County's Wildland-Urban Interface (WUI) had been developed.[596]

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583 U.S. Department of Commerce. 2012. Census Bureau. (5)

584 http://www.fs.fed.us/, accessed 7/12/2013 11:59 am.

585 http://netapp.audubon.org/iba/Site/1970, accessed 7/12/2013 12:01 pm.

586 http://www.city-data.com/county/Yavapai_County-AZ.html, accessed 5/16/2013 5:42 pm.

587 U.S. Department of Commerce. 2012. (1)

588 U.S. Department of Commerce. 2012. (1)

589 U.S. Department of Commerce. 2012. Census Bureau. (2)

590 U.S. Department of Commerce. 2012. Census Bureau. (2)

591 U.S. Department of Commerce. 2012. Bureau of Economic Analysis. (3)

592 U.S. Department of Commerce. 2012. Bureau of Economic Analysis. (4)

593 U.S. Geological Survey, Gap Analysis Program. 2012. (1)

594 U.S. Geological Survey, Gap Analysis Program. 2012. (1)

595 Theobald, DM. 2013.

596 Theobald, DM. 2013.

In 2007 the Census of Agriculture reported that the total number of cattle and calve farms in Yavapai was 374.[597] This represented a 42 percent increase from the reported number of farms in 2002 (263).[598] In 2007 there were 46,980 cattle and calves compared to a 2002 census of 37,508.[599] The number of sheep and lambs in Yavapai County in 2007 was 670 and 288 in 2002.[600] The number of farms shrank from 45 in 2002 to 43 in 2007.[601]

In Yavapai County the game management units (GMU) with elk hunting are 6A, 6B, 8, 10, 16A, 17A, 17B, 18A, 18B, 19A, 19B, 20A, 20B, 20C, 21, 22, 42 the 44A number of permits sold in 2012 for hunts including any of these GMUs was 9,087, while the estimated number of elk harvested in these 2012 hunts was 2,907. Game management units 17A, 17B, 19A, 19B, 20A, and 20C completely within the county.[602]

In 2011 Yavapai County had a total of 10,820 jobs related to the travel and tourism industry in the private sector.[603] This represents about 13.6 percent of the total jobs in the county. Since 1998, the county has gained 2,315 jobs in this sector.[604] Yavapai County attractions include the Heritage Park Zoological Sanctuary and Delgadillo's Snow Cap Drive-In.[605][606]

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597 USDA, National Agriculture Statistics Service, 2007. (1)

598 USDA, National Agriculture Statistics Service, 2007. (1)

599 USDA, National Agriculture Statistics Service, 2007. (1)

600 USDA, National Agriculture Statistics Service, 2007. (2)

601 USDA, National Agriculture Statistics Service, 2007. (2)

602 Arizona Game and Fish Department. Final results of the 2012 general, junior and muzzleloader elk questionnaire. Amber A. Munig, Big Game Management Supervisor. June 19, 2013.

603 U.S. Department of Commerce. 2012. Census Bureau. (5)

604 U.S. Department of Commerce. 2012. Census Bureau. (5)

605 http://www.heritageparkzoo.org/, accessed 7/12/2013 2:56 pm.

606 http://www.roadsideamerica.com/tip/101, accessed 7/12/2013 2:58 pm.

Tribal Trust Lands

San Carlos Apache Tribe

The San Carlos Apache Tribe reservation is in southeastern Arizona. The reservation is approximately 1.8 million acres and is a third forested lands. [607]The Bureau of Indian Affairs population and labor force report estimated the 2005 San Carlos Apache Tribe enrollment at 13,246. The same year there were 10,709 tribe members on or near the reservation, a 4 percent increase from 2001 (BIA 2001, BIA 2005). The U.S. Census Bureau estimated the 2011 population of the San Carlos Apache reservation to be 10,992 persons. Of those living on the reservation 10,397 were American Indian alone. Of those living on the reservation that are 25 years or older in 2011, 72 percent are high school graduates. An estimated four percent of the reservation population was below proficiency standards for spoken English (CENSUS 2012 b).

Per capita income in 2011 was $8,974 and median household income was $23,600 (CENSUS 2012 b). In 2011 5,224 of the individuals identifying as American Indian alone, 50 percent of them were living in poverty (CENSUS 2012 b). In 2005, 36 percent that were employed were also below the poverty guidelines; in 2001 25 percent were below poverty guidelines (BIA 2001, BIA 2005).

The population available to work in 2005 consisted of 7,602 individuals, 2,456 of which were employed (BIA 2005). The unemployment rate was 68 percent in 2005, a decrease of 14 percentage points since 2001 (BIA 2001, BIA 2005). Total civilian population employed of the reservation residents in 2011 was 2,350. Seventy-seven residents were reported working in the agriculture, forestry, fishing & hunting, mining industries, which represent three percent of the workforce. The industry that employs the largest number of residents is education, health care, & social assistance at 705 people (CENSUS 2012 b).

White Mountain Apache Tribe

The Fort Apache Indian Reservation (FAIR) is in central Arizona. The reservation is approximately 1.6 million acres which is the tribe's ancestral homeland.[608] Unemployment rate on the FAIR is between 70-85 percent with a population of about 15,000 tribal members (Cromwell 2014).

The Bureau of Indian Affairs population and labor force report estimated the 2005 White Mountain Apache Tribe enrollment at 13,200. The same year there were 12,213 tribe members on or near the reservation, a 9 percent decrease from 2001 (BIA 2001, BIA 2005). The U.S. Census Bureau estimated the 2011 population of the White Mountain Apache reservation to be 13,434 persons. Of those living on the reservation 12,047 were of American Indian ancestry (CENSUS 2012 b).

Of those living on the reservation that are 25 years or older in 2011, 64 percent are high school graduates. An estimated four percent of the reservation population was below proficiency standards for spoken English (CENSUS 2012 b).

Per capita income in 2011 was $9,738 and median household income was $26,134 (CENSUS 2012 b). In 2011 5,746 of the individuals identifying as American Indian alone, 48 percent of them were living in poverty (CENSUS 2012 b). The population available to work in 2005 consisted of 7,815 individuals of which 3,849 were employed (BIA 2005). The unemployment rate was 51 percent in 2005, an increase of one percentage points since 2001 (BIA 2001, BIA 2005). Of those employed in 2005, half (50 percent)

[607] http://itcaonline.com/?page_id=1177 Accessed 2/3/2014, 5:20 pm.

[608] http://itcaonline.com/?page_id=1185 Accessed 2/3/2014 at 5:28 pm

were below the poverty guidelines. In 2001, 47 percent of those employed were below the poverty guidelines (BIA 2001, BIA 2005). Total civilian population employed of the reservation residents in 2011 was 3,446. 168 residents were reported working in the agriculture, forestry, fishing & hunting, mining industries, which represent three percent of the workforce. The industry that employs the largest number of residents is education, health care, & social assistance at 1,079 people (CENSUS 2012 b).

Navajo Nation

The Navajo Nation reservation encompasses portions of the states of Utah, Arizona and New Mexico. The reservation is approximately 27,000 square miles (over 17 million acres) and is home to more than a dozen National Monuments.[609] The Bureau of Indian Affairs population and labor force report estimated the 2005 Navajo Nation enrollment at 273,872. The same year there were 192,067 tribe members on or near the reservation, an 8 percent increase from 2001 (BIA 2001, BIA 2005). The U.S. Census Bureau estimated the 2011 population of the Navajo Nation reservation to be 101,159 persons. Of those living on the reservation 95,927 were American Indian alone. Of those living on the reservation that are 25 years or older in 2011, 68 percent are high school graduates. An estimated 21 percent of the reservation population was below proficiency standards for spoken English (CENSUS 2012 b).

Per capita income in 2011 was $10,817 and median household income was $27,951. In 2011 38 percent of the 36,861 individuals identifying as American Indian, were living in poverty (CENSUS 2012 b). In 2005 there were 26,224 persons employed from a total of 54,664 individuals available to work, (BIA 2005). The unemployment rate held at 52 percent between 2001 and 2005 (BIA 2001, BIA 2005). Of those employed in 2005 9 percent were also living below the poverty guidelines. In 2001 this figure was 15 percent (BIA 2005, 2001). Total civilian population employed of the reservation residents in 2011 was 25,364. 527 residents were reported working in the agriculture, forestry, fishing & hunting, mining industries. This number represents three percent of the workforce. The industry that employs the largest number of residents is education, health care and social assistance with10,162 people working in this sector (CENSUS 2012 b).

Mescalero Apache Tribe

The Mescalero Apache Tribe reservation is in south central New Mexico. The reservation is approximately 461,000 acres in size. The Bureau of Indian Affairs population and labor force report estimated the 2005 Mescalero Apache Tribe enrollment at 4,309. The same year there were 4,447 tribe members on or near the reservation, an 11 percent increase from 2001 (BIA 2001, BIA 2005).

The U.S. Census Bureau estimated the 2011 population of the Mescalero Apache reservation to be 3,743 persons. Of those living on the reservation 3,391 were of American Indian ancestry. Of those living on the reservation that are 25 years or older in 2011, 78 percent are high school graduates. An estimated five percent of the reservation population was below proficiency standards for spoken English (CENSUS 2012 b).

Per capita income in 2011 was $9,299 and median household income was $25,708s (CENSUS 2012 b). In 2011 1,414 of the individuals identifying as American Indian, 41 percent were living in poverty (CENSUS 2012 b). The population available to work in 2005 consisted of 2,423 individuals all of which were employed (BIA 2005). The unemployment rate was zero percent in 2005, a decrease of 62 percentage points since 2001 (BIA 2001, BIA 2005). None of those employed in 2005 and 2001 were also below the poverty guide lines (BIA 2001, BIA 2005). Total civilian population employed of the

[609] http://discovernavajo.com/ Accessed 2/3/2014 on 5:33 pm

reservation residents in 2011 was 1,196. There were 59 residents reported working in the agriculture, forestry, fishing/hunting and mining industries. This represents three percent of the workforce. The industry that employs the largest number of residents is arts, entertainment, recreation, accommodation and food with 370 people working in this sector (CENSUS 2012 b).

Pueblo of Acoma

The Pueblo of Acoma reservation resides in central west New Mexico. The reservation is approximately 449,000 acres. The Pueblo has been continuously inhabited since at least 1200 A.D..[610] The Bureau of Indian Affairs population and labor force report estimated the 2005 Pueblo of Acoma enrollment at 4,819. The same year there were 4,762 tribe members on or near the reservation, a 70 percent increase from 2001 (BIA 2001, BIA 2005).

The U.S. Census Bureau estimated the 2011 population of the Pueblo of Acoma reservation to be 3,134 persons. Of those living on the reservation 3,058 were American Indian alone. Of those living on the reservation that are 25 years or older in 2011, 85 percent are high school graduates. An estimated three percent of the reservation population was below proficiency standards for spoken English (CENSUS 2012 b).

Per capita income in 2011 was $12,282 dollars with a median household income of $35,147 dollars (CENSUS 2012 b). In 2011 833 of the individuals identifying as American Indian alone, 27 percent of them were living in poverty (CENSUS 2012 b). In 2005 there was no data about the percent that were employed and below poverty guidelines, in 2001 it was 22 percent (BIA 2001, BIA 2005).

No data is available for the work force in 2005. The population available to work in 2001 consisted of 1,849 individuals, 1,394 were employed. The unemployment rate was 25 percent in 2001. The Native American averages for the state of New Mexico and the nation in 2001 were both 49 percent (BIA 2005).

Total civilian population employed of the reservation residents in 2011 was 995. Zero residents were reported working in the agriculture, forestry, fishing & hunting, mining industries, which represent three percent of the workforce. The industry that employs the largest number of residents is arts, entertainment, recreation, accommodation and food at 327 people (CENSUS 2012 b).

Pueblo of Isleta

The Pueblo of Isleta reservation is in central New Mexico. The reservation is approximately 211,000 acres. The Pueblo today is comprised of two small communities; Oraibi and Chicale and the main Pueblo, Isleta.[611] The Bureau of Indian Affairs population and labor force report estimated the 2005 Pueblo of Isleta enrollment at 3,980. The same year there were 3,980 tribe members on or near the reservation, a 10 percent decrease from 2001 (BIA 2001, BIA 2005).

The U.S. Census Bureau estimated the 2011 population of the Pueblo of Isleta reservation to be 2,997 persons. Of those living on the reservation 2,780 were American Indian alone. Of those living on the reservation that are 25 years or older in 2011, 81 percent are high school graduates. An estimated eight percent of the reservation population was below proficiency standards for spoken English (CENSUS 2012 b).

[610] http://www.puebloofacoma.org accessed 2-3-2014 5:50 pm

[611] http://www.indianpueblo.org/19pueblos/isleta.html accessed 2-3-2014

Per capita income in 2011 was $17,013 dollars with a median household income of $38,583 (CENSUS 2012 b). In 2011 579 of the individuals identifying as American Indian alone, 21 percent of them were living in poverty (CENSUS 2012 b). In 2005 26 percent that were employed were also below the poverty guidelines, in 2001 it was 15 percent (BIA 2001, BIA 2005).The Native American averages in 2005 for the state and nation were 15 and 29 percent respectively (BIA 2005).

The population available to work in 2005 consisted of 2,008 individuals, 1,339 were employed (BIA 2005). The unemployment rate was 33 percent in 2005, an increase of 21 percentage points since 2001 (BIA 2001, BIA 2005).The Native American averages for the state of New Mexico and the nation in 2005 were 32 percent and 49 percent respectively (BIA 2005).

Total civilian population employed of the reservation residents in 2011 was 1,275. There were 48 residents reported working in the agriculture, forestry, fishing/ hunting, mining industries, which represent three percent of the workforce. The industry that employs the largest number of residents is public administration with 307 people working in this sector (CENSUS 2012 b).

Pueblo of Laguna

The Pueblo of Laguna is located in west-central New Mexico. The Pueblo's trust lands total approximately 500,000 acres. It includes six communities known as villages, an area of commercial development located west of the Albuquerque metropolitan area. [612] The Pueblo of Laguna ranges in elevation from 10,000 ft on the shoulder of Mt. Taylor, to 5,000 ft at the Rio Puerco and consists of a variety of habitats including semi-arid tablelands montane conifer, conifer woodlands, savannahs, and Albuquerque Basin habitat. About two-thirds of these lands, are used for livestock grazing, the remainder is reserved for wildlife habitat, wood gathering, the Pueblo villages and economic development.

All livestock producers run cow-calf operations with a total of approximately 1200 head of cattle on the reservation. Laguna does not currently herd sheep; however, some livestock including sheep, horses, cattle, and chickens are kept near or in the villages.

Currently Laguna manages elk, mule deer, pronghorn, wild turkey, Himalayan tahr and Barbary sheep through permit hunting, and much of the small game and furbearing populations with more general year-long permits for hunting and trapping. Small game and predator take is not currently tracked by the Pueblo.

The Pueblo's enrollment office indicates that the total enrollment as of August 2013 was 8,578, with an estimated 4,255 or 49.6 percent living on the Pueblo's lands. These are the Laguna people most likely to be affected by the project (CENSUS 2012 b).

The U.S. Census Bureau counted the 2011 population of the Pueblo of Laguna reservation and trust lands at 4,684 persons. Of that number, 4,476 or 95.6 percent were American Indian alone (Laguna 2014).

The Census Bureau's American Community Survey (ACS) estimate of the population on the Pueblo's lands between 2007 and 2011 was 4,684 persons. Of those persons that were 25 years or older, 87 percent were high school graduates. An estimated four percent of the reservation population was below proficiency standards for spoken English (CENSUS 2012 b).

Per capita income for 2007-2011was $11,052 and median household income was $29,896. Of 3,341 residents over the age of 16, 1,927, or 58 percent of the population over 16 (41 percent of the total

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[612] http://www.lagunapueblo-nsn.gov/ accessed 12/4/2013.

population), were participating in the work force. 1,372 residents, 71 percent of the work force, were employed. Five hundred and fifty-five residents, 29 percent of the work force, were unemployed. 33 percent of the Pueblo's resident population and 44 percent of the resident population under 18 years was living below the poverty level, compared to 19 and 27 percent for New Mexico and 14 and 20 percent for the United States as a whole (CENSUS 2012 b).

According to Bureau of Indian Affairs Population and Labor Force Report data, in 2001, on the reservation among 1,409 individuals identifying as American Indian alone, 31 percent of them were living in poverty. The Bureau of Indian Affairs Population and Labor Force Report for 2005 contained no data about the percent that were employed and yet living below poverty guidelines; in 2001 it was 10 percent (BIA 2001, BIA 2005).The Native American averages in 2005 for the state of New Mexico and nation were 15 and 29 percent respectively (BIA 2005).

No data is available for the work force in 2005. The population available to work in 2001 consisted of 3,393 individuals, 1,259 were employed. The unemployment rate was 63 percent in 2001. The Native American averages for the state of New Mexico and the nation in 2001 were both 49 percent (BIA 2001).

The Census Bureau's ACS estimated that 1,372 Pueblo residents were employed between 2007 and 2011. 34 residents were reported working in the agriculture, forestry, fishing & hunting, mining industries, which represented three percent of the workforce. The industry that employed the largest number of residents was arts, entertainment, recreation, accommodation and food, at 349 people (CENSUS 2012 b).

In 2013 the Pueblo of Laguna had a total of 156 jobs related to the ranching. This represents about 8.1 percent of the total jobs for Pueblo members living on Pueblo land(s). There is no good data on historical percentages; however in the early 1900's a much larger percentage of the population ran sheep, which are no longer present on Laguna. In 2013 there were approximately 1700 head of cattle grazed on Pueblo lands. Ranching and rangelands account for approximately 2/3's of Pueblo lands. Predation losses in 2013 were approximately 3 percent of the herd. Few, if any, Pueblo members rely solely on livestock for their livelihoods, because profit levels are low, any increase in predation may drive more of them away from this traditional activity (Laguna 2014).

In 2013 the Pueblo of Laguna had a total of 10 jobs related to the hunting and guiding industry. This represents about 0.5 percent of the total jobs for Pueblo members living on Pueblo land(s); however, over 280 Pueblo members applied for hunting permits in 2013, or 3.3 percent of the enrolled membership. There are no reliable historic data on the hunting and guiding industry. Revenues from hunting activities including but not limited to tags and fees for 2013 were approximately $40,000 dollars. Although Big Game hunting is not a major economic driver on the Pueblo, many of the members rely on hunting to supplement their food resources, changes in the availability of big game could potentially have a major impact on the lives of Pueblo members (Laguna 2014).

Between 2007 and 2011, the Pueblo of Laguna had a total of 349 related to the travel and tourism industry (CENSUS 2012 b). This represents about 18.1 percent of the total jobs for Pueblo members living on Pueblo land. This primarily represents casino and hotel related positions. Revenues from recreation related activities such as user fees are a large part of the Pueblo's revenue.

Pueblo of Zuni

The Pueblo of Zuni reservation is located in northwest New Mexico. The reservation is approximately 463,000 acres and is made up of for 300 year most Zunis have lived in the single village of the Pueblo. [613]

[613] http://itcaonline.com/?page_id=1171 Accessed, 2/3/2014 5:23 pm

The Bureau of Indian Affairs population and labor force report estimated the 2005 Pueblo of Zuni enrollment at 10,258. The same year there were 10,369 tribe members on or near the reservation, a 16 percent increase from 2001 (BIA 2001, BIA 2005).

The U.S. Census Bureau estimated the 2011 population of the Pueblo of Zuni reservation to be 12,097 persons. Of those living on the reservation 11,389 were American Indian alone. Of those living on the reservation that are 25 years or older in 2011, 81 percent are high school graduates. An estimated eight percent of the reservation population was below proficiency standards for spoken English (CENSUS 2012 b).

Per capita income in 2011 was $10,575 dollars with a median household income of $31,050 (CENSUS 2012 b). In 2011 3,861 of the individuals identifying as American Indian alone, 34 percent of them were living in poverty (CENSUS 2012 b). In 2005 24 percent that were employed were also below the poverty guidelines. In 2001 21 percent of those that were employed were below poverty guidelines (BIA 2001, BIA 2005).

The population available to work in 2005 consisted of 4,979 individuals, 1,757 were employed (BIA 2005). The unemployment rate was 65 percent in 2005, a decrease of one percentage points since 2001 (BIA 2001, BIA 2005).

Total civilian population employed of the reservation residents in 2011 was 4,628. 192 residents were reported working in the agriculture, forestry, fishing & hunting, mining industries, which represent three percent of the workforce. The industry that employs the largest number of residents is education, health care, & social assistance at 1,558 people (CENSUS 2012 b).

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APPENDIX C: MEXICAN WOLF NUISANCE REPORTS

Date	Wolf ID	General Location	Type of Wolf Nuisance Activity	Human/IFT Action	Wolf Response/Management Result
1998-2003					
04/28/1998	156		Charge/ Investigative approach, Dog present	Wolf 156 was fatally shot by a camper who feared for his family's safety when the wolf was in the area of their camp and attacked their dog	
05/08/1998	494	Alpine, Arizona	Investigative search, habituated	Wolf 494 became a nuisance by frequenting the town of Alpine, Arizona, from May 8 to 28, 1998 and was permanently removed from the wild. Aversive conditioning, Removed.	
05/1999 to 08/1999	191, 208, 562		Investigative approach, Dog present	191 (alpha female), 208, and 562 (all recently released) approached ranch house with loose dogs, dogs chased wolves, wolves chased dogs, dog was bitten. Owner ran wolves off, one wolf M208 followed owner back toward house. F191 subsequently denned and several more encounters with dogs ensued near the house. Attempts at aversive conditioning were mostly unsuccessful. All wolves removed in August due to livestock depredation. Aversive conditioning. Removed for livestock depredation.	
01/06/ 1999	166, 482		Investigative search, Food conditioning	Campbell Blue pair pulled down a deer carcass hanging in a hunter's camp	
01/05/2000	522		Investigative search, Dog present	Female 522 hung around hunter's camp and interacted with dogs. Trapped and put in acclimation pen to hold through hunting season. Removed.	
02/06/ 2000	522		Investigative search, Dog present	Interacted with dogs at a ranch house immediately post-release. Removed.	
04/14/ 2000	166, 518		Charge, Dog present	Permittee reported an aggressive encounter with Campbell Blue pair when the female (518) bumped his horse and passed under it. Wolves also attacked one of his dogs. They followed him to a cabin and he stayed in it until the wolves left. Removed.	
05/16 2000	191, 208		Investigative approach, Dog present	A female was jogging with 2 dogs when 2 wolves approached. According to the jogger, the wolves were clearly interested in her dogs and she was able to scare them away.	
06/01/ 2000	624		Investigative search.	Frequented a ranch house. Removed.	
07/16/ 2000	624		Investigative search, Dog present	Frequented a ranch and exhibited playful behavior with a dog. Removed.	
08/20/2000	509, 511, 587, 590		Aggressive charge, Habituated, Dog present	Camper and his cocker spaniel were in the middle of a meadow behind his trailer when 4 wolves (most likely Francisco) came running out of the woods toward them. Camper fired one shot in front	

Date	Wolf ID	General Location	Type of Wolf Nuisance Activity	Human/IFT Action	Wolf Response/Management Result
				of the wolves but they kept coming. He fired a second shot as they got closer and they turned away. He was upset at the situation and felt that the wolves were a danger to people and animals/pets. Later that week, people camped nearby observed several wolves and pups resting in the shade under and around the camper's trailer. At the time he was inside with his dog, unaware wolves were outside. He was upset when he learned of the incident, stating that this was not the behavior of wild animals and was concerned about what would have happened had he or his dog come out of the trailer. Aversive conditioning.	
08/24/2000	511, 509, 587, 590	Double Cienega Campground	Investigative approach, Habituated,	Camper observed Francisco and Cienega packs on multiple occasions camping at Double Cienega. Sometimes they came through camp, <5 ft of him taking pictures, although the pups seemed more skittish. He saw them other times farther away within the campground or out in the meadow. Aversive conditioning.	
09/25/2000	590	Double Cienega Campground	Investigative search, Habituated,	Yearling male 590 frequented Double Cienega Campground most of one day. Aversive conditioning.	
09/29/2000	509, 511, 587, 590	Double Cienega Campground	Investigative approach, Food conditioning, Habituated,	5-6 people camped in Double Cienega from about August 21 to 30, 2000. They had interactions with Francisco Pack throughout the week. On multiple occasions campers howled them in, chased them on ATVs, left food out, and shot blunt arrows at them. The wolves also chased their horses, mules, and people on ATVs. The IFT informed them this behavior was not acceptable, and explained that what they were doing could have negative effects on the wolves' behavior. On August 30, 2100, while speaking with the hunters, an IFT member observed the wolves chasing the mules. He then hazed the wolves by running at them and throwing rocks. The wolves did not respond. We first spoke with the group on about August 23, 2000. IFT personnel informed them about the Mexican Wolf Reintroduction Project, the presence of wolves in the area, and proper behavior with respect to wolves (e.g. do not leave food out; keep an eye on mules/horses; if you see wolves, yell and throw rocks at them). We also asked them to let us know if they had any interactions with the wolves. Aversive conditioning.	
10/01/2000	Unknown		Investigative search, Food conditioning	At about 0440 hrs, the homeowner went out the front door on the porch and observed an animal in the driveway. At first he thought it was a German shepherd, then by the color and size he realized it was a wolf. He scared it away and it headed west down the road. He tried to follow it in his truck but lost track of it. When he got back to the house it was by the back door eating out of the dog dish. He scared it away again and it ran behind the house between the animal pens and the barn. He checked	

Date	Wolf ID	General Location	Type of Wolf Nuisance Activity	Human/IFT Action	Wolf Response/Management Result
				the dog dish and it was empty. He was not sure if there had been food in it or not. IFT personnel responded to the call made by the landowner's sister. The IFT observed large canid tracks in the driveway and yard. (track size = 5 x 3 ½", in the sand and gravel). No other tracks were found in area. IFT personnel returned on October 2, 2000 at about 0500 hrs	
11/2001	M580; Wildcat	Point of Pines, San Carlos Apache Reservation.	Investigative search, dog present	Wolf frequented a residential area. There were many domestic and feral dogs in the area. The wolf was captured by helicopter. Removed.	
Summer 2002	Bluestem	Vicinity of PS Knoll, Apache National Forest, Arizona.	Investigative search, Habituated	Permittee was on horseback and encountered a wolf while monitoring cattle. The permittee shouted at the wolf, however the animal made no response. The wolf eventually left the area. The wolf did not approach the permittee, therefore, most likely was displaying curious behavior. Unknown if a dog was with permittee or not.	
Summer 2002	Bluestem	Vicinity of PS Knoll, Apache National Forest, Arizona.	Investigative search, Habituated, dog present.	Permittee on horseback encountered a wolf while monitoring cattle; dog present. Shouted at wolf; wolf vacated area. Wolf most likely displaying curious behavior, possibly due to the presence of the dog.	
Summer 2002	637; Bluestem	Big Lake campground road, Apache National Forest, Arizona	Investigative search,habituated,	U.S. Forest Service reported a wolf walking down the Big Lake campground road, in Apache National Forest, Arizona. Project personnel located wolf f637 150 yards south of active campsites. Project personnel responded that same day and fired/hit the wolf with a rubber bullet. Wolf vacated area. Aversive conditioning.	
Summer 2002	637; Bluestem	White River, Fort Apache Indian Reservation, Arizona.	Investigative search, Habituated, dogs present.	Project personnel located f637 around White River for several days. The wolf was seen traveling adjacent to residential area. Project personnel attempted to haze the wolf from these areas. Many domestic and feral dogs in area. Wolf observed interacting with resident's dog about 8 miles to the north of White River in the yard of a private residence. Wolf was captured and returned to captivity. Removed.	
Summer 2002	Bluestem	Sprucedale Ranch, Apache National Forest, Arizona.	Investigative search, dog present.	No direct interaction between wolves and humans, but wolves were observed from the ranch headquarters. A female domestic dog with pups was present which was killed by the wolves after she attempt to chase them away from area. Project personnel intensively monitored wolves, and aversively conditioned them when located in area. Wolves eventually stayed away from ranch. Aversive conditioning.	
Summer 2002	Bluestem	Beaver Creek Ranch, Apache National Forest, Arizona.	Investigative search, Habituated, dogs present.	On several occasions the wolves were in the vicinity of the ranch headquarters and cabins. No direct interaction between wolves and humans. Several dogs and horses at residence. The IFT intensively monitored and aversively conditioned wolves when located in area. Wolves eventually	

Date	Wolf ID	General Location	Type of Wolf Nuisance Activity	Human/IFT Action	Wolf Response/Management Result
				stayed away from ranch. Aversive conditioning.	
08/23/2002	Francisco	Four Drag allotment, Apache National Forest, Arizona	Investigative search, dogs present.	Permittee was checking cattle along Malay pasture fence line with his working dogs. Permittee encountered WS and was told he could ride into the area with the dogs based on a wolf radio signal in a different direction. The dogs were released and began barking while working cattle. When a dog squealed, the permittee saw a wolf holding it by the back of the neck and shaking. The rancher yelled and the wolf let go. The rancher left with his dogs.	
Summer 2002	Francisco	Four Drag Cattle allotment, Apache National Forest	Investigative search, dogs present.	Hunter encountered wolves while hunting cougar in a remote area. Hunter was on horseback with a pack of hounds. The dogs got in a fight with the wolves; one of the dogs suffered extensive injuries. Hunter heard the fight, rode his horse toward the wolves, and fired a shot in the air. However, one wolf would not let go of the one hound. The other three wolves were about 50 yards away when he approached. He fired two more shots and scared the wolf away at about 10 yards. Hunter reported being in fear for the dogs but did not feel threatened himself. The wolves had a kill nearby and may have had pups in the area.	
10/19/2002	584, 624; Gapiwi	Chicken Coop Canyon, Gila Wilderness, New Mexico.	Investigative approach, dogs present	Hunters saw two wolves near camp. Later wolves followed outfitter (on horseback) and her dogs. Hound ran at wolves, brief fight, hound came back and wolves left.	
10/21/2002	584, 624; Gapiwi		Investigative approach, dogs present	On October 21, 2002, two wolves came by outfitter's camp. Meat from three elk was near camp. There were also dogs in the camp. Hunters ran out to take pictures and the wolves left. Adult pair of wolves had a rendezvous site nearby with one pup.	
05/01/2003	648 (?); Sycamore	Near Little Turkey Creek, Gila Wilderness, New Mexico.	Investigative approach,	Hunter saw a wolf on trail during middle of the day. Wolf moved toward hunter, and he threw a rock at the wolf, causing it to leave. Aversive conditioning.	
05/2003	592, 648; Sycamore	Seventy-Four Draw, Gila National Forest, New Mexico.	Investigative search.	Young female on horseback encountered 2 wolves. Closest wolf was approximately 10 yards away, second wolf was further off and moving away from. Gun fired to scare wolf off. Wolf showed limited fear of person and gunshot, but eventually moved away. Incident lasted approximately 10 minutes. Removed.	
05/2003	592, 648; Sycamore	Seventy-Four Draw, Gila National Forest, New Mexico.	Investigative search.	Wolves followed armed rancher six miles. He was on foot driving cattle down a canyon toward home. The wolves had been observed trying to kill calves in that group and the rancher chose to move them onto private land. He drove the herd of cows and was followed by the wolves for an hour. Rancher stated, "The wolves followed right behind me and kept getting closer and closer, I yelled at them and	

Date	Wolf ID	General Location	Type of Wolf Nuisance Activity	Human/IFT Action	Wolf Response/Management Result
				threw rocks at them, and it didn't work. When they got within 40 feet of me at that point I thought wild animals don't act like this, and because I felt threatened, I fired one round from my 30-30 over them. Their reaction was to skulk off the road and go around me and get in front of the cows again, they still showed no signs of leaving. They seemed to try and hold the cows up, just like when we originally saw them. From that point on I had trouble driving the cows and had to throw rocks over the cows trying to scare the wolves off, this continued until the vehicle the IFT member was driving came into earshot then the wolves moved up on the side of the canyon wall but still didn't leave. The IFT person was informed the wolves were right there with me and he confirmed that." Removed.	
Spring 2003	Unknown; Cienega Pack home range	Foote Creek trail area, Apache National Forest, Arizona.	Investigative approach. Dogs present.	Cougar hunters had wolf a follow them for approximately one mile. The hunters had several hounds with them. The wolf never approached the hunters or dogs and eventually left the area.	
07/2003	613; Red Rock	Occurred around Aragon and Cruzville, New Mexico.	Investigative search. Habituated.	Wolf near residences at Cruzville, hit with one rubber bullet, and moved to Aragon area. Sighted repeatedly near residences, no direct threats; F613 would leave area or hide when observed. Caught near residence east of Aragon after killing a turkey. Wolf caught and returned to captivity. Aversive conditioning. Removed.	
Fall 2003	729; Red	Sheep Basin, Gila National Forest, New Mexico.	Investigative search. Dogs present.	Hunters pulled into camp at night and saw M729 confronting their two dogs, that were tied to a tree. Hunters got out of vehicle and yelled at the wolf. The wolf stared at the hunters and eventually fled from the area. No threat to human safety. Wolf was drawn into area by presence of dogs.	
Fall 2003	Unknown	Dry Prong, San Carlos Apache Reservation.	Investigative approach.	Based on a second hand report from a San Carlos Apache Tribe representative. A wolf approached a tribal hunting camp within 50 yards and was hanging around near the camp and was unafraid of people. The hunters tried to scare the wolf away by yelling and throwing things in the direction of the wolf, but it wouldn't leave. The hunters did not feel safe and moved their camp. Aversive conditioning.	
2004-2013					
2/5/2004	M859	Nutrioso, AZ	Investigative Search	Located in residential area, hazed from the area. Wolf left the area.	
2/10/2004	M859	Nutrioso, AZ	Investigative Search; dog present	USDA-WS personnel investigated a report of a wolf incident with a dog near Nutrioso, AZ. It was determined that is was probable M859 bit a dog.	
4/28/2004	Francisco	Gwynn Base Camp	Investigative Search; dog present	Francisco coming into to a camp. RAG boxes used. Dogs present.	

Date	Wolf ID	General Location	Type of Wolf Nuisance Activity	Human/IFT Action	Wolf Response/Management Result
9/12/2004	Aspen, M512, F667	Residence on Blue River, AZ	Investigative Search; dog present	Report of wolves harassing a calf in a corral. IFT initiated intensive monitoring and hazing. Wolves moved away from residential areas.	
10/28/2004	Aspen, M512, F667, F872	Blue River Corridor, AZ	Investigative Search; dog present	Wolves interacted with a dog in the vicinity of a rural residence. Superficial injuries to dog. IFT intensively monitored and hazed. Wolves moved away from residential areas.	
11/4/2004	Aspen, M512, F872	Blue River Corridor, AZ	Investigative Search; dog present	Non-injurious interaction with two domestic dogs enclosed in a chain link fence near a house. Hazing. Resident fired a gun into the air. Wolves left the area.	
11/7/2004	Saddle, M732, F797	Gila Wilderness, NM	Investigative Search; dog present	Wolves interacted with four hound dogs in the wilderness. Injuries sustained by dogs. Hazing. Outfitting guide fired a gun into the air. Wolves left the area	
11/30/2004	Aspen, M512, F667, F872	Blue River Corridor, AZ	Investigative Search; dog present	Non-injurious incident involving a wolf and dogs at residence. Report of uncollared wolves attacking dog on porch. Resident reported a wolf-like animal 200 yards from the house the following day but the animal left without hazing.	
4/3/2005	unknown	Blue, AZ	Investigative Search; dog present	Resident reported being awoken by two howls near his home. He fired a cracker shell, after which he observed a wolf-like animal running from the area of their dog kennel. He fired a second cracker shell, and the animal was not seen again. Project personnel responded later that day and picked up radio signals of Cienega AF487 considerably north of the residence. No signals were heard from the Aspen Pack. The area around the home was searched, but the hardness of the ground and abundance of dog tracks made confirmation of any wolf sign impossible	
4/4/2005	Aspen, M512, F667	Blue River Corridor, AZ	Investigative Search; dog present	Nuisance behavior and non-fatal livestock and domestic dog injury.	
5/26/2005	f872, f873	Blue River Corridor, AZ	Investigative Search; dog present	Non-fatal injury to a dog.	
8/24/2005	Aspen, M512, F667, M871	Gila Cliff Dwellings, NM	Investigative Search; dog present	Fatal injury to dog.	
Nov-05	F613	FAIR, AZ	Investigative Search; dog present	Non-aggressive interactions with dogs in combination with the production of a wolf-dog hybrid litter. Captured and placed F613 in captivity, euthanized litter.	
3/26/2006	Luna	N Bar, NM	Investigative Search	Permittee observed non-injurious interaction with a horse on private land. Permittee hazed the wolves and they left the area. IFT conducted intensive monitoring.	
7/22/-9/19 2006	Meridian	Middle Mountain, AZ	Investigative Search; dog present; habituated	Two interactions with dogs (both injurious) and in proximity to residence and vehicles. Intensive monitoring, hazing, use of fladry and RAG boxes. Nuisance behavior ended.	
Aug-06	M806	Middle Mountain, AZ	Investigative Approach; habituated	Incident in which wolf walked after/followed an ATV.	

Date	Wolf ID	General Location	Type of Wolf Nuisance Activity	Human/IFT Action	Wolf Response/Management Result
7/18-7/29 2006	923	Mogollon/Glenwood, NM	Investigative Search	Wolf in close proximity to Mogollon, NM hwy 191. IFT conducted intensive monitoring and hazing. Nuisance behavior ended.	
7/31/2006	uncollared	Rainy Mesa, NM	Investigative Search; dog present	Two interactions with dogs (one injurious, one fatal). Investigated and searched for wolf sign, trapped, nothing caught and no additional nuisance noted. WS investigated and confirmed the injuries to be wolf caused and the owner reported seeing sign of wolf in the area.	
8/22/2006	F923	Rainy Mesa, NM	Investigative Search	Limited fear of a vehicle. Intensive monitoring and hazing. Nuisance behavior ended.	
9/6 - 10/11 2006	M973	Greer, AZ	Investigative Search; dog present; habituated	Dog interactions (non-injurious) and proximity to residences. Intensive monitoring, hazing and trapping.	
9/19/2006	F923	Devils Park, NM	Investigative Search	Wolf near hunting camp. Intensive monitoring and hazing. Nuisance behavior ended.	
10/7/2006	unknown	Gila Wilderness, NM	Investigative Search; dog present	Report of a wolf attacking dogs in the wilderness. Wolf grabbed bear hunting hound by the throat. Owner threw rocks but wolf did not let go until the owner approached.	
10/9/2006	Aspen, M512		Investigative Search; dog present	Individual was gathering horses at their residence with their dog. A wolf pinned the dog by the neck. Owner yelled and threw rocks, but wolf did not let go until the owner approached.	
10/22/2006	Luna	Corner Mountain, NM	Investigative Approach	Close proximity to a human in the Gila National Forest. Intensive monitoring and hazing, nuisance behavior ended.	
11/3/2006	M806	Luna, NM	Investigative Search; dog present; habituated	Dog interaction (non-injurious) and proximity to residence. Intensive monitoring and hazing. Nuisance behavior ended.	
11/9/2006	Aspen	Diamond Creek, NM	Investigative Search; dog present	Dog interaction (non-injurious) and proximity to residence. IFT offered RAG boxes and fladry, but declined by residents. Nuisance behavior ended.	
11/26/2006	Aspen	Diamond Creek, NM	Investigative Search; dog present	Dog interaction (non-injurious). No response by IFT due to lapse in reporting.	
11/28/2006	uncollared (two pups)	Centerfire Creek, AZ	Investigative Search	Close proximity to human in the Apache National Forest. IFT found no wolf sign. Elk hunter encountered two pups traveling down the trail toward her. Pups fled when hunter loaded gun.	
11/29/2006	M806	Middle Mountain, AZ	Investigative Search; habituated; food conditioned	Wolf took elk head from hunting camp. IFT could not locate elk head. Campers left area after hunt ended.	
2/24/2007	unknown	Beaver Creek, AZ	Investigative Search; dog present;	Dog interactions (non-injurious) and proximity (100 yards) to residences. IFT could not confirm wolves in area. Nuisance behavior ended. Resident saw two dogs fighting with two wolves and a third in the treeline. Honked horn and scared the wolves away. Dogs appeared okay, however two days later owner noticed injury to dog's neck (single puncture wound). Potentially Bluestem but no location data available at time of incident.	
3/20/2007	unknown	Rainy Mesa, NM	Investigative Search; dog present	Unknown wolf or wolves injured a dog.	

Date	Wolf ID	General Location	Type of Wolf Nuisance Activity	Human/IFT Action	Wolf Response/Management Result
3/21 to 6/25 2007	F1028	Alpine Divide, Alpine Valley, AZ	Investigative Search; habituated	Multiple duck interactions (fatal), proximity to residence and town (Alpine). Intensive monitoring and hazing. Wolf repeatedly left residence but remained in area. Was observed with injury to leg. Trapped and removed.	
May-07	F923	SCAR	Investigative Search; habituated; food conditioned	Wolf reported near camps and residences.	
9/10 to 11/1 2007	Durango	Indian Peaks, NM, Corduroy Canyon, NM	Investigative Search; habituated; food conditioned	Close proximity to residence. Intensive monitoring and hazing on public lands, wolves left the immediate area but remained in the general vicinity. Wolves went fate unknown by 11/1/2007.	
10/11 to 10/17 2006	M806	Luna, NM	Investigative Search; habituated	Close proximity to town of Luna, NM. Intensive monitoring and hazing. Nuisance behavior ended.	
11/24/2007	uncollared	Glenwood, NM	Investigative Search	Close proximity to Community Center. Wolf remained in the area.	
5/12/2008	uncollared	Railroad Canyon, NM	Investigative Search	Wolf tracks in close proximity to residence. IFT found single set of tracks. Wolf left the area until late May.	
5/26/2008	uncollared	Railroad Canyon, NM	Investigative Search	Wolf tracks in close proximity to residence. IFT found single set of tracks. No further nuisance reported.	
7/1 to 9/4 2008	Laredo	Gila Cliff Dwellings, NM	Investigative Search	Close proximity to campground. Intensive monitoring and hazing. Wolves left campground but remained in the area.	
11/13/2008	uncollared	Beaver Creek, AZ	Investigative Search	Close proximity to residence. Issued cracker shells to landowner for hazing. Wolves left the area, no further nuisance activity reported.	
12/19/2008	M619, F836	Antelope Mountain, AZ	Investigative Search	Tracks observed in close proximity to livestock corral on private property. Conducted intensive monitoring, wolves left the corral but remained in general vicinity.	
2/11/2009	F1054	North of St. Johns, AZ	Investigative Search; habituated	Located 30 miles outside the BRWRA. Seen near human residences. IFT darted the animal and placed it in a holding pen in Fox Mtn Territory. F1054 was not re-released, and taken back to Sevilleta.	
2/28/2009	F1053	West of Quemado, NM	Investigative Search	Resident observed a "coyote" in close proximity to house at night. Shot at the animal, which was discovered to be F1053.F1053 died.	
3/18/2009	Fox Mountain	Near Nutrioso, AZ	Investigative Search	Wolves were near residence and alpacas. IFT used cracker shells to haze wolves, placed fladry around 2 acre alpaca enclosure. No additional incidence of wolves in the area.	
4/4 to 4/11 2009	Fox Mountain	East of Escudilla Mountain	Investigative Search	Wolves on private property, wary of resident but not overly fearful. IFT investigated and took no action - wolves had left the area.	
4/6/2009	Fox Mountain	Spur Lake Basin, NM	Investigative Search	Observed 4 wolves at gate ~ 20 yards. They moved around the house and headed off south.	
7/14/2009	Paradise	FS rd 583 near FS rd 61	Investigative Search; dog present	Individual was exercising his hounds. Heard barking and snarling, loaded hounds and observed 2 wolves cross the road when he left. No injuries to dogs.	

Date	Wolf ID	General Location	Type of Wolf Nuisance Activity	Human/IFT Action	Wolf Response/Management Result
7/23/2009	F1028	South of Negrito Work Center, NM	Investigative Search	Wolf observed in and near a barn on private property. Resident confronted the wolf. Wolf left the area. IFT investigated and took no action as wolf had left the area.	
Aug-09	F1028	South of Negrito Work Center, NM	Investigative Search	In early August, wolf returned to private property and was chased off by resident. IFT investigated, continued to monitor and haze when required.	
Aug-09	unknown	N Bar, NM	Investigative Search	Individual went to equipment yard and saw wolves (30 yards) and chased them off with an ATV. Wolves ran off but not sure whether they stayed inside the fence or not.	
8/13/2009	Hawks Nest	FS road 586, AZ	Investigative approach; dog present	Rider encountered HN pups at rendezvous site. Two adult wolves investigated rider with domestic dog. Rider charged wolves twice, each time wolves ran away. Dog ran toward wolves, rider called it back, and left area with the 2 wolves following.	
8/24/2009	M1155	Near Crosby Crossing, AZ	Investigative Search; dog present	Wolf was present at a camp for a few minutes on morning. Dogs were in trailer, no food available. No actions taken, wolves left the area.	
9/12/2009	uncollared	FS trail 470 north of Cowhead Tank	Investigative Search; dog present	Individual yelled at single uncollared wolf that was running down the 470 trail at his 4 dogs as he was riding up the trail. The wolf ran away.	
9/13 to 9/19/2009	uncollared	Near Greer, AZ	Investigative Search	Wolf seen very close to residence. Issued cracker shells, set traps. No wolves documented in the area.	
9/23/2009	unknown	camp near 157 and 507 NM Gila Wilderness	Investigative Search	Camper observed wolf in campsite, observed for 15 minutes and opened the trailer door and wolf ran off.	
2/13/2010	San Mateo	North of Apache Creek, NM	Investigative Search	Wolves near residence and cattle. No action take as wolves had left the area.	
2/19 to 3/10 2010	uncollared	Cliff, NM	Investigative Search	Report of wolves on private property near residence. IFT monitored and found one potential wolf sized track.	
Mar-10	F1154	North of Mimbres, NM	Investigative Search	Report mid-March. Wolf on private property near residence. Cracker shells issued to landowner. Wolf left the area.	
1/29/2011	M1049	Rudd Creek/Benton Creek, AZ	Investigative Approach; habituated	Wolf unafraid of humans, approached IFT member. 3 cracker shells dispensed, wolf moved away.	
1/31 to 2/2 2011	M1049	Nutrioso, AZ	Investigative Search; dog present; habituated	Wolf in close proximity to residences, interacting with dogs. Showed little fear of people, chased colts in a corral, etc. IFT hazed wolves as well as a resident fired his gun into the air. Wolf ran off but eventually returned. M1049 was captured and returned to captivity.	
Feb and Mar 2011	F1105	Old Horse Springs, NM	Investigative Search; dog present	Wolf observed near human establishment, and entering private elk ranch - fenced area. IFT fixed elk enclosure fence, hazed F1105 on several occasions. F1105 was also observed interacting with a dog.	
2/20/2011	Bluestem	Alpine, AZ	Investigative Search; dog present	Wolves walked through yard, interacted with dog, left yard when chased. IFT walked in on the wolves, they moved off and away from residence.	
2/21/2011	Bluestem	Alpine, AZ	Investigative Search	Wolf near private residence. No action taken, wolves left the area.	

Date	Wolf ID	General Location	Type of Wolf Nuisance Activity	Human/IFT Action	Wolf Response/Management Result
12/13/2011	1105	Beaverhead Ranch	Investigative Search; dog present; habituated	Wolf seen chasing peacocks and heard whimpering near an outbuilding and socializing with ranch dog. Wolf in driveway in close proximity to humans, wolf remained just outside the house on front porch overnight. Lethally removed.	
1/28/2012	uncollared	Poverty, NM	Investigative Search	Wolf along highway in close proximity to people outside the vehicle. IFT investigated and determined it was likely a Mexican wolf and documented wolf tracks in the vicinity. Staff attempts to trap the animal were unsuccessful.	
2/3/2012	uncollared	Near Adobe Ranch	Investigative Search	Wolf approached vehicle around midnight, to within 10 yards. Did no appear aggressive. Observers were concerned with the “tame” behavior of the wolf. Potentially the same wolf observed in Poverty Creek NM on 1-28-12.	
1/29/2013	Fox Mountain	Near Luna, NM	Investigative Search	Three wolves passed near a residence. IFT responded and located 3 Fox Mountain wolves. Packed moved several miles away.	
1/29/2013	M1133	Reserve NM	Investigative Search; habituated	Wolf located near Reserve, did not show fear of humans	
4/5/2013	San Mateo	Sand Flats, NM	Investigative Search; dog present	Report of 2 wolves near a residence, concern that they might attack a domestic dog. IFT responded and confirmed wolves from San Mateo in the area. Wolves moved off, and no additional reports.	
6/17/2013	Bluestem	37/276 Junction	Investigative Search; dog present	Wolf was 30 yards away in woods. Camper saw wolf trot toward dog and called dog back. Wolf continued and left through the meadow.	
7/1/2013	F1295	San Mateo Territory	Aggressive Charge	1295 ran toward human. Human yelled and waved hands, animal ran off.	
7/5/2013	Fox Mountain	Mangas, NM	Investigative Search; dog present	Rancher reported dog was attacked by a wolf while they were rounding up livestock. IFT investigated and confirmed that a wolf attacked the dog. Wolves were hazed from the area.	
8/10/2013	Bluestem	AZ	Investigative Search; dog present	Pack interacted with bear dogs, no injuries. No investigation needed, nor response.	
8/22/2013	unknown	Aragon, NM	Investigative Search; dog present	Report of a wolf attacking a dog. IFT investigated and confirmed wolf involvement. Wolf left the area	
11/22/2013	Paradise	South of Vernon, AZ	Investigative Search	Observed wolves move past house.	

APPENDIX D: WOLF POPULATION, DISTRIBUTION, AND DENSITY PROJECTIONS FOR ALTERNATIVES ONE-FOUR

In order to analyze the environmental consequences of the implementation of our proposed action and alternatives, we estimated the expected Mexican wolf population, distribution, and density in the MWEPA when the population reached the population objective of Alternative One or achieved medium-high wolf densities in Alternatives Two-Four, after which time we would expect impacts to remain fairly constant for all Alternatives. We based our estimations on the extrapolation of information and data from Mexican wolves in the BRWRA and other wolf populations, and related scientific literature.

1.1 Population Growth

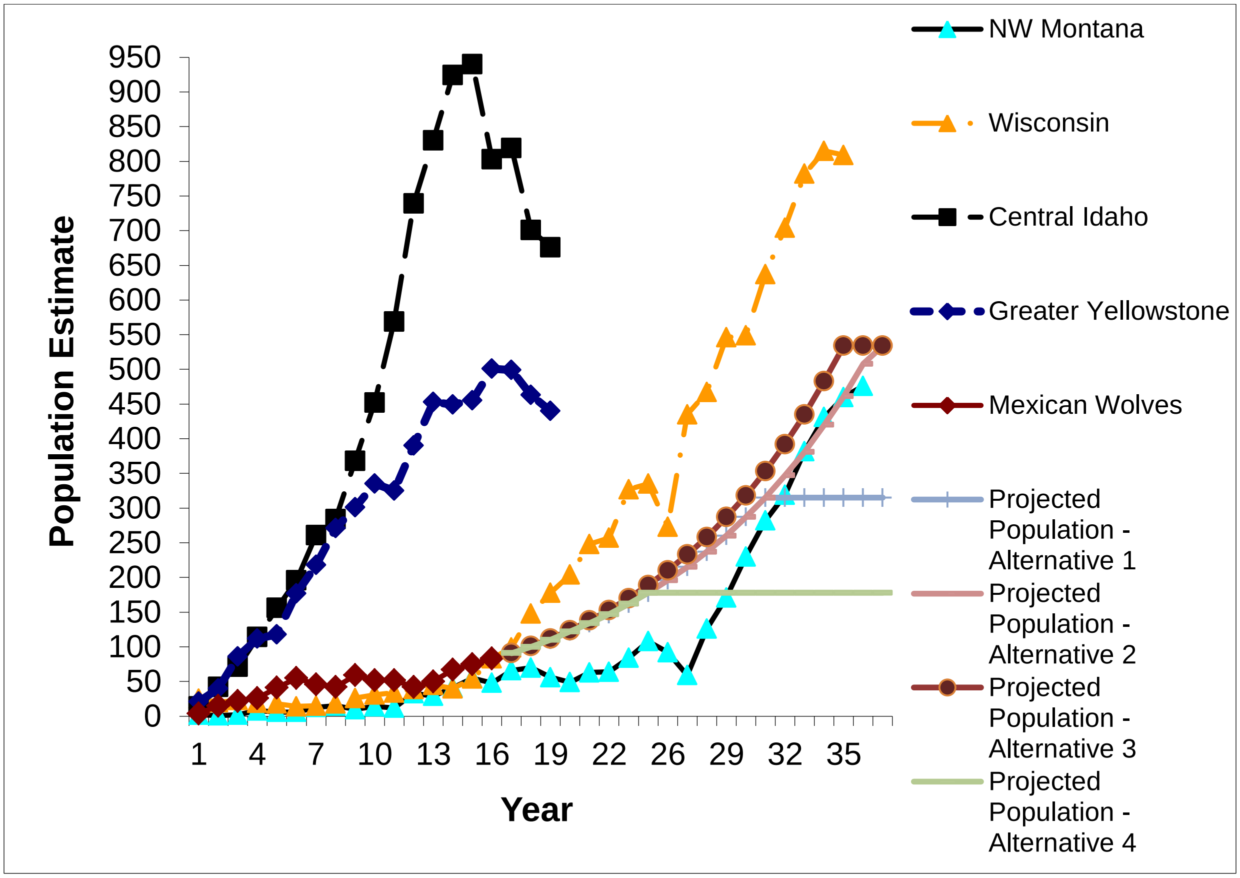
We selected an average annual increase in population size for the proposed action and alternatives after considering the experimental population's growth during the last 16 years, growth exhibited by other wolf populations, and the specific considerations of our project study area and management provisions. We describe how population size or growth may vary between each alternative, below.

Wolf population growth can be highly variable from one time period to the next or for different wolf populations (Fuller et al. 2003, Table 6.8). Natural population growth is driven by pup survival, immigration, and limiting factors such as food availability, disease, and mortality (Fuller et al. 2003), and can be influenced artificially by release of animals or removal of animals, as in the case of a managed, reintroduced population such as the Mexican wolf experimental population. For example, population increases of 450% have been observed from one year to the next in a gray wolf population, as have drastic declines due to harvest or disease (Fuller et al. 2013). Over the reintroduction time frame (1998 to 2013), the Mexican wolf population exhibited an average annual increase of 33% per year, with significant annual variation -- the population decreased by 19% (from 52 to 42 wolves) during 2009, but increased by 40% during 2006 (from 42 to 59 wolves: http://www.fws.gov/southwest/es/mexicanwolf/pdf/MW_popcount_web.pdf).

We have gained extensive knowledge over the last 16 years of the Reintroduction Project regarding the efficacy of the 1998 Final Rule. In particular, we have documented the synergistic or antagonistic interaction of our regulations and our management actions, and their effect on the persistence and growth of, and the genetic variation within, the experimental population (USFWS 2010a). For example, we have observed additive negative population effects from the regulations that restrict initial release, require that we capture and return wolves that disperse outside the boundaries, and that result in increased management related to removal of nuisance or depredating wolves. In the years 1998 through 2002, we conducted a high number of initial releases and translocations (n = 110) and a moderate number of removals (n = 58), which contributed to a net gain of 38 wolves in the overall population and the highest average population growth rate (1.003) (e.g. the average population growth was approximately 100 percent per year: calculated as the population count at year two minus the population count at year one divided by the population at year one) experienced by the population. From 2003 through 2007, we conducted a moderate number of initial releases and translocations (n = 68) and a high number of temporary and permanent removals (n = 84), resulting in a net gain of 10 wolves in the overall population and an average population growth rate that was relatively flat (0.069). Between 2008 and 2013, which was characterized by a low number of releases and translocations (n = 21) but also a low number of removals (n = 17), we observed a net gain of 31 wolves and a higher average population growth rate (0.095) than the previous phase (Tables 1-2 and 1-3).

Using the 2008-2013 period (0.095, or 9.5%) as a starting point from which to develop our population growth estimate, we refined our estimate for the alternatives by considering the specific circumstances of the project for the Mexican wolf. One of the most significant differences the experimental population will experience due to project implementation is exposure to a matrix of suitable and unsuitable habitat, as opposed to the current BRWRA composition of 87% suitable habitat on primarily National Forest land. We consider the potential for wolf mortality due to illegal killing, vehicular mortality, or removal due to depredation or nuisance issues as likely to occur at the same or increased levels, compared to current levels, as wolves disperse within the MWEPA. However, we expect boundary related removals to be reduced, compared to past levels, and initial releases and translocations to occur at higher numbers relative to the 2008 to 2013 time period because of the proposed action. On balance, we expect the proposed changes to result in a slightly higher average population growth compared to the 2008 - 2013 time period. With these considerations in mind, we developed a baseline annual population growth of 11%, which we further refined based on the circumstances of each alternative (below).

The projected baseline population growth rate (11%) we estimated for the Mexican wolf experimental population would exhibit similar growth as the naturally recovering populations of gray wolves in northwestern Montana and Wisconsin (Figure D-1) when these populations were fully protected as endangered species. Population growth of Mexican wolves has never mimicked the higher growth rates that have been observed in the Greater Yellowstone Ecosystem and Central Idaho populations, but has in the past resembled the growth of populations in northwestern Montana and Wisconsin (Figure D-1). We recognize that actual population growth from year to year during the implementation of our proposed action may fluctuate significantly, as it has in the past. The amount of suitable habitat within the MWEPA (excluding tribal lands) is slightly higher (68,938 km^2, including Zone 3) than the amount of high quality habitat within northwestern Montana (44,929 km^2) and the Greater Yellowstone Ecosystem (45,900 km^2) (Oakleaf et al. 2006, pp. 559). However, the suitable habitat within the MWEPA is more patchily distributed than habitat in the Northern Rocky Mountain population. This ancillary information is supportive of a Mexican wolf population that would be limited by habitat at population levels slightly above northwestern Montana or the Greater Yellowstone Ecosystem, but below Central Idaho, which has a greater amount (77,596 km^2) (Oakleaf et al. 2006, pp. 559) and more uniform distribution of high quality habitat. In addition, the Northern Rocky Mountain population has larger protected (e.g., wilderness and national parks with limited or no grazing) areas than the MWEPA.



Data for the Central Idaho, Greater Yellowstone, and northwestern Montana populations were obtained from U.S. Fish and Wildlife Service et al. 2014, while data for the Wisconsin population was obtained from MacFarland and Wiedenhoeft 2013.

Figure D-1. Comparison of experimental Mexican wolf population from 1998-2013 (Year 1 to Year 16) and projected into the future (Year 17 to Year 38) under different alternatives relative to other recovering wolf populations.

1.2 Effective Migrants

We will strive to supplement the experimental population with a specific number of effective migrants per generation to improve the genetic composition of the population (Carroll et al. 2014). We estimate a wolf generation to be 4 years. We expect to achieve effective migration into the MWEPA utilizing initial release of Mexican wolves and cross-fostering of Mexican wolf pups.

Initial releases of Mexican wolves from the captive population are a method to improve genetic composition of the experimental population, as the captive population currently has greater genetic diversity and lower mean kinship than that of the experimental population. Another method to improve genetic composition of the experimental population would be dispersal between other populations of Mexican wolves that have become established. We have considerable experience conducting initial releases and resulting data upon which to guide our actions. Between 1998 and 2013, our initial release success rate has been about 21% (USFWS 2002-2014). In other words, for every 100 wolves we release, only 21 of them survive, breed, and produce pups, therefore becoming effective migrants. Based on this success rate, we expect that we will need to initially release 10 wolves to achieve 2 effective migrants. Based on assessment of initial release success of various releases strategies (single wolves, pairs, packs, etc.), we would expect to achieve this target by releasing 2 packs, each with an adult pair and several pups (estimated as~3 pups), during years 1-4 and 4-8, and 1 or 2 packs during the next three successive generations until year 20, or for 5 generations. The number of effective migrants could decrease in the third and subsequent generations, assuming the population is above 250, as a population of that size is more robust (Carroll et al. 2014). This number of effective migrants (7-10 wolves over 5 generations) is negligible from a population size standpoint but should be significant from a genetic standpoint assuming animals selected for initial release are genetically desirable contributions to the population (Carroll et al. 2014, Fredrickson et al. 2007)

Cross-fostering is a management tool that we began using in 2014. Cross-fostering occurs when offspring are removed from their biological parents and placed with surrogate parents. Our proposed action and alternatives (with the exception of the No Action Alternative which would only allow cross fostering of genetically appropriate animals in the Primary Recovery Zone of the BRWRA (See Figure 1-4)) allow for cross-fostering in Zone 1 and Zone 2, although Alternative One would restrict cross fostering in Zone 1 and Zone 2 based on the phase being implemented (see below). Therefore, we could potentially improve the genetic composition of the experimental population by placing wolf pups from captivity with adult wolves in the MWEPA. It would take at least two years to determine whether a cross-fostering effort has produced an effective migrant (i.e. pups survive to adulthood to breed with other wolves). As this is a new technique for our program, we do not have extensive data regarding its success, although we recognize that once cross-fostered pups have been successfully integrated into a pack, their likelihood of surviving, breeding, and producing pups is equalivant to the other wolves in the experimental population.

1.3 Distribution and Density

As with population growth, wolf density can vary significantly from one population to the next, driven in large part by available ungulate biomass (Fuller et al. 2003, Figure 6.2). Wolf densities of more than 50 wolves per 1,000 km^2 (386 mi^2) to less than 10 wolves per 1,000 km^2 (386 mi^2) have been observed in North America (Fuller et. al., Table 6.2). We estimate wolf density in the BRWRA and the Fort Apache Indian Reservation (FAIR) to be between 3.5 wolves per 1000 km^2 (386 mi^2) to 11.3 wolves per 1000 km^2 (386 mi^2) of suitable habitat depending on the methodology used to calculate density (Table 1-Appendix F). We calculated the current density of wolves within the BRWRA and the FAIR using three methodologies to account for the variation observed in the population. Density in methods 1 and 2 was calculated using the 2012 population count as adjusted (80 wolves) in the 2012 Mexican Wolf Annual Report addendum (USFWS 2013a), with a potential for an additional 10% of wolves being missed during the census (e.g., 88 wolves). Method 1 used the largest area of suitable wolf habitat, that is, suitable wolf habitat on the BRWRA and FAIR. Method 2 used a smaller area to calculate density than method 1 to account for the lower likelihood that some areas have been surveyed or the lower likelihood of wolf presence due to distance from the core population of wolves. Thus, method 2 represented the suitable wolf habitat in the BRWRA and FAIR that was east of highway 73 and north of the Burro Mountains. Finally, method 3 was based on the suitable wolf habitat in the BRWRA and FAIR within the 95% kernel home range of Mexican wolves during 2012 and the number of known wolves occurring within those home ranges (55 wolves); therefore this estimate utilized the smallest area of potential wolf habitat and the smallest number of wolves of the three estimates (Table D-1).

Table D-1. Density estimate of Mexican wolves in BRWRA and FAIR.

Category	Amount of Suitable Wolf Habitat (km^2)	# of Wolves	Density (# of Wolves/1000 km^2)
Method 1	22,851	80-88	3.5-3.9
Method 2	18,457	80-88	4.3-4.8
Method 3	4,874	55	11.3

The density estimate resulting from method 2 is likely the most realistic description of current wolf density in the BRWRA and the FAIR. Our density estimate resulting from method 1 may result in an artificially low density estimate because it included areas that were either not intensively surveyed or too far from the core population to expect wolves to establish; it would be the second lowest density (out of 32 other studies) for gray wolf populations in North America (Fuller et al. 2003). Our density estimate resulting from method 3 may be artificially high because it assumes that wolf territories are adjacent to one another without any interstitial space between territories throughout suitable habitat, which is highly unlikely (Mech and Boitani 2003).

In order to establish a likely future density for wolves to use as a guide for estimating the impacts of our alternatives, we estimated 8 Mexican wolves per 1000 km^2 (calculated based on the estimated wolf population in two 10,000 km^2 restoration zones south of Interstate 40 in Carroll et al. 2006). We chose this density because it does not assume wolf territories are adjacent to each other without interstitial space (e.g. 11.3 wolves per 1000 km^2), but allowed for higher densities than that currently documented in the BRWRA and FAIR (e.g. 4.5). Therefore, we projected the population growth associated with Alternatives Two-Four until such time as the population reached a density of approximately 8 wolves per 1000 km^2 of suitable habitat in Zones 1 and 2 (note: Alternatives One, Two, and Three excluded suitable habitat on tribal lands because tribes have the option of allowing wolves on these lands and determining the number of allowable wolves. Under Alternative Four we included the FAIR because the White Mountain Apache Tribe currently allows wolves to occupy that area).

Over the project time period, we expect wolves to occupy, and have a higher likelihood of persistence in, areas we have identified as suitable habitat in the proposed MWEPA, rather than habitat that is not considered suitable (Figure 1-21). This assumption is supported by our experience with Mexican wolves in the BRWRA (see Figure D-2, note that wolves have not occupied the area in the southwestern portion of the BRWRA despite releases occurring in this area in 1998 and 1999). However, for our proposed action and alternatives, we do not know which patches of suitable habitat may become occupied first (with the exception of the No Action Alternative, see below). For Alternatives Two and Three, wolves dispersing from Zone 1 into Zone 2 may take the first patch of suitable habitat available, resulting in areas in Zone 2 closest to Zone 1 becoming occupied first; or, they may bypass unoccupied habitat and establish a territory further from Zone 1, as has been observed in other gray wolf populations in which wolves disperse beyond the "frontier" of their population (Mech and Boitani 2003). Our translocations and limited initial releases in Zones 2 throughout the time period may also affect wolf distribution. Locations for these management actions will be determined based on our release criteria and the specific circumstances attending the action; thus no discernible pattern can be predicted, although we expect to concentrate our translocation or limited initial release actions in contiguous habitat adjacent to occupied areas. Similar to what has been observed for other gray wolves, whose territories shift over time (Mech and Boitani 2003), Mexican wolves may occupy a patch of suitable habitat for a period of time and then the habitat may become unoccupied due to dispersal, prey availability, mortality, or removal actions.

Under Alternative One, we would implement a phased approach to provide a gradual expansion of wolf occupancy, such that wolves are moving into and occupying contiguous habitat adjacent to occupied areas. We developed two scenarios (A and B) to represent the range of potential desities and impacts relative to Alternative One because of the uncertainty associated with the implementation of the phases. We maintained growth rates at 10% for each scenario, but in scenario A, we assumed that we would remain in Phase 1 for years 1 through 11, thus wolf densities would be highest in this scenario because wolves are distributed in a smaller area than scenario B. In scenario B, we assumed that we would implement Phase 2 for years 6-8, and Phase 3 for years 9-11, which would result in the lowest wolf densities during the first 11 years because wolves would occupy the largest area possible under the phased approach. We examined the projected densities at year 5, year 8, and year 11 to represent the maximum difference between the scenarios during each Phase. Regardless of scenario, we projected that the wolf population in this Alternative would stabilize at approximately 315 wolves based on the population objective of 300-325. Thus, the maximum density for Alternative One would be approximately 4.72 wolves per 1000 km^2 (calculated by dividing the number of wolves (315) by the amount of suitable habitat on non-tribal land in Zones 1 and 2 (66,808 km^2)). The maximum density would be reached around year 13 and would stabilize thereafter (see section 1.4.1 below for specific differnces through time from implementation of the two scenarios).

For Alternatives Two and Three, the population stabilized at approximately 534 wolves (calculated by multiplying 8 wolves per 1000 km^2 by the amount of suitable habitat on non-tribal land in Zones 1 and 2 (66,808 km^2). Full occupancy of Zones 1 and 2 is projected to occur at year 19 under Alternative Two and year 17 under Alternative Three. Due to lack of suitable habitat, we expect wolf density in Zone 3 to be at or near zero (unoccupied) at the end of the project time period for all Alternatives. Under Alternative Four, a maximum of approximately 178 wolves would be present on the BRWRA and FAIR at year 7 to 8 based on wolves occupying suitable habitat at a density of 8 wolves per 1000km^2, and the population would remain stable into the future.

1.4 Alternatives

1.4.1 Alternative One

In this Alternative we assume a 10% annual population growth until the population achieved the population objective (300-325), for an estimate of around 315 wolves in year 13 regardless of which Scenario (A or B) was implemented (Table D-2). This is less than the baseline of 11% because in this alternative we will include two new provisions for take on non-Federal land that the 1998 Final Rule does not include (see proposed rule (7)(iv)). One provision allows for the take of Mexican wolves by domestic animal owners or their agents if wolves are in the act of biting, killing, or wounding a domestic animal on non-Federal lands. This provision expands the previous take provision for livestock under the 1998 Final Rule to now include non-feral dogs on non-Federal lands. We estimate, based on the number of dog injuries or mortalities that have occurred from 1998 to 2013 (30 dogs over 16 years, or 1.9 dog injuries or deaths per year across all land types, an incident rate of 0.041 dogs per wolf, that this provision could result in the attempted take of approximately 1.9 wolves per year (one wolf per dog incident), or approximately 4 potential incidents that allow for take per 100 wolves. However, it is likely that some of these events will occur at night or in conditions in which attempts to take a wolf are unsuccessful. We estimate that actual take of a wolf would occur only in about 25% of the instances in which take would be authorized, or the take of 1 wolf every other year. However, because the wolf population would be increasing over time, we also analyzed the information relative to our population size at a rate of 0.01025 per wolf (0.25 (probability of successful take) multiplied by 0.041 (probability of an individual wolf being involved in a dog incident), which results in the average take of approximately 2 wolves per year. Based on these calculations, we use a 10% average annual growth for this alternative, rather than the baseline growth rate of 11%.

The second take provision would provide for the conditional issuance of permits to allow domestic animal owners or their agents to take (including intentional harassment or kill) any Mexican wolf that is present on non-Federal land owned by the domestic animal owner. In these instances, we are allowing the permittee to assist us in completing a management action to address a conflict situation. The permit will thus not allow for any take beyond that which we are already attempting to conduct. Therefore, the amount of take we expect if we issue these permits is equivalent to the amount of take we expect if we do not issue them.

Scenarios A and B were modeled with the same growth rate, but differed relative to the implementation of the phases and thus the area that wolves were allowed to occupy. The density of wolves, and therefore the associated impacts would be more concentrated under Scenario A within the smaller area defined by

Phase 1 relative to the broader area defined by Phase 3. To illustrate this pattern we calculated wolf:elk ratios and wolf density through time (Table D-2). The two Scenarios result in no differences in density or wolf:elk ratios through year 5, minor differences in years 6-8, larger differences in year 9-11, and no differences following year 12.

Table D-2. Experimental population projection at 10% annual growth until the population goals of 300-325 wolves are achieved.

Year	End-of-Year Population	Density of Wolves under Scenario A (wolves/1000 km^2 of suitable habitat)[1]	Density of Wolves under Scenario B (wolves/1000 km^2 of suitable habitat)[1]	Wolves per 1000 elk Ratio under Scenario A[2]	Wolves per 1000 elk Ratio under Scenario B[2]
*2014**	*91*	*N/A*	*N/A*	*N/A*	*N/A*
Year 1	100	1.92	1.92	1.46	1.46
Year 2	110	2.11	2.11	1.60	1.60
Year 3	122	2.34	2.34	1.78	1.78
Year 4	134	2.57	2.57	1.95	1.95
Year 5	147	2.82	2.82	2.14	2.14
Year 6	162	3.11	2.74	2.36	2.04
Year 7	178	3.41	3.01	2.59	2.24
Year 8	196	3.76	3.31	2.86	2.47
Year 9	215	4.12	3.22	3.13	2.69
Year 10	237	4.55	3.55	3.45	2.96
Year 11	260	4.99	3.89	3.79	3.25
Year 12	287	4.30	4.30	3.59	3.59
Year 13	315	4.72	4.72	3.94	3.94
After year 13	315	4.72	4.72	3.94	3.94

Note: *2014 is not included in the project time period but assumes 10% growth from 2013 in order to provide a starting point for the projection.

[1]Based on the amount of suitable habitat on non-tribal lands in Zones 1 and 2 in Phase 1 (52,143 km^2) for Scenario A and suitable habitat on non-tribal lands in Phase 1 (52,143 km^2) in years 1-5, Phase 2 (59,045 km^2) in years 6-8, and Phase 3 (66,808 km^2) in years 9-11 for Scenario B. Years 12 and beyond were based on full implementation at 66,808 km^2 of suitable habitat.

[2]Elk populations were based on herd units in Arizona and New Mexico. In herd units where a herd unit was bisected by the boundaries for the specific Phase, we used the geographic proportion of the herd unit in each phase to represent the proportion of elk in each phase. This resulted in 68,641 elk available in Phase 1, 79,458 elk in Phase 2, and 79,933 elk in Phase 3 or full implementation on non-tribal lands in New Mexico and Arizona.

We would expect to provide at least 2 effective migrants via initial releases to the population in years 1-4 and 5-8, and 1-2 effective migrants in subsequent generations until year 20 (or five generations). In Alternative One, initial release sites in the Tonto, Pleasant Valley, and Payson Ranger Districts of the

Tonto National Forest, the Sitgreaves National Forest, the Magdalena Ranger District of the Cibola National Forest, and the Gila National Forest, in addition to the Apache National Forest, would be available for us to choose from as we select the best site for each release. Depending on our management agreements with tribal governments, we may also be able to conduct initial releases on tribal land. We may also develop management agreements with other private landowners (with the concurrence of the respective State game and fish agency) and tribes in Zone 2 for release and management of wolves. We expect to utilize the same, or similar, release criteria as those currently in place for the BRWRA, which specify:

"Releases sites must be:

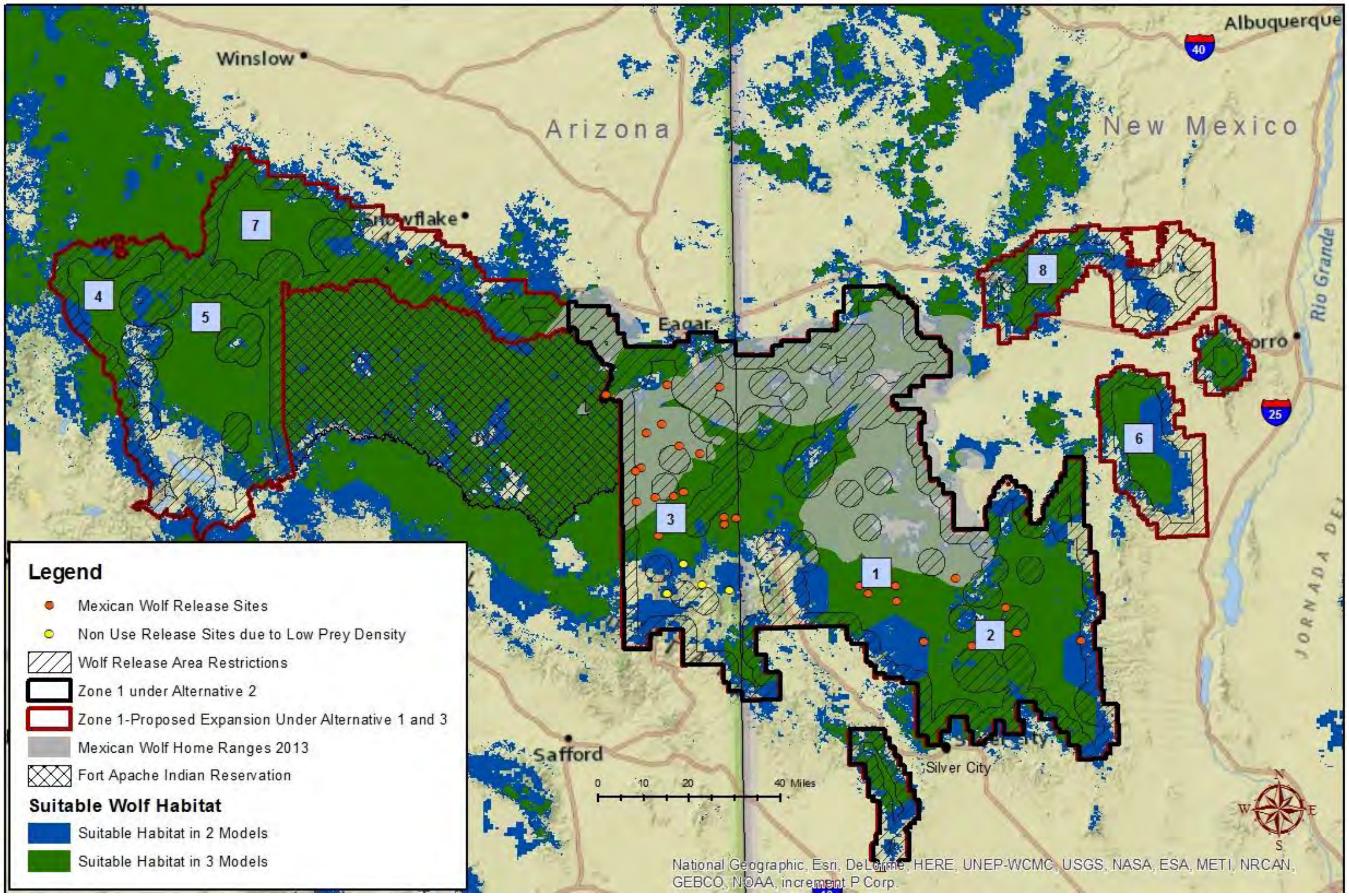
i. Five or more miles from a town.

ii. Three or more miles from a dwelling occupied year-round.

iii. Three or more miles from Recovery Area boundaries.

iv. In areas of adequate prey abundance (e.g. elk, deer, and other native ungulates), based on the best available information from the appropriate state or tribal wildlife agency."

Based on applying our current criteria to Zone 1, we expect to have adequate availability of initial release sites for the initial releases during future generations (see Figure D-2) that is, we would need 7-10 sites available (unoccupied by established wolf packs) for the release of packs. However, these actions will also depend on the natural recolonization of the area. Coordination with state and federal agencies, counties, tribes, and the public would be needed prior to identifying specific release sites in Zone 1 outside of the BRWRA (Figure D-2). Scenario A differs slightly from Scenario B relative to areas available to initially release wolves, such that under Scenario A, area 4 (Figure D-2), would not be available until after year 11 whereas in Scenario B, it would be available after year 5. In addition, we would expect Scenario A to result in a higher density of wolves in years 6-11 (Table D-2), which could also limit available release sites due to the occupancy of those sites by recolonizing wolves. Combined, these impacts could limit the recruitment of individuals and should be considered by decision makers when determining if the next phase of implementations should occur. Conversely, cross-fostering efforts could provide effective migrants and would mitigate these concerns. Thus, decision makers should also consider the number of effective migrants that are achieved through cross-fostering during determination of phased implementation.



Credit: USFWS.

Figure D-2. Map of release restrictions in Zone 1 under Alternative One (black and red polygons), Alternative Two (black polygon only), and Alternative Three (black and red polygons) and current release sites approved within the BRWRA (Orange and Yellow Dots).

Numbers represent areas where effective migrants could potentially be recruited into the population as initial releases depending on Alternatives. Suitable habitat is identified as blue or green areas. Wolf home ranges are considered proprietary information and not displayed on the Fort Apache Indian Reservation per agreement with the White Mountain Apache Tribe.

Under Alternative One, wolf occupancy in the MWEPA would be influenced by a combination of initial releases (Zone 1, and the potential to conduct initial releases under management agreements with private landowners (with the concurrence of the respective state wildlife agency) and tribes in Zone 2), translocations (Zones 1 and 2), natural reproduction and dispersal events (Zones 1, 2 and 3), as well as management removals and mortalities. At the beginning of the project time period (year 1), wolves will occupy the Gila and Apache National Forests in Zone 1. Based on 2013 occupancy, wolves will occupy approximately 30% (9,579 km^2 (3,698 mi^2) of Zone 1, or about 33% (8,975 km^2 (3,465 mi^2)) of the suitable habitat in Zone 1. Our ability to begin conducting initial releases into the Gila National Forest (the former SRZ of the BRWRA) and the Magdalena Ranger District of the Cibola National Forest, the Sitgreaves National Forest, and the Tonto, Payson, or Pleasant Valley Ranger Districts of the Tonto National Forest, as well as continued ability to conduct (limited, due to spatial constraints from existing wolf occupancy) initial releases in the Apache National Forest, will likely result in these areas serving as sources of wolves dispersing into unoccupied suitable habitat elsewhere in the MWEPA. Zone 1 is comprised almost entirely (83%) of suitable habitat.

At the beginning of the project time period, based on 2013 occupancy, wolves will occupy approximately 3% (5,419 km^2 (2,092 mi^2)) of Zone 2, or about 6% (3,313 km^2 (1,279 mi^2)) of suitable habitat in Zone 2, due to their presence on the FAIR. Zone 2 contains a more varied matrix of suitable (27%) and unsuitable (83%) habitat than Zone 1. Wolf occupancy will expand in Zone 2 over time from natural dispersal out of Zone 1 or from FAIR, by a translocation, or (less likely) an initial release we conduct into this zone. These events could happen relatively quickly after project implementation (during the first year), pending the appropriate local coordination and planning. A phased management approach would provide a more predictable pattern of expansion.

At the beginning of the project time period, no wolves will occupy Zone 3. Wolves may disperse into Zone 3 from Zone 2, but we consider it unlikely that a wolf would establish a territory in Zone 3, as it contains very little suitable habitat (1% of Zone 3 is suitable habitat). We therefore see no real likelihood of occupancy in Zone 3.

We do not provide a location-specific projection of occupancy of suitable habitat due to our inability to predict occupancy of a specific patch of suitable habitat at a specific time, recognizing that occupancy will be continually shifting due to natural population dynamics and management actions (e.g., translocations or removals), particularly in Zone 2. Based on our population projections, density predictions, and the amount of suitable habitat in Zones 1 and 2, we do not expect Alternative One to be habitat limited. That is, in Zones 1 and 2, wolves will not likely occupy all available suitable habitat.

1.4.2 Alternative Two

Alternative Two mirrors Alternative One in all provisions except for: (1) the geographic designation of Zone 1: in this Alternative, the Tonto, Sitgreaves, and Cibola National Forests would be in Zone 2 (Figure D-2), (2) the phased approach to management would not be used, and (3) we would not establish a population objective. We would therefore be limited to conducting initial releases in the Gila National Forest and the entire Apache National Forest. In addition, the population would expand beyond the population objective of Alternative One and become limited by wolf densities in suitable habitat. Depending on our management agreements with tribal governments, we may also be able to conduct initial releases on tribal land in Zone 2. We may also develop management agreements with other private landowners (with the concurrence of the respective state wildlife agency) in Zone 2 for release and management of Mexican wolves. Due to its similarity to Alternative One, we assume a 10% annual average population growth over 19 years in Alternative Two, for a population estimate of around 534 wolves in year 19 (Table D-3), at which time the population would be limited by habitat constraints set at a density of approximately 8 wolves per 1000 km^2.

Table D-3. Experimental population projection at 10% annual growth until the density achieves approximately 8.0 wolves per 1000 km^2.

Year	End-of-Year Population	Density of Wolves under Alternative Two (wolves/1000 km^2 of suitable habitat)[1]	Wolves per 1000 elk Ratio under Alternative Two[2]
*2014**	*91*	*N/A*	*N/A*
Year 1	100	1.50	1.25
Year 2	110	1.65	1.38
Year 3	122	1.82	1.53
Year 4	134	2.01	1.68
Year 5	147	2.20	1.84
Year 6	162	2.42	2.03
Year 7	178	2.66	2.23
Year 8	196	2.93	2.45
Year 9	215	3.22	2.69
Year 10	237	3.55	2.96
Year 11	260	3.89	3.25
Year 12	287	4.30	3.59
Year 13	315	4.72	3.94
Year 14	347	5.19	4.34
Year 15	381	5.70	4.77
Year 16	420	6.30	5.25
Year 17	461	6.90	5.77
Year 18	508	7.60	6.36
Year 19	534	7.99	6.68
After Year 19	534	7.99	6.68

Note: *2014 is not included in the project time period but assumes 10% growth from 2013 in order to provide a starting point for the projection.

[1]Based on the amount of suitable habitat on non-tribal lands in Zones 1 and 2 at 66,808 km^2.
[2]Elk populations were based on herd units in Arizona and New Mexico that were estimated at 79,933 elk.

In this alternative, we would expect to provide at least 2 effective migrants via initial releases to the population in years 1-4 and 5-8, and 1-2 effective migrants in subsequent generations (through at year 20, or 5 generations). Based on 2013 occupancy of established packs (Figure D-2), the BRWRA currently has 2-3 sites available for initial releases that are considered to be within suitable habitat that is currently unoccupied by established wolves (Figure D-2). With natural population growth and the translocations of wolves into these areas during 2014-2015, these areas may become occupied by wolves in the next 2 years (Note: Initial releases or translocations were conducted during 2014 at sites near locations 1, 2, and 3 in Figure D-2). If they do not become occupied, we would have the minimum capacity necessary to conduct 2 releases during the first 4 years, with very little or no flexibility in site selection. It is highly unlikely, with a growing population, that any release sites would be available during subsequent generations; therefore, we would be unable to achieve the level of effective migration we are seeking from conducting initial releases, unless we were to translocate wolves out of occupied habitat to allow for additional initial releases. In this situation, we could attempt to improve the genetics of the population through cross-fostering of pups; however, we are unsure of our ability to successfully integrate cross-fostered wolves into the population. Therefore, we have greater uncertainty under Alternative Two than under Alternative One (or Three) that we would achieve the level of effective migration we deem necessary to improve the genetic composition of the experimental population.

Signifigant differences occur relative to the ultimate density and number of wolves between Alternatives One and Two because we do not establish a population objective in Alternative Two (Table D-3).

Based on 2013 occupancy, wolves will occupy approximately 46% (8517 km^2 (3289 mi^2) of Zone 1 at the beginning of the time period. In this Alternative, suitable habitat occurs in 87% of Zone 1; there are 16,221 km^2 (6,263 mi^2) of suitable habitat in Zone 1. Mexican wolves occupied about 50% (8029 km^2 (3100 mi^2)) of the suitable habitat in Zone 1 in 2013. At the beginning of the project time period, based on 2013 occupancy, wolves will occupy approximately 3% (6468 km^2 (2497 mi^2)) of Zone 2, or about 7% (4259km^2 (1645 mi^2)) of suitable habitat in Zone 2, due to their presence on the FAIR. Approximately 30% of Zone 2 is suitable habitat; there are 65,008 km^2 (25,100 mi^2) of suitable habitat in Zone 2.

We expect a different occupancy pattern and density in Zones 1 and 2 under Alternative Two than Alternative One due to maintenance of a population objective in Alternative One. While, under Alternative 2, we would not be conducting initial releases into the Magdalena Ranger District of the Cibola National Forest, the Sitgreaves National Forest, and the Tonto, Payson, and Pleasant Valley Ranger Districts of the Tonto National Forest, these areas would likely become occupied via natural dispersal of wolves from Zone 1 or by our translocation events, as they provide high quality suitable habitat on Federal land. We do not foresee any difference in wolf occupancy in Zone 3 in this Alternative as compared with Alternatives One or Three; that is, wolf dispersal into, and occupancy of, Zone 3 will be rare or nonexistent.

We expect a wolf population of approximately 534 wolves to be habitat limited, but additional wolves could be present on tribal lands with the agreement of the tribal government. In addition, impacts in various resource areas are expected to be higher under Alternative Two than Alternative One principally due to the higher number and density of wolves under Alternative Two.

1.4.3 Alternative Three

This alternative mirrors Alternative One in all provisions (and therefore initial occupancy descriptions) except that: (1) the two take provisions discussed under Alternative One would not be allowed, (2) the modified definition of unacceptable impacts to wild ungulates and the modified take provision related to unacceptable impacts to wild ungulates would not be included, (3) the phased approach to management would not exist, and (4) we would not establish a population objective. Consequently, we would expect the wolf population to grow slightly more rapidly towards the limit of habitat constraints at a density of 8.0 wolves per 1000 km^2. Therefore we projected an 11% annual average population growth until the wolves reached a density of 8 wolves per 1000 km^2 (Table D-4). This resulted in wolves reaching a population of 534 in Year 17 (Table D-4) rather than year 19 (Table D-3) under Alternative Two.

Table D-4. Experimental population projection at 11% annual growth until the density achieves approximately 8.0 wolves per 1000 km^2.

Year	End-of-Year Population	Density of Wolves under Alternative Two (wolves/1000 km^2 of suitable habitat)[1]	Wolves per 1000 elk Ratio under Alternative Two[2]
*2014**	*91*	*N/A*	*N/A*
Year 1	101	1.51	1.26
Year 2	112	1.68	1.40
Year 3	125	1.87	1.56
Year 4	139	2.08	1.74
Year 5	154	2.31	1.93
Year 6	171	2.56	2.14
Year 7	190	2.84	2.38
Year 8	210	3.14	2.63
Year 9	234	3.50	2.92
Year 10	259	3.88	3.24
Year 11	288	4.31	3.60
Year 12	319	4.77	3.99
Year 13	355	5.31	4.44
Year 14	394	5.90	4.93
Year 15	437	6.54	5.47
Year 16	485	7.26	6.06
Year 17	534	7.99	6.68
After Year 17	534	7.99	6.68

Note: *2014 is not included in the project time period but assumes 10% growth from 2013 in order to provide a starting point for the projection.

[1]Based on the amount of suitable habitat on non-tribal lands in Zones 1 and 2 that we estimated at approximately 66,808 km^2.

[2]Elk populations were based on herd units in Arizona and New Mexico that were estimated at 79,933elk.

We expect a wolf population of approximately 534 wolves to be habitat limited, but additional wolves could be present on tribal lands with the agreement of the tribal government. In addition, impacts in various resource areas (such as elk populations in this example) are expected to be higher under Alternative Three than Alternative One, principally due to the higher number and density of wolves under

Alternative Three. Because Alternative Three has higher growth rates (due to fewer take provisions) than Alternative Two, this alternative reaches suitable habitat saturation two years earlier than Alternative Two. Alternative Three also has more areas to conduct initial releases than Alternative Two, which should allow for more certainty in attaining goals for effective migrants. However, Alternative One is similar in terms of areas for initial releases, particularly under Scenario B.

1.4.4 No Action Alternative

In this Alternative, we would expect population growth to remain similar to what we observed from 2008-2013, until such time as the population was limited by factors such as: (1) inbreeding and decreased reproductive success resulting from a reduced ability to conduct initial releases (Fredrickson et al. 2007), (2) increasing numbers of management actions and removals due to boundary violations as wolves search for unoccupied habitat, and (3) limited translocations due to reduced availability of suitable translocation sites. Thus, we selected an initial population growth rate of 10% for this alternative. However, we projected that suitable habitat would become saturated before the end of the project time period and thus we also limited the number of wolves based on projected densities in this Alternative.

Based on a medium-high density of wolf occupancy in the BRWRA and the FAIR (8 wolves per 1000km^2) most suitable habitat is filled by no later than midway through year 7 of the project. Therefore, we projected 10% growth for years 2015 to 2021 and no growth thereafter. We would expect a population of around 178 wolves (i.e., 7 years of 10% growth (through 2021 see Table D-2) 0% growth in subsequent years), to arrive at a density of approximately 8.0 wolves per 1000 km^2 of suitable habitat.

Under this Alternative we would not have the capacity to conduct initial releases to achieve 2 effective migrants per generation. We attempted 2 initial releases in 2014 into habitat deemed to be marginal within the PRZ due to its proximity to other wolves; both initial releases failed likely due to interactions with wolves in nearby territories, resulting in the two pairs of wolves splitting up and the two initially released animals failing to be incorporated into the population. We consider it highly unlikely that we would be able to conduct adequate initial releases during the first generation (note: only area 3 in Figure D-2 would be available for initial releases), and even less likely in the second, third, or subsequent generations. In this alternative, spatial constraints from the expanding population would also mean that unoccupied habitat for translocations would not be available. We would not meet our genetic goals under this alternative, and, as the population grows, the lack of genetic variation in the population will become more pronounced and the likelihood of inbreeding will increase (Fredrickson et al. 2007, Siminski and Spevak 2013). Our best option for reducing the risk of inbreeding in the population might be to remove wolves that have genes that are overrepresented in the population or show evidence of inbreeding and replace them with genetically desirable wolves. This would not be a long-term solution, however, as population size would be constrained under this Alternative, ultimately constraining the genetic composition. We could also conduct cross-fostering within the portion of the Apache National Forest that is considered the Primary Recovery Zone (PRZ) of the BRWRA. However, we have been prepared to conduct cross-fostering in each of the past three years, but for a variety of reasons, primarily related to the wolves denning outside of the PRZ, we have been unable to attempt cross-fostering in this area with pups from captivity (which would be considered an initial release).

This Alternative represents a continuation of the regulations in the 1998 Final Rule. At the beginning of the time period, wolves will occupy approximately 46% of the BRWRA (50% of suitable habitat in the BRWRA) at their current density. Occupancy of currently unoccupied suitable habitat would be driven primarily by natural population growth and dispersal, with very limited or no initial releases and translocations due to our spatial limitations within which to conduct these management actions. We would expect an increasing number of boundary violations over time, as space available in the BRWRA to establish territories becomes more and more limited due to population growth (AMOC and IFT 2005). We would expect most of the suitable habitat in the BRWRA, and presumably the Fort Apache Indian Reservation to the degree allowable as established in our management agreements with the White Mountain Apache Tribe, to be occupied at densities that may be unachievable because of the juxtaposition of suitable habitat to the boundaries of the BRWRA.

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APPENDIX E: SUMMARY OF PUBLIC COMMENTS ON THE DRAFT ENVIRONMENTAL IMPACT STATEMENT FOR THE PROPOSED REVISION TO THE NONESSENTIAL EXPERIMENTAL POPULATION OF THE MEXICAN WOLF (CANIS LUPUS BAILEYI)

We received over 36,000 substantive comments during the 2014 public comment period addressing a wide range of topics on our draft EIS. We categorized comments according to the major components of the EIS so that we could efficiently group, condense, and respond to comments. For this reason, and due to the large number of comments we received, we do not identify the commenter in the following appendix. We also do not include responses to many editorial comments that we accepted by correcting our text; these include punctuation, citation omissions, formatting issues, and similar comments. Chapter 6 provides additional information summarizing our public process for the development of the EIS, including a description of our scoping process, public information sessions, public hearings, and public comment periods.

General or Editorial

Comment: The document is not consistent in the use of the terms Apache Forest and the Apache-Sitgreaves National Forest.
Our response: The Apache and the Sitgreaves National Forest are managed by the Forest Service as one unit however only the Apache National Forest is part of the BRWRA established under the 1998 Final Rule. Some data is available only for the entire Apache-Sitgreaves National Forest.
Resolution: We have reviewed the draft EIS and resolved inconsistencies in usage and data where possible.

Management Plan

Comment: The Mexican Wolf Management Plan for portions of Arizona, New Mexico, and Texas outside of the MWEPA is an integral part of the 2013 proposed revision to the nonessential experimental population of the Mexican wolf. However, the management plan was withdrawn from review by the Service and hasn't been rereleased to the public for review and comment.
Our response: The development of a management plan for Mexican wolves for portions of Arizona, New Mexico and Texas outside of the MWEPA was considered as part of an alternative that was not brought forward for further consideration in the draft EIS. We address the reasons that we did not bring it forward in subsection 2.2.2.2 of the EIS.
Resolution: No further action.

Suitable Habitat

Comment: Commenter questioned how the Service used Oakleaf et al. 2006 to generate the suitable habitat map considering that Oakleaf et al. 2006 analyzed habitat in Idaho, Montana, and Wyoming.
Our response: We identified potential wolf habitat in Arizona and New Mexico by combining three methods that have been used to assess wolf habitat in the current scientific literature: (1) Carroll et al. (2006), areas with an wolf occupancy level >25% under current landscape conditions; (2) Carroll et al. (2013), areas with a wolf habitat score greater than 700 (based on a scaled metric for habitat suitability that ranged from 1 to 1000 based on a multiplication of land cover, greenness, slope, and habitat effectiveness; the level of ≥700 was suggested by authors as an effective point to consider as potential wolf habitat in this analysis); and (3) Oakleaf et al. (2006), areas in Arizona and New Mexico that were primarily forested. Oakleaf et al. (2006) utilized a more complex model that included forest cover, human density, elk density, and domestic sheep density. However, for identifying potential wolf habitat, we only utilized the readily available forest cover for this analysis. Percent forest cover was the first parameter retained in all of the competing models analyzed by Oakleaf et al. (2006). We generated a

grid that indicated where all 3 models agreed, where 2 out of 3 models agreed, and where only 1 out of 3 models suggested that the area was wolf habitat. We consider the areas where at least 2 models spatially concur with each other as potential wolf habitat for the purposes of the EIS.
Resolution: No further action.

Comment: Commenter stated that Carroll et al. 2006 described wolf habitat as having adequate prey and connectivity, and that the Service failed to follow those caveats, particularly for connectivity. How are isolated patches of habitat such as the sky islands, which likely have low prey, considered suitable habitat?
Our response: See previous response. In addition, we further describe our methodology for identifying suitable habitat in Section 3.2.
Resolution: No further action.

<u>EIS Purpose/Need or Alternatives</u>
***Comment*:** One of the implicit tenets of the Service's proposal is that liberalizing the circumstances for legal take creates a net benefit for the subspecies. Indeed in both a statutory and logical sense, the only reason to allow increased take is because it furthers conservation (Section 10(j)(2)(A)), i.e., recovery (16 U.S.C. 1532 (3)) of the species. However, the connection between wolf killing and tolerance is increasingly unsupported by science. Recent research shows that take of wolves, either by management agencies or via hunting, lowers tolerance for wolf occupancy (for a recent review of the literature see Treves and Bruskotter, 2014; see also Hogberg *et al.*, 2013). The Service may be acting under the assumption that increased legal take will lead to tolerance and therefore to decreased illegal take. Unless the Service is explicit about the assumptions underpinning the decision to choose Alternative 1, which allows more take and leads to a lower population growth rate than Alternative 3, and can support these assumptions with credible scientific findings, the Service is at risk of making an arbitrary decision.
Our response: The Hogberg et al. 2013 survey was undertaken to "understand change in attitudes towards wolves among people living inside and outside of wolf range in Wisconsin, since the first legal wolf harvest in Wisconsin." We do not consider this survey applicable to an understanding of the effectiveness or ineffectiveness of agency wolf management actions toward improving the tolerance of the affected communities for the reintroduction of wolves. As stated in Treves and Bruskotter, 2014: "The terms tolerance and intolerance are widely used to capture both individual level judgments of predators (such as attitudes and perceptions), as well as individual behaviors (such as poaching) that directly or indirectly influence outcomes for predators." While "the factors that affect people's tolerance of wildlife are not well understood" (Treves and Bruskotter, 2014) the Service's experience in the Mexican wolf reintroduction and the successful wolf reintroductions in the northern Rocky Mountains and upper Great Lakes supports our cited statement in Section 1.2.4.3 of the DEIS that "Minimizing wolf-human conflicts through active management is an essential ingredient to establish and maintain public tolerance of wolves, particularly from those communities living close to wolf populations (Jimenez 2013, Bangs et al. 2005, Fritts et al. 2003, Bangs et al. 1998, Mech 1995, Bangs et al. 1995, Fritts and Carbyn 1995). In a recent study by Olson et al. 2014, the authors state, "To our knowledge, this research provides the first demonstrated link between illegal wildlife killing and management authority under the ESA. This suggests that consistent and responsible depredation management programs may reduce illegal killing (p. 10)."
Resolution: No further action.

Comment: "Agencies shall not commit resources prejudicing selection of alternatives before making a final decision (sec. 1506.1)"(CEQ 40 CFR 1502.2 (f)). The proposed action will unavoidably commit resources prejudicing selection of alternatives before making a final decision in the revision of the Recovery Plan.

Our response: No commitment of resources necessary to implement the proposed action (i.e., budget requests, funding allocations, staffing changes or the hiring of additional personnel) have been, or will be, made until after the filing of the record of decision.
Resolution: No further action.

Comment: Commenters stated that the Service is piecemealing its actions for the Mexican wolf to avoid findings of significance, from starting with a population objective of 100, expanding to 300, and still claiming that additional wolves/wolf populations will be needed for recovery. The proposed action is connected with the reasonably foreseeable recovery plan revision, which the Service states is expected to be completed following issuance of a revised final rule. Both are interdependent parts of the larger Mexican Wolf Recovery Program and depend on the larger action for their justification, and therefore should be evaluated in a single EIS.
Our response: Section 1508.27 of the NEPA regulations, defines the word "significantly" as used when the Act refers to "a major Federal action significantly affecting the quality of the human environment." Such actions require preparation of an EIS, thus the definition of "significantly" indicates how the significance of impacts should be measured in an EA. If the effects of a federal action are not "significant," then a Finding of No Significant Impact (FONSI) can be issued and the project proceeds with no further NEPA review. If the definition is met, then an EIS is needed. We have drafted an EIS because we acknowledge that the Federal action is in fact "significant" as that term is defined in the NEPA regulations. Furthermore, although commenter referenced 40 C.F.R. § 1508.25, that section provides guidance for determining the scope of an environmental impact statement not an evaluation of significance.

"Segmentation" can occur when a federal action is improperly divided and analyzed in smaller separate components. However, projects that have independent utility and logical termini can be considered individually under NEPA. As specified in our 1998 Final Rule, the reintroduction of the Mexican wolf into the BRWRA was envisaged "as the first step toward recovery of the Mexican wolf in the wild" (63 FR 1752, January 12, 1998). The scope of the 1996 Final EIS was limited to the actions proposed to initiate the reintroduction of Mexican wolves within part of the subspecies' historical range in the southwestern United States. The scope of our 2014 EIS is limited to considering actions intended to further the conservation of the Mexican wolf by improving the effectiveness of the Reintroduction Project in managing the experimental population. Accordingly, both this EIS and our 1996 Final EIS state that considering actions necessary for the full recovery of the Mexican wolf are" beyond the scope" of the EIS. The independent utility of our proposed action and its logical termini is the achievement of the goals as laid out in Section 1.2 and summarized in Section 1.3 of the draft EIS. We do intend for the experimental population of Mexican wolves to contribute to recovery. However the size of the metapopulation of Mexican wolves needed for recovery, the number of semi-disjunctive but viable subpopulations that might make up that metapopulation, the areas in which those subpopulations should be established, and the degree of connectivity needed between those areas are some of the many issues associated with revising the 1982 Mexican Wolf Recovery Plan that are, at this time, speculative and the subject of ongoing review and debate. Section 4(f) of the ESA directs the Service to develop and implement recovery plans for threatened and endangered species. While all recovery plans are made available in draft form and public comments are solicited before the plan is finalized, the completion of a recovery plan itself does not constitute a major federal action requiring NEPA review. The management actions needed to implement the guidance of a revised recovery plan for the Mexican wolf may be subject to NEPA review if they are to be undertaken by a Federal agency. However, until that plan is completed those actions that will be needed to achieve full recovery of the Mexican wolf are speculative and not "reasonably foreseeable" at this time. For these reasons we disagree with the commenter's statements that "the proposed action is connected with the reasonable foreseeable recovery plan revision" or that "the

proposed action and a revised recovery plan should be evaluated in a single EIS."
Resolution: No further action.

Comment: The analysis discusses the survival of the experimental population, but does not describe the relative effects this population would have on the recovery of the species *Canus lupis baileyi*.
Our response: We state in Section 1.2 of the DEIS that "The **purpose** of our proposed action is to further the conservation of the Mexican wolf by improving the effectiveness of the Reintroduction Project in managing the experimental population." We also state in subsection 1.2.1 that "we intend for the experimental population of Mexican wolves that we reestablish in the MWEPA to contribute to recovery…" More specifically, we expect that the Mexican wolves in the experimental population in the MWEPA will count toward demographic recovery criteria. An analysis of the possible impact of the proposed action and alternatives on the listed population of the Mexican wolf is provided in section 4.3.
Resolution: No further action.

Comment: Commenters stated that the Service does not justify how keeping wolves within the MWEPA contributes to the conservation of the Mexican wolf, as opposed to allowing them to disperse beyond the MWEPA boundaries. More specifically, the Service rejects a proposal to capture wolves north of I-40, west of highway 87 and east of Interstate 25, in part because it would not meet the intent of Section 10(j)(2)(A) to further the conservation of the Mexican gray wolf (see dEIS, chapter 2, page 6), but never applies this same Section 10(j)(2)(A) criterion to its own proposal to capture and move wolves dispersing north of Interstate-40. Indeed the amount of suitable habitat within the MWEPA west of highway 87 and east of Interstate 25 (I-25) from which wolves would be excluded by the above proposal appears to be similar to or less than the 30,977 square miles of suitable habitat north of I-40 from which the Service proposes to exclude wolves.
Our response: The statement in question refers to the proposal to expand the MWEPA north of I-40 <u>coupled</u> with a management provision to remove wolves from this expanded area as well as areas in the existing MWEPA to the west of State Highway 87/I-19 in Arizona and east of I-25 in New Mexico. We do not believe that expanding the MWEPA only to remove wolves from the expanded area meets the intent of Section 10(j)(2)(A)"to further the conservation." This is different than our proposal to authorize the removal of Mexican wolves that disperse to establish territories in areas outside of the MWEPA under a revised and reissued section 10(a)(1)(A) research and recovery permit. We address the issue and rationale of using a revised and reissued section 10(a)(1)(A) to remove Mexican wolves that disperse to establish territories in areas outside of the MWEPA in subsection 1.2.4.4 of the EIS.
Resolution: We have revised subsection 2.2.1.5 in the final EIS to better explain that expansion of the MWEPA in Arizona and New Mexico north of I-40, coupled with the proposed management provision that would require removal of any wolf in the expanded area regardless of its involvement in depredation or nuisance behavior, would <u>not</u> provide increased flexibility to the Reintroduction Project in making decisions related to the release, translocation, take and removal of Mexican wolves necessary to improve the effectiveness of our management of the experimental population.

Comment: Commenters stated that the 1982 Mexican Wolf Recovery Plan needs to be revised to provide the appropriate scope for the proposed action as it relates to the overall recovery needs of the Mexican wolf. Commenters stated that the scope of the EIS and the proposed rule are beyond the 1982 Mexican wolf recovery plan, which had a prime objective to establish a wild population of more than 100 wolves in 5,000km^2, and are therefore unjustified.
Our response: Section 4(f) of the ESA directs the Service to develop and implement recovery plans for threatened and endangered species; however, the requirement of a recovery plan itself does not constitute a major federal action requiring NEPA review. The 1982 Mexican Wolf Recovery Plan provided a prime objective: "To conserve and ensure the survival of *Canis lupus baileyi* by maintaining a captive breeding

program and re-establishing a viable, self-sustaining population of at least 100 Mexican wolves in the middle to high elevations of a 5,000 square mile area within the Mexican wolf's historic range" (USFWS 1982). To date, that prime objective has not been met. This objective provided the guidance to the proposed action and preferred alternative of the 1996 Final EIS "to reintroduce Mexican wolves, classified as nonessential experimental, into the Blue Range Wolf Recovery Area." The preferred alternative of the 1996 Final EIS was selected for implementation through issuance of the 1998 Final Rule. The scope of the proposed action of our 2014 EIS (as specified in section 2.3 of the draft EIS) is based on our purpose and need statement in section 1.2 of the draft EIS. Subsection 1.2.1 of the draft EIS explains why the prime objective of the 1982 Mexican Wolf Recovery Plan, which represented "a working hypothesis" which would be "subject to amendment as more data on the Mexican wolf are acquired" (USFWS 1982), has been superseded and is not considered applicable to the actions proposed for implementation in this EIS.
Resolution: No further action.

Comment: Several commenters noted that the scope of the project is not fully explained, such as the planned total number of wolves the Service intends to release, the number of wolves which the Service expects to successfully propagate in the wild, an end date for the project or trigger for when the Service would stop releasing wolves.
Our response: The scope of the project is provided in our description of the proposed action and alternatives. In Appendix D (formerly Appendix F in the DEIS), we discuss the number of wolves that would need to be released to reduce our genetic concerns with the experimental population: 2 or fewer effective migrants (from the captive population into the MWEPA) per generation depending on the size of the MWEPA population. Given our success rate with initial releases (21 percent), we expect that we will need to release a pack of two adults and several offspring to achieve one effective migrant. We may conduct initial releases for other management purposes other than addressing genetic concerns, such as replacing animals removed for nuisance behavior, depredations, or other problem behavior. We do not provide a schedule of releases at this time; rather, determination of the timing and location for initial releases will be developed with our partners and in communication with the local communities as the circumstances warrant over time, as also described in Appendix D. We expect that we can decrease the number of effective migrants (and therefore the number of initial releases) from 2 migrants per generation to 1 per generation when the population reaches around 250 animals, as a population of this size will be less reliant on effective migration for persistence than it is when it is smaller than 250. When we achieve our population objective of 300-325 Mexican wolves in the MWEPA, we may continue to conduct occasional initial releases to address genetic concerns or for other management purposes, but we would expect to conduct fewer releases over time as the population stabilizes around 300 wolves.
Resolution: Revisions made in section 2.3 and Appendix F of the final EIS.

***Comment*:** The Service claims that wolves are habitat generalists; then how do you know that wolves will primarily inhabit "suitable habitat" as opposed to areas with high human and livestock density? There are large areas of unsuitable habitat in the revised MWEPA.
Our response: We agree that historically wolves worldwide occupied a wide range of ecosystems in North America and in Europe, Russia and southwestern Asia. As discussed in sub-section 1.1.3 of the EIS Mexican wolves historically inhabited montane woodlands and adjacent grasslands in northern Mexico, New Mexico, Arizona, and the Trans-Pecos region of western Texas (Brown 1988) at elevations of 4000-5000 ft. where ungulate prey were numerous (Bailey 1931). We modeled suitable wolf habitat in the project study area based on a number of factors including vegetation type, wild prey availability, and the absence of anthropogenic disturbances such as roads, human habitation, and cattle grazing. The MWEPA encompasses areas that have suitable habitat for wolves and areas that do not. While wolves may disperse through or temporarily occupy areas that we do not consider suitable habitat, we do not expect

them to establish pack territories or to persist in these areas. We will not release or translocate wolves into areas that do not have suitable habitat. Under all three action alternatives proposed management Zone 3 is an area where neither initial releases nor translocations would occur and where wolves, should they occur, would be more actively managed under the authorities of the proposed rule to reduce human conflict.
Resolution: No further action.

Comment: Commenters provided additional alternatives or modifications to alternatives for our consideration, such as:

- Modify Alternative 3 to allow for more initial releases from captive breeding facilities and provide all wild Mexican wolves more room to establish territories in suitable historical habitat, should also strengthen protections against shooting and trapping Mexican wolves;
- Alternative that allows wolves to disperse north of I-40;
- Alternative that specifies Annual population growth of at least 10% must be documented before any provisions in this rule resulting in 1) lethal control by the agencies, 2) permitted lethal take by anyone for any reason, or 3) removal of wolves from the wild population (except temporary removal for legitimate management purposes for no more than 6 months) can be authorized by the Service. This provision applies to any entity granted decision authority under this rule. When any annual population count fails to document at least 10% growth of the wild population, the above restrictions would remain in effect for the entire following year. This provision will remain in effect until the expanded BRWRA population reaches at least 350 wolves, or until an approved Mexican Wolf Recovery Plan establishes some other numerical population objective for the expanded BRWRA population;
- Alternative that uses a projection model with faster growth and longer timeframe;
- Arizona Cooperator's Alternative Proposal; and
- Alternative that minimizes the burden on small (business) entities.

Our response: Section 2.1 of the draft EIS provides the criteria we used to evaluate whether a proposed alternative or a proposed component part of an alternative substantially meets the purpose of, and need for, the proposed action. We addressed additional alternatives and modifications to alternatives submitted for our consideration using these criteria and eliminated those that were not economically or technically practical or feasible and/or did not substantially meet the purpose of, and need for, the Proposed Action. To meet our objective to "facilitate the federal, state agency, local and tribal cooperation necessary to improve the effectiveness of the management of the experimental population of Mexican wolves" we have incorporated into Alternative One (proposed action and preferred alternative) the management concepts developed in cooperation with Arizona Game and Fish Department (AGFD) to adopt a phased management approach to address their concerns regarding possible impacts from Mexican wolves on potentially vulnerable elk herds west of Highway 87, and to incorporate a Mexican wolf experimental population objective of from 300 to 325 wolves within the entire MWEPA. We have also adopted the AGFD proposal, as further refined by the New Mexico Department of Game and Fish (NMDGF), to define unacceptable impacts of Mexican wolf predation on wild native ungulate herds. An unacceptable impact would be determined by a state agency based upon ungulate management goals, or a 15 percent decline in an ungulate herd as documented by a State 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.
Resolution: Revisions made to section 2.3.1 of the final EIS to incorporate management concepts developed in cooperation with AGFD and NMDGF.

Comment: Commenter suggested the list of criteria we used to determine alternatives brought forward for consideration should include "Meets the duty to conserve mandate of the Endangered Species Act".
Our response: We state clearly in Section 1.2 of the DEIS that "The **purpose** of our proposed action is to further the conservation of the Mexican wolf by improving the effectiveness of the Reintroduction Project in managing the experimental population." We developed criteria to evaluate whether a proposed alternative or a proposed component part of an alternative substantially meets the purpose of, and need for, the proposed action. To add the suggested sentence would be redundant.
Resolution: No further action.

Comment*:* Several commenters stated that the range of alternatives is too narrow and contrary to 40 C.F.R. 1502.14.
Our response: Based on comments received on the DEIS we have incorporated suggested elements into Alternative One (Proposed Action and Preferred Alternative), such as establishing a population objective of from 300-325 Mexican wolves, adopting a phased management approach, and adding a definition of unacceptable impacts to wild ungulate herds. These changes to Alternative One now more clearly delineate it from Alternative Two and Alternative Three.
Resolution: Comment addressed by making substantive changes in the final EIS Section 2.3 Proposed Action and Alternatives Considered.

Comment: Commenters stated that by describing the Purpose and Need in terms identical to the Preferred Alternative, the Service has predetermined that the Preferred Alternative will be selected. The Service cannot define the Purpose and Need so narrowly that only the Preferred Alternative will meet the objectives.
Response: The statement of purpose in Section 1.2 of the DEIS is written as "The **purpose** of our proposed action is to further the conservation of the Mexican wolf by improving the effectiveness of the Reintroduction Project in managing the experimental population." Our need is summarized in Section 1.2. In sub-sections 1.2.2 through 1.2.4 we provide the detail and objectives for each existing condition we feel must be changed. We established criteria for the evaluation of alternatives to help us determine whether a proposed alternative substantially meets the purpose of, and need for, the Proposed Action (see section 2.1 in the draft EIS). All three of the action alternatives, not just Alternative One (Proposed Action and Preferred Alternative) that are described in Chapter 2, Section 2.3 achieve in varying degrees the objectives as stated in Chapter 1, Section 1.2.
Resolution: No further action.

Comment: Commenter stated that the best available science confirms that areas beyond the Mexican Wolf Experimental Population Area (MWEPA) are essential for Mexican wolf recovery. The proposed action, as well as all alternatives in the DEIS, place significant roadblocks in the way of achieving full recovery for Mexican wolves. How then can the MWEPA be helping to conserve the Mexican wolf?
Our response: We do not agree with the statement that the proposed action and alternatives place significant roadblocks in the way of achieving full recovery for the Mexican wolf. We state in Section 1.2.1 of the draft EIS that: "While we intend for the experimental population of Mexican wolves that we reestablish in the MWEPA to contribute to recovery, full recovery is beyond the scope of this EIS". And we state that: "Our intention, under Section 10(j)(2)(A) of the Act, is to "further the conservation" of the Mexican wolf by improving the effectiveness of the Reintroduction Project in managing the experimental population of Mexican wolves." Our need is summarized in section 1.2 of the draft EIS. In sub-sections 1.2.2 through 1.2.4 we provide the detail and objectives for each existing condition that we feel must be changed. To this end we are proposing actions to meet the need as stated in section 1.2 and to achieve the goals summarized in section 1.3 of the draft EIS. We address in sub-section 2.2.1.5 of the draft EIS the

reasons why we do not consider expanding the MWEPA to include areas of suitable habitat north of I-40 in Arizona and New Mexico would meet our current purpose and need. We have provided additional edits in subsection 2.2.1.1 to make the rationale more clear. If a revised recovery plan recommends establishment of Mexican wolves north of I-40, the experimental rule for the MWEPA could be revised, or other (new) regulations established, pending appropriate analyses and decisions, including NEPA review and public involvement.
Resolution: Additional edits made in subsection 2.2.1.1 of the final EIS.

Comment: Due to spatial constraints in the captive breeding program, the Service needs to adopt an alternative that will allow for significantly higher numbers of initial releases so that valuable genetic information will not be lost.
Our response: The need to increase the number of initial releases and improve the level of recruitment from the captive population into the experimental population is included in the statement of purpose and need (Section 1.2 in the draft EIS) and further explained in subsection 1.2.2 of the EIS. One of the criteria we used for the selection of alternatives also specifies: "Improves the recruitment of wolves from the captive population into the experimental population of Mexican wolves" (Section 2.1 of the draft EIS).
Resolution: No further action.

Comment**:** The entirety of the MWEPA will not be managed to conserve wolves to the extent necessary to ensure survival and recovery because "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 human conflict."
Our response: The MWEPA encompasses areas of suitable and unsuitable habitat for wolves. While wolves may disperse through or temporarily occupy areas that we do not consider to be suitable habitat we do not expect Mexican wolves to establish pack territories or to persist in these areas. We will not release or translocate Mexican wolves into areas that do not have suitable habitat; therefore under all three action alternatives proposed management Zone 3 is an area where neither initial releases nor translocations would occur and where wolves, should they occur, would be more actively managed under the authorities of the rule to reduce human conflict. Wolves that attempt to establish themselves in areas lacking suitable habitat are less likely to survive and more likely to engage in depredation or nuisance behavior. Therefore, we view active management in proposed management Zone 3 as necessary to the conservation Mexican wolf and that this management will contribute to improving the effectiveness of the reintroduction project.
Resolution: No further action.

<u>Tribal Issues</u>
Comment: The DEIS does not identify or assess the likelihood of big game depredation. The Tribe's elk hunts are recognized worldwide as exceptional big game hunting experiences. As a result, the Tribe and its member outfitters benefit economically from elk and deer hunts on the Reservation.
Our response: The potential impact of Mexican wolf predation on wild ungulates, specifically elk, resulting from implementation of the proposed action and alternatives is addressed in section 4.3 of the EIS. The potential impact on big game (elk) hunting is addressed in sub section 4.4.2 of the EIS. Based on information from AGFD (AGFD 2012a) and the White Mountain Apache Tribe (Tribal Sub-Group MWRT 2014), there have been no significant impacts to big game population numbers due to Mexican wolf presence in the BRWRA or on the Fort Apache Indian Reservation. In addition, based on our proposed rule, tribal governments may request that Mexican wolves be removed from tribal trust land for any reason, including due to impacts to wild ungulate herds.
Resolution: We have added a brief discussion of the WMAT experience with Mexican wolves and

effects on big game hunting on the FAIR to subsection 4.4.2 of the final EIS.

Impacts Analysis – General

Comment: The analysis discusses the survival of the experimental population, but does not describe the relative effects this population would have on the recovery of the species *Canus lupis baileyi*.
Our response: We state in Section 1.2 of the DEIS that "The **purpose** of our proposed action is to further the conservation of the Mexican wolf by improving the effectiveness of the Reintroduction Project in managing the experimental population." We also state in subsection 1.2.1 that "we intend for the experimental population of Mexican wolves that we reestablish in the MWEPA to contribute to recovery…"
Resolution: We provide an analysis of the possible impact of the proposed action and alternatives on the Mexican wolf experimental population and the listed entity in Chapter 4.

Comment: The Service only analyzed impacts to "suitable" habitat. The area deemed "suitable" by the Service includes only 27% of the MWEPA. If adopted, however, the proposed rule will result in wolves being released and translocated, and dispersing throughout the entire MWEPA. Therefore, the effects of the action throughout the entire MWEPA should be analyzed.
Our response: The MWEPA encompasses areas that have suitable habitat for wolves and areas that do not. While wolves may disperse through or temporarily occupy areas that we do not assess as suitable habitat we do not expect them to establish pack territories or persist in these areas. We will not release or translocate wolves into areas that do not have suitable habitat. Under all three action alternatives proposed management Zone 3 is an area where neither initial releases nor translocations would occur and where wolves, should they occur, would be more actively managed under the authorities of the proposed rule to reduce human conflict. Chapter 4 of the draft EIS analyzed the environmental consequences of our proposed action and alternatives throughout the project study area including all three proposed management zones.
Resolution: No further action**.**

Comment: The DEIS states that the Proposed Action and alternatives would not directly or indirectly affect community services such as police, fire and ambulance in those portions of Arizona or New Mexico within the project study area. However, there are direct, indirect and cumulative affects to community services in the City of Sierra Vista and Cochise County that were omitted from the NEPA analysis. When our communities lose a portion of our local tax base from livestock producers that suffer economic losses due to wolves, as documented in Carey (2012), community service budgets are often the first to be impacted. When a wolf threatens or attacks people, pets or livestock, police officers and fire fighters are often the first responders. This directly impacts their time, manpower allocations, wages and fuel costs. Indirect impacts include lost benefits due to the investment that the City of Sierra Vista and Cochise County spend training their community service employees, as revenues for such services decrease, and employees leave the economically depressed communities.
Our response: The possible direct and indirect impacts from the proposed action and alternatives to livestock producers is addressed in section 4.4 of the draft EIS, including a discussion of property value impacts. The possible direct and indirect impacts from the proposed action and alternatives to public safety is addressed in section 4.5 of the draft EIS. We have no verifiable data that attributes a loss of county tax base to Mexican wolf depredation in the BRWRA. We have no verifiable data that suggests that the presence of Mexican wolves in the BRWRA has adversely affected the provision of police, fire or ambulance services and the analysis of section 4.5 of the draft EIS concludes that no significant impact to human health or public safety is expected from implementation of the proposed action or alternatives. 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".
Resolution: No further action.

Comment: The DEIS states that no direct impacts will be made to water resources (Chapter 3, Page 2, Lines 2 – 4). The majority of water sources in the proposed reintroduction area within the City of Sierra Vista and Cochise County are those constructed and maintained by livestock producers. Wolves will have to use the livestock water sources to survive. The use of livestock water sources by wolves will at times affect livestock - livestock will avoid areas where wolves are present. Ranchers can stop maintaining certain water sources due to presence of wolves. That action would directly impact water sources for wolves and other wildlife. When ranchers go out of business due to wolf depredation, their water sources can go dry due to lack of maintenance, pumps being turned off, and sediment filling tanks. The results can include a reduction in the number of water sources for livestock and wildlife, including wolves. This in turn concentrates livestock, predators and other wildlife at fewer water sources. Excess trampling of water sources can occur, decreasing the quality of the water sources or causing springs to go dry. The direct and indirect impacts to water sources need to be analyzed.

Our response: We define "Water Resources" in section 3.1 of the draft EIS as "those portions of the natural environment related to surface water and groundwater, water quality, floodplains and wetlands." We do not include in this definition stockponds. The assertion that "wolves will have to use livestock water sources to survive" is unsupported and the connection drawn from wolf presence to indirect adverse effects on water quality and natural springs is speculative.
Resolution: No further action.

Land use
Comment: "In Arizona and New Mexico, federal land ownership often dominates the land status within county boundaries. Generally counties have county plans to guide land use through the development of county planning decisions. Counties can also use zoning laws and regulations to guide county development and land uses. County plans are an important tool to provide county residents opportunities for involvement in activities within a county, and knowledge of county goals and objectives. These plans directly affect the management of private lands, but have limited authority over Federal land management. Federal land managers work closely with counties to maximize consistency between county and Federal plans and to promote cooperation." The Service mischaracterized the authority of city and county government, which may be why they constantly attempt to dominate local government under the auspices of federal supremacy. The way the Service phrases the local jurisdiction issue is incorrect. Both Cities and Counties have jurisdiction on federal lands. That jurisdiction includes protecting citizens against wolves and other harm.
Our response*:* County land use plans and city zoning ordinances do not apply to federal land. Federal land management agencies are not legally bound by local planning decisions but attempt to work closely with local planning officials to prevent conflict and promote cooperation. Cooperation at the early stages of planning is a key factor to the prevention of potential conflicts and provides consistency in planning. Public safety is an important aspect of both local government and federal agency decision making and is an integral part of the planning process. Emergency response on federal land from state and local first responders and mutual aid may be provided under cooperative agreement.
Resolution: Edits have been made in Section 3.3 of the final EIS to make the jurisdictional relationship between federal agencies and state and local government more clear.

***Comment*:** Chapter 4, Page 5, Lines 26 - 39

"Non-Federal Land use activities on non-federal land would remain the same as that currently occurring. State owned lands are often scattered and the total amount of state land within suitable wolf habitat is limited. Impacts to land uses on state owned lands would be similar to those on federal land and are not considered significant. The Service makes conclusions with no analysis, in violation of NEPA.

Our response: The MWEPA is made up of a mix of federal and non-federal (state, private and tribal) lands. Under all three action alternatives we propose to allow wolves to occupy federal and non-federal land in the MWEPA. Although Mexican wolves on non-federal private and state land would not be subject to removal, except in the case of depredation or other nuisance behavior that cannot be effectively managed through non-removal techniques, land owners would continue to control the use of their land. Consultation under Section 7 of the Act is not required, except on National Park and National Wildlife Refuge lands, and critical habitat cannot be designated for nonessential experimental populations designated under Section 10(j) of the ESA. Accordingly, a new final 10(j) rule would not impose regulatory restrictions on current or future land use on private or state land.
Resolution: Additional analysis has been provided in section 4.2 of the final EIS to better support the conclusion that no significant adverse impact to land use on non-federal state, tribal or private land is expected to occur from implementation of the proposed action or alternatives.

Comment: *"*Based on this information, we do not expect Alternative One to result in direct significant, less than significant, or indirect effects to federal land use. Therefore, it is not anticipated that the presence of the Mexican wolf would require the development or implementation of mitigation measures to ensure the continuation of current land uses." Where is the analysis? The 1996 EIS did not analyze impacts to Zone 2, where the City of Sierra Vista and Cochise County are located or to land in adjacent Zone 3. The EIS makes broad conclusions as if they are facts, without the requisite NEPA analysis. The Service must provide an in-depth analysis and documentation of the proposed expansion area in relation to prey, livestock - wolf conflicts, water sources, health and safety and other relevant factors before concluding there will not be significant impacts.
Our response: Implementation of the proposed action and alternatives does not require changes to any federal agency land use plans that guide authorized land use on federal land within the MWEPA. Section 10(j) of the ESA expressly states that critical habitat shall not be designated for nonessential experimental populations. A new final 10(j) rule would not impose regulatory restrictions on current or future land use on federal land nor require changes to federal agency policy or management. Temporary area closures of limited scope (approximately one mile in radius) and duration (only during the period of wolf occupancy) may be required to limit human access and disturbance at wolf release sites, dens and rendezvous sites on federal land. These actions are expected to be consistent with the management direction, including standards and guidelines to implement temporary area closures for the protection of wildlife during breeding seasons or other vulnerable periods, of all federal agencies. The analysis of the potential impacts to prey species, livestock, and health and human safety are addressed in sections 4.3, 4.4 and 4.5 of the draft EIS. Section 3.1 of the draft EIS addresses those resource areas, including water resources, to which impacts from implementation of the proposed action and alternatives are unlikely to occur.
Resolution: Additional analysis has been provided in section 4.2 of the final EIS to better support the conclusion that no significant adverse impact to land use on federal land is expected to occur from implementation of the proposed action or alternatives.

Economics-Livestock Production
Comment: Several commenters noted that the draft EIS inappropriately included milk cows and feeder cows in its estimation of the number of cattle and calves potentially impacted by wolf reintroduction.
Response: We agree that inclusion of milk and feeder cows in our estimates of the number of cattle and calves potentially impacted by wolf reintroduction is not valid.

Resolution: We have removed milk cows and feeder cattle in our estimate of the number of cattle and calves in the potentially affected area in the final EIS.

Comment: Several commenters noted the availability of more current data to describe the affected agricultural community.
Response: We agree that current data have become available since the publication of the DEIS.
Resolution: We have updated our description of the affected environment using the more recently available 2012 Agricultural Census data.

Comment: Several commenters questioned the appropriateness of comparing depredations to Animal Unit Months within the BRWRA.
Response: We concur that the comparison may not be useful.
Resolution: We have deleted this comparison in the final EIS.

Comment: A commenter disagreed with the appropriateness of including the results of several of the information sources we used to estimate the average number of unconfirmed depredations for every confirmed depredation in the BRWRA.
Response: We have re-examined the papers of concern referenced by the comment and have concluded that it would be appropriate to exclude one of the papers from our calculation of average unconfirmed annual depredations because it provided observational mention of the ratio of confirmed to unconfirmed depredations without data to substantiate the statement. The effect of excluding the results of this paper resulted in a modest increase in the number of unconfirmed depredations for every confirmed depredation.
Resolution: We have modified our ratio of confirmed to unconfirmed depredations in the final EIS.

Comment: Several commenters expressed concern about the methodology used in the draft EIS to compute the value of depredated livestock, in particular relying too much on the simplifying assumption that depredated cattle were mainly calves.
Response: We have revised the final EIS to be clearer about how both the type of cattle likely to be depredated (cow, calf, yearling, or steer) and computed value.
Resolution: The final EIS derives, and utilizes, a value for a depredated cattle unit based on the distributional weight of the type of cattle killed by wolves since 1998 and market price.

Comment: Several commenters noted that the draft EIS did not include a consideration of how sheep and lambs could be impacted by the proposed action and alternatives.
Response: The final EIS includes a characterization of how the number of sheep and lambs and associated ranches have been impacted within the BRWRA.
Resolution**:** Information has been added to the final EIS.

Economics - Big Game Hunting

Comment : One commenter disagreed with the Service's characterization of an internal review conducted by the Arizona Game and Fish Department regarding Mexican wolf impacts on deer and elk populations in Arizona 1998 through 2012 as a formal study of the issue.
Response: We agree with the commenter that the above mentioned paper is not a formal peer reviewed study. Nonetheless, because this paper represents one of only a few that formally review the effects of interactions between Mexican wolves and elk population estimates, we believe it prudent to include in our EIS.

The paper was obtained through AGFD's website and can be found through the following URL: http://www.azgfd.gov/w_c/wolf/documents/130523_FAQ2-MWImpactsonPreyPopulationsinAZThrough2012_000.pdf.
Resolution: We have changed our descriptive wording referencing this paper from "study" to a "review."

Human Health and Public Safety

Comment: The Service is not following their own Data Quality Guidelines (FWS Environmental Checklist for Some of the More Common Social Concerns) and it is out of compliance with the Best Available Science Policy by refusing to accept the two mental health assessments of children in the BRWRA.
Our response: The cited FWS environmental checklist is a guide that can be used to help focus the analysis on those areas where impacts might plausibly occur and to eliminate from further consideration those areas to which impacts from the proposed action and alternatives are implausible. The checklist does not mandate impact analysis on each of the 20 line items presented for consideration. Section 4.5.2 of the draft EIS 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 in the BRWRA. 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, considers 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.
Resolution: No further action.

Comment: Comment that Walsh 2013 study is misinterpreted and referenced in the DEIS. The author(s) of the DEIS are twisting the conclusions Walsh reaches in her 2013 paper. In the paper referenced in the DEIS, she never once mentions that wolf encounters are interpreted through a "filter" of ideas. She has a completely different analytic approach that focuses on rhetoric and how that rhetoric can be used to isolate ones beliefs values, and norms. Walsh starts from a statement made by ranchers or wolf program administrators and works back to identify the beliefs, values and norms of particular statements. She then compares the beliefs, values, and norms statements of the people on both sides of the debate to find where they are common and where they diverge. Her research is an analysis of rhetoric and has nothing to do with how people interpret wolf interactions.
Our response: Citations from Rutherford and Clark 2005, Wilmot and Clark 2005 and Carnes 2004, as well as Walsh 2013 are presented to support our statement in Section 4.5 of the DEIS that "How a wolf-human interaction is interpreted is therefore inextricably linked to, and filtered by, the observer's own belief system and emotions and the wolf's perceived intent, rather than its actual behavior, and is often reported in that context." We contend that bias is inevitably introduced into reports of wolf behavior both from people who support wolf recovery and from those who oppose it. Therefore our analysis of possible impacts from our proposed action must take that bias into account when evaluating reports of wolf-human interactions.
Resolution: No further action.

Comment: The authors of the DEIS strongly imply that eye witness reports of dangerous encounters with wolves are to be dismissed outright because 1) Eye witness reports of dangerous encounters are misinterpreted because of exposure to biased cultural background knowledge, 2) Residents of the BRWRA value eye witness accounts more than research conducted by agencies that are inherently biased against and hostile towards opponents to the wolf reintroduction project. The authors of the DEIS failed to mention that Walsh (2013) specifically mentions those biases (p. 466): The attitudes represented in this rich rhetorical archive have not yet been seriously addressed for at least two reasons. First, the conservative politics of the majority of Area ranchers run counter to the prevailing political drift of the academic programs concerned with environmental communication and rhetoric (Klein & Stern, 2004; Zipp & Fenwick, 2006); this "red/blue " divide raises concerns about bias in academic approaches to rancher attitudes, a concern that has been already been raised for environmental risk assessment (Ball, 2002). Concerns are heightened when academics reconstruct rancher attitudes as part of a wider effort to persuade rural citizens to accept predators in their area (Bath, 2000; Ericsson & Heberlein, 2003; Meadow, Reading, Phillips, Mehringer, & Miller, 2005;Naughton Treves, Grossberg, & Treves, 2003; Thompson, 1993).
Our response: Citations from Rutherford and Clark 2005, Wilmot and Clark 2005 and Carnes 2004, as well as Walsh 2013 are presented to support our statement in Section 4.5 of the DEIS that "How a wolf-human interaction is interpreted is therefore inextricably linked to, and filtered by, the observer's own belief system and emotions and the wolf's perceived intent, rather than its actual behavior, and is often reported in that context". We contend that bias is inevitably introduced into reports of wolf behavior both from people who support wolf recovery and from those who oppose it. Therefore our analysis of possible impacts from our proposed action must take that bias into account when evaluating reports of wolf-human interactions.
Resolution: No further action.

Comment: The author(s) go on to state that as noted in the 5-Year Review (AMOC and IFT 2005): "fear is not necessarily a fact, data, or logic based emotion, and absence of a factual or logical foundation for fear does not make the personal impact any less real. Fear is a very personal thing: some people will fear wolves no matter what the facts are, others will not fear wolves no matter what the facts are." The presentation of the statements in tandem apparently is an attempt to dismiss concerns regarding the significant negative impact dangerous wolf encounters have on the psychological well-being of children. The authors imply that 1. Because there are no peer reviewed studies corroborating the association between PTSD and dangerous wolf encounters there must be no association, and 2. Simply because some fears are irrational, the PTSD and other psychological trauma experienced by children after dangerous wolf encounters must be imaginary or somehow illegitimate.
Our response: The paragraph entitled "Psychological effects to children from fear of wolves" in subsection 4.5.2 and the use of the quote from the 5-Year Review are not intended to be dismissive but rather to point out that how a person reacts to an encounter with a wolf or how a person feels about the presence of wolves (whether fearful or fearless) is very much based on their own personal emotions, social influences and associations.
Resolution: Subsection 4.5.2 has been modified in the final EIS to remove the quote and address the comment.

Comment: The author(s) of the DEIS do not acknowledge the need for further research into the psychological damage experienced by children in the wolf re-introduction area. Simply put, their argument is that because no peer reviewed studies exist, the psychological damage does not exist. In general, Service does not adequately include consideration of mental stress as part of public health and safety. Section is lacking first-hand information from practitioners who have dealt with wolf related

mental trauma in the reintroduction area. Service needs to include information from Julia Martin and Alex Thal.
Our response: Section 4.5.2 of the draft EIS 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 <u>not evidence</u> of widespread psychological trauma (adverse impact) to children from the presence of the Mexican wolf in the BRWRA. 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 <u>not evidence</u> of a widespread psychological benefit (beneficial impact) to children. The analysis provided in section 4.5.2 considers the relevant scientific information, considers 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.
Resolution: No further action.

Comment: Walsh (2013) concludes her report by recommending "that the MOU Cooperators take the initiative to validate the values and norms forming the top ranked expectations in the rancher's filters in a systematic way..." (p. 479). In other words, she is recommending that MOU Cooperators listen to rancher concerns regarding (among other things) the psychological trauma inflicted upon children, and treat them as valid. This recommendation was omitted from the DEIS by the author(s).
Our response: Walsh 2013 examines rancher rhetoric concerning the Mexican Wolf Blue Range Reintroduction Project and applies filter theory to induce a model of stakeholder attitudes that "enables prediction of future interpretive judgments, comparison of attitudes among groups, and identification of the power dynamics pressuring interpretive attitudes" (Walsh 2013). The recommendations she provides are intended to help "build common rhetorical and political ground and reduce resistance on the basis of misaligned attitudes." We agree that validating the concerns, values and norms held by other people (i.e. putting oneself "in another person's shoes" and being able to understand another person's point of view) helps to build common ground.
Resolution: No further action.

<u>Biological Resources</u>
Comment: Commenter requested the Service consider a study by Mech, L. David, "Prediction Failure of a Wolf Landscape Model" (2006). Dr. Mech pointed out that Mladenoff's study showed where wolves are, but predictions based on his model were wrong more than 50% of the time. "Wolves locate their home ranges in areas with adequate prey and low levels of human interference (Mladenoff et al. 1995)."
Our response: Wolves are a large, wide-ranging carnivore, and are ecological generalists. We preface the discussion of wolf numbers and future distribution in Chapter 4 by the following:
Future wolf distribution will probably be determined by variable prey abundance, the patchwork of human settlement, and livestock distribution. How quickly the wolf population grows and where wolves will be found will differ to some degree across the four alternatives and will likely depend on the location, frequency, and distribution of initial releases and translocation events." Mladenoff et al. (1995) also noted the caveat that wolves in Minnesota were colonizing areas formally thought to be unsuitable habitat by their criteria, and the authors noted that even their conclusions of what constituted suitable habitat may have been conservative. The commenter correctly states that Mech (2006) re-analyzed the Mladenoff et al. (1995) model and found that it failed to predict where Wisconsin wolves would recolonize. While we

are aware of the study by Mech (2006), Mladenoff et al. (2006) replied to Mech (2006) noting that Dr. Mech's re-analysis could not be replicated, and was based upon a subjective method of analysis.
***Resolution*:** No further action.

Comment: The Service should assume higher densities of wolves when it assesses impacts, and needs to use more current literature related to predator-prey dynamics. The Service is correct that wolf density is often related to prey. However, the Service omitted the fact that density can be as high as 30.8/100 km^2 and fails to analyze potentially high densities within the proposed Mexican wolf expansion area. There should be an analysis of the carrying capacity. " Strong (1992) suggests ecosystems are driven by resource abundance and weather with no significant influence from carnivore predation as predation would be considered compensatory for mortality that would have occurred in the population otherwise. " Strong wrote his statement before he knew that wolves have rapidly reduced the elk population in Yellowstone National Park more than 80% and the moose in Northwest Minnesota by more than 99%. Any and all theories and hypotheses regarding carnivore predation being compensatory have been proven wrong when they are applied to wolves. See Mech (2014) for a full explanation of this fact. Delete the 22 year old Strong citation, since it is obviously wrong. Use Mech (2014) and other more recent literature.
Our response: We have revised the action alternatives from the DEIS such that the density in Alternative Two and Alternative Three will be higher than predicted in the DEIS. We do not consider it likely that density would exceed our projections, as discussed in Appendix F. A higher density of wolves above that which is stated in the EIS is unlikely in the project study area based on prey densities and the amount of suitable habitat. Densities in the Yellowstone ecosystem were able to reach high densities because of the contiguous habitat available to wolves. The proposed MWEPA is by contrast, made up of a mixed-use landscape comprised of federal lands, private lands, and human settlement, and much of it is used for livestock production. Hamlin et al. (2009) stated that in areas where wolf depredations consistently occurred (wolves were actively managed), wolves were controlled and did not reach numbers or predator:prey ratios where wolf densities were high or population impacts on ungulates were detected. Ungulate prey in northern latitudes, such as Montana, Canada, and Alaska are exposed to deep snow which increases their vulnerability to wolves and other predators. Ungulates in lower latitudes with little or no snow will not be so disadvantaged, and will likely stand a greater chance of escaping wolves. Mech and Boitani (2003) report a relationship between territory size and latitude since prey biomass density declines with latitude. However, a larger territory size does not necessarily correlate with a higher pack size. A colonizing pair of wolves establishing a new territory in unoccupied habitat may select an area significantly larger than what they would initially need for survival because they will require additional resources for raising pups. The pack size of Mexican wolves has traditionally been small (see IFT annual reports), while pack sizes in Yellowstone, Montana, Alaska can reach upwards of 15 or more animals. Wolf pack sizes will likely be correlated with food supply (prey biomass) in the MWEPA.
Resolution: No further action.

Comment: The best scientific data available shows Yellowstone fires were a significant factor in aspen regeneration. Wolves were not the sole cause of aspen, cottonwood and willow restoration. The Service should use science to accurately portray the Yellowstone vegetative changes associated with fires as well as wolves.
Our Response: The commenter is correct that wolves were not the sole cause of aspen, cottonwood and willow restoration in the Greater Yellowstone Area. In Chapter 4, Alternative 1, under subheading: Impacts to Vegetation, we state, "Within each zone, disturbance and modification of vegetation communities has occurred from many factors unrelated to predator-prey dynamics." We did not intend to imply that wolves were the sole cause of the vegetative change but rather that the absence of native predators can affect native plant community structure due to increased browsing pressure.

***Resolution*:** We have added verbiage which addresses the Yellowstone fires of 1988 as part of our discussion of vegetative changes in the Greater Yellowstone Area.

Comment: The Service needs to update its literature search and use the best available science in its discussion of trophic cascades, see Mech 2012.
Our response: Mech (2012) is cited in our discussion of trophic cascades in Chapter 4, under 4.3.2 as follows: "Mech (2012) challenges the cascading effects attributed to wolves in earlier studies of wolf restoration and questions whether the findings of those studies conducted in national parks are relevant to areas where overriding anthropogenic influences on prey, vegetation, and other parts of the food web are present."
Resolution: We have added several recent papers (Winnie (2012, 2014) and Beschta et al. (2014)) to our discussion regarding behaviorally mediated trophic cascades.

***Comment*:** The DEIS at Chapter Page 17, Lines 16 – 17, states:
"Domestic livestock comprised from 8% (Reed eta/. 2006) to 16.8% (Merkle et al. 2009) by mass of the diet of Mexican wolves. " In their overall dietary analysis, Merkle et al. 2009 found that 80.3 percent of the Mexican wolves' diet was elk, 16.8 percent was cattle; deer, squirrels and rabbits comprised less than 1 percent each, and rodents made up 2 percent. This fell largely in line with a previous dietary study by Reed et al. in 2006, but it's important to note that the Luna pack consumed 52.7 percent of their diet as cattle and 45.9 percent as elk one year. The following year, the pack ate 24.1 percent of their diet as cattle, and 75.1 percent as elk. By comparison, in 2005 the Saddle pack consumed less than 4.3 percent of their diet as cattle, and 94.5 percent as elk while the Rim pack, in 2006, ate no cattle and 96 percent elk. The point being that the average does not tell the entire story. Problem wolves can significantly impact livestock producers, a fact that is not given adequate consideration in the DEIS.
Our response: The commenter is correct in noting that a problem wolf may consume a disproportionate amount of cattle in its diet compared to the wild population, in general. However, should this occur, and should there be a disproportionate amount of cattle depredation, problem wolves would be quickly managed by the Interagency Field Team. Management may involve hazing, wolf removal, and an increase in proactive wolf management activities. The economic analysis looks at the sensitivity of ranches to earning a profit following a model ranch approach, which was adopted from New Mexico State University. The ranches are broken down into small, medium, and large ranches based on the number of cattle in their operations. The pro-forma financial statements show the sensitivity of each ranch to changes in baseline conditions and shows the number of cattle that must be sold under current market conditions for the ranch to earn a profit from operations. Depredations, of course, would affect a ranch's revenue stream and depending on the number of depredations, may or may not affect a ranches ability to turn a profit, depending on compensation.

Comment: BLM species of concern may need to be added to Appendix C as suitable wolf habitat is present on BLM land in Zones 2-3.
Response: We do not provide a specific description of BLM species of concern due to the limited acreage of suitable wolf habitat on BLM land.
***Resolution*:** No further action.

Comment: The Service must modify the impact analysis to provide factual support for its assertion that the Proposed Action will have no significant impacts on ungulates. The Service predicts no significant impact on ungulates because the Arizona Game and Fish Department has shown no decrease in the elk population at current rates of depredation. The Service, however, does not compare the current wolf : elk ratio and rate of depredation on elk with the anticipated wolf : elk ratio and the rate of depredation that will occur under the Proposed Action.

Response: The current wolf to elk ratio in the BRWRA is provided in Chapter 3. Numerous factors are involved in determining the rate of predation on elk by wolves (elk killed per wolf per period of time) such as vulnerability of prey, availability of alternate prey, seasonal variation, wolf group size, and offtake by scavengers, among others. Furthermore, in a multi-predator ecosystem, the overall trend of prey population dynamics depends on the combined (usually additive) effects of all predators (e.g., Gasaway et al. 1992, Kunkel and Pletscher 1999).
Resolution: In the final EIS, we refined our impact analyses based on maximum population sizes that may occur under each alternative, as described in Appendix F, including wolf to elk ratios.

Comment**:** The Service omitted relevant analysis of the adverse impact that increased numbers of ravens will have on Sonoran and Mojave desert tortoises, sage-grouse and other federally protected wildlife.
Response: The availability of wolf-killed carcasses in areas previously not colonized by wolves may lead to an increase in scavenger species. Ravens may therefore increase in areas where wolves occupy suitable habitat and establish their territories. It is unlikely however, that this potential increase in ravens will lead to an adverse impact on Sonoran and Mojave desert tortoises or sage-grouse because these species do not occupy a significant portion of the suitable habitat available to wolves in Zones 1 or 2. Roads and power line rights of way attract potential avian predators of Sonoran desert tortoises, such as ravens, that use power lines as nesting and perching sites, and the proximity of roads can serve as sources of carrion (Knight and Kawashima 1993, p. 266). Conversely, wolf-killed carcasses will not likely be located in proximity to roads, and will not act as an attractant to the use of powerlines as perches for avian predators. Raven populations, and potential risk of predation of Sonoran desert tortoises by ravens, are both higher with increasing proximity to human development (Kristan and Boarman 2003, p. 2432). While ravens have been identified as a subsidized predator on juvenile Mojave desert tortoises, and possibly on juvenile Sonoran desert tortoises (Boarman 1993, p. 192), very few observations of raven predation of Sonoran desert tortoises in Arizona or Sonora have been documented in the literature, leading us to conclude that raven predation on the Sonoran desert tortoise is not a concern.
Resolution: No further action.

Comment: In the FEIS, discuss the extent to which the US/Mexico border fence may inhibit or preclude the migration of wolves from Mexico and how this affects the potential for extension of the MWEPA to the Mexico border to offer a stepping stone habitat.
Response: We concur that this is useful information. The Environmental Protection Agency and the U.S. Customs and Border Patrol provided us with additional information.
Resolution: We have added a discussion of the US/Mexico border fence in section 1.2.3.

Environmental Justice
Comment**:** The Alamo Band of Navajo is within the congressional boundary of the Magdalena Ranger District of the Cibola National Forest. The Alamo Band of Navajo is not listed in several places where tribes are identified, including as an Indigenous/Tribal Population Group of Concern. The Cibola National Forest consults with the Alamo Band separately from the Navajo Nation.
Our response: In coordination with the Navajo Nation for the purposes of identifying tribes as population groups of concern, we address the Alamo Band as well as the Ramah Navajo as part of the larger Navajo Nation.
Resolution: No further action.

Comment*:* The analysis claims there are a lack of data on demographics within local industries. The DEIS utilizes data from the Agriculture Census. The 2012 Census of Agriculture for New Mexico provides a description of how census data are frequently used and includes data about the demographics and financial well-being of producers. The census includes demographic data on agricultural producers at

the county level, and the DEIS used data from the census elsewhere in the analysis. Why were these demographic data not used?
Our response*:* Portions of data and analysis in the economics section have been revised. State level data have been added on minorities that are the main proprietor of beef cattle ranches. The minority data are available in the aggregate of all farms at the county level. Since this dataset did not disaggregate to the type of farm, the data requested by the commenter were not added.
Resolution*:* No further action.

Comment*:* Commenter stated that Presidential Executive Order 12898 recognized the importance of research, data collection, and analysis, particularly with respect to multiple and cumulative exposures to environmental hazards for low-income populations, minority populations, and Indian tribes. Thus, specific data on these exposure issues should be incorporated into the analyses.
Our response*:* Other hazards such as environmental contaminants could be added yet qualitative conclusions on how exposures may change impacts would be highly speculative and require independent studies.
Resolution*:* No further action.

Comment*:* Mitigated less than disproportionally high and adverse impacts on environmental justice; (DEIS, pp. XIII XV). The findings are not credible based on the Service's own statements that many cow-calf operations in Arizona and New Mexico depend heavily on federal lands for forage (DEIS, Chap. 3, p. 48) in a context where 55% of the growers ranch herds that count fewer than 10 cattle, and 75% of the growers ranch herds that count fewer than 20 cattle (DEIS, Chap. 3, p. 48), for whom the loss of even one animal can have devastating economic consequences when the number of cattle representing profit is as low as 2 (DEIS, Chap. 4, Table 4-8, p. 36).
Our response*:* It was determined that no alternative had disproportionately high and adverse impacts to any population groups of concern. Designations were elevated above the level of no disproportionately high and adverse impacts due to uncertainty. The determinations represent the upper bound of impacts in all resource areas (including but not limited to economics). The determinations are in effect based on the highest impact assessed. Mitigation measures are provided in chapter 4 in the economics and environmental justice sections. The economic analysis details the ranching industry's use of public lands for forage and therefore it is already incorporated into the analysis.
Resolution: Discussion on the proactive programs available to ranchers is in chapter 4 economics and additional discussion on mitigation was added to the chapter 4 environmental justice including the new Livestock Forage Disaster Program in the Agricultural Act of 2014. The program provides assistance to producers for excess livestock deaths due to attacks by animals, including wolves, reintroduced by the federal government or protected by federal law.

Comment: Commenter stated that crime increases in relation to poverty and lack of opportunity, in and surrounding wolf recovery areas, were never analyzed during the last DEIS (1998) of the Mexican wolf reintroduction, or the current DEIS. In Catron County alone, property crime has risen drastically since wolf depredation numbers have risen, and ranches have been forced to sell out. This may be attributed to the cumulative impact of wolf recovery and all of the other government implemented endangered species protections implemented under the ESA without compliance with the CEQ.
Our response: Including additional social data on the communities with environmental justice concerns was considered and ruled out. No peer reviewed papers on a causal link (as opposed to a correlation) between wolf presence and crime rate increases have been found. The economic analysis discussed that an established link between depredations and losses on the sale of ranches has not been found. ESA compliance is not discussed in the cumulative impacts. Cumulative impacts on Indian tribes from ESA compliance would require independent studies as to the effects on these groups.

Resolution: No further action.

Appendices

Comment: The fact that 43% of known wolf-human interactions over the past 9 years involved the presence of dogs casts serious doubt on the Service's claim that the addition of a provision allowing the killing of wolves attacking dogs would not lead to increased taking of wolves.

Our response: We specifically incorporated some level of additional take with the provision for taking a wolf that is in the act of biting, wounding, or killing non-feral dogs on non-federal lands, such that our analyses of Alternative One and Two project annual growth rates of 10% (the alternatives with this provision) versus an annual growth of 11% for Alternative 3 (the alternative without these provisions) (see Appendix D, formerly Appendix F in the DEIS). It is also important to note that known wolf-human interactions include: (1) interactions on public land (where the provision to kill wolves in the act of biting, wounding, or killing non-feral dogs does not apply), (2) interactions where wolves were not in the act of biting, wounding, or killing a non-feral dog, but where wolves approached a human with a dog present, and (3) interactions at night. In all of these cases, killing of wolves would not be allowed or would be infeasible because of the difficulty of killing a wolf at night. In Alternative One, we do allow for take of a wolf (including killing) on non-federal lands (private, state, and tribal trust) when wolves are in the act of biting, wounding, or killing non-feral dogs, and we have appropriately considered the effect on Mexican wolves from this provision in our annual growth projection in Appendix D (formerly Appendix F in the DEIS).

Resolution: No further action required.

Comment: The Service claims that the projected baseline population growth rate (11%) estimated for the Mexican wolf experimental population would exhibit similar growth as the naturally recovering populations of northwestern Montana and Wisconsin (Figure 1-Appendix F) when these populations were fully protected as endangered species• (DEIS, Appendix F, p. 2). However, the Montana Fish, Wildlife & Parks Department Minimum Wolf Count in Montana, indicates that over the 12 years that preceded the delisting in May 2011, the annual growth rate was an average of approximately 22%.

Our response: Average growth rate of 22% is not numerically equivalent to an annual growth rate of 22% because negative and positive growth is encapsulated in the average growth rate. For instance, if we had a starting population of 100 wolves that had 5 years of 10% growth, it would end at approximately 161 wolves. However, if we instead had growth rates of 80%, 20%, 10%, -40%, and -20% (this is an average of 10%), the population would end at 114 wolves. Regardless, the baseline population growth was largely based on the average growth of the Mexican wolves between 2008-2013 (9.5%) and our expectations of how the proposed changes would affect our overall growth rate. We noted that the projected Mexican wolf population exhibited similar growth to populations in northwest Montana and Wisconsin. It appears that the commenter has conflated average growth rate with annual growth rate and numerically similar population sizes with average growth rates.

Resolution: We modified Appendix D (formerly Appendix F in the DEIS) to clarify some of these issues.

Comment: The Service correctly employs the exponential biologic population growth equation Nt = N0 (r * N0) . However, there are three issues with the Service projected population, and when these three issues are addressed, the population projection looks significantly different.1) The projection does not integrate an additional 10% of wolves being missed during the census (DEIS, Appendix F, p. 3). An undercount of 10% is probably a minimum number in as much as various studies have documented that on average 10 to 15% of wolf populations are composed of lone or dispersing wolves (Fuller et al. 2003). Further, estimate for total numbers of wolves exceeding the minimum count by as much as 40% remains within that observed in other studies of wolves (Becker et al. 1998) or more common ungulate species (Hamlin and Ross 2002, Vander Wal et al. 2011). If an undercount correction of 10% is applied to the

starting population for the projection (the January 2014 count identified a minimum of 83 wolves as the 2013 annual population), the starting number becomes 83. Ten percent of 83 equates to 8 = 91, and the wolf number for the environmental impact analysis at the end of the period becomes 315 wolves instead of 287.
Our response: We significantly modified our approach to Appendix D (formerly Appendix F in the DEIS) based on adjustment of Alternative One and an adjustment to the time frame of consideration. We used an annual growth of 10% under Alternative One until the population was between 300 to 325 wolves (Year 13), consistent with the population objective under Alternative One.
Resolution*:* We modified Alternatives Two and Three to represent populations of wolves that were habitat limited, or limited at a population of 534 wolves (year 19 in Alternative Two or year 17 in Alternative Three).

Comment: Under a revised and reissued section 10(a)(1)(A) research and recovery permit the Service would authorize removal of Mexican wolves that can be identified as coming from the experimental population that disperse to establish territories in areas outside of the MWEPA. We fail to see how the 10(a)(1)(A) research and recovery permit achieves any legitimate recovery objective. In fact, as we have shown elsewhere in these comments and in our comment on the proposed rule, the proposed permit would serve to preclude recovery of Mexican wolves. The permit is simply an unlimited take order for wolves that establish outside the MWEPA, where considerable suitable wolf habitat exists. This permit should not be issued until it can be shown to be necessary based on a revised recovery plan for Mexican wolves.
Our response: The Service is limiting the revised MWEPA to areas south of Interstate 40 in Arizona and New Mexico in order to more effectively manage the reintroduction project. Our intention is to effectively manage Mexican wolves within the expanded MWEPA in a manner that furthers the conservation of the Mexican wolf while being responsive to the needs of the local communities and minimizing wolf-human conflict. Any geographical area outside of the MWEPA important for the conservation and recovery of the Mexican wolf will be addressed in a future revised recovery plan. We initiated the revision of the 1982 Mexican Wolf Recovery Plan in 2010. The revised plan will provide information about suitable habitat and population sizes for Mexican wolf recovery in the United States and Mexico. A draft plan will be provided for public and peer review before being finalized.
Resolution: No further action.

10(a)(1)(A) permit

Comment: The Service fails to analyze the impact of the 10(a)(1)(A) permit in the DEIS. The Service implies that there are no substantive changes to the permit and therefore no analysis is required. The permit is a significant part of the Proposed Revision from which impacts will flow, and therefore analysis of this permit is required under NEPA.
Our response: We concur that analysis of the impact of the 10(a)(1)(A) permit should be included in the EIS.
Resolution: We have added a discussion of the impacts of the 10(a)(1)(A) permit as it applies to areas outside the MWEPA in Chapter 4, section 4.3.

Cumulative Impacts

Comment: "Therefore, we do not predict significant beneficial cumulative impact on the federally listed Mexican wolf would occur from the proposed action and alternatives when added to the aggregate effects of other management actions in the project study area." If the wording of this statement is intentional, then FWS has clearly abrogated its duty to conserve under the ESA.
Our response: The sentence immediately preceding the quote provided in the comment states: "We expect implementation of the proposed action and action alternatives to provide direct and indirect

beneficial impacts to the federally listed Mexican wolf." The question under consideration is whether there are other actions that, interacting with the proposed action and alternatives, may raise the level of significance of the beneficial impact to the Mexican wolf that we predict from implementation of our proposed action alone.
Resolution: No further action**.**

Comment: Cumulative impacts section limits itself to impacts on Federal land. CEQ regulations require analysis of federal and non-federal land. Cumulative impacts need to be considered over a longer time frame than 2015.
Our response: 40 C.F.R. § 1508.7 defines a cumulative impact as 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." The discussion of cumulative impacts should reflect the severity of the impacts and their likelihood of occurrence, but it need not provide the same level of detail as the discussion of the environmental effects attributable to the project alone. In determining what information is necessary for a cumulative effects analysis, agencies should use scoping to focus on the extent to which information is "relevant to reasonably foreseeable significant adverse impacts" (CEQ, 2005, 40 C.F.R. § 1502.22). While we recognize that wolves may inhabit suitable habitat on non-federal land, the majority of suitable habitat in the project study area occurs on federal land, with the majority of this on Forest Service land. This is where cumulative effects are most likely to occur. Therefore, because "it is not practical to analyze how the cumulative effects of an action interact with the universe" we narrowed the focus of our analysis of environmental effects on the aggregate effects of past, present and reasonably future actions that are truly meaningful (CEQ 2005). In section 4.7 of the draft EIS we address the cumulative impact of our proposed action on ranching/livestock production across the project study area (which includes both federal and non-federal land) when added to the aggregate effects of human caused global climate change. We also address the cumulative impact of our proposed action on wild prey (elk) across the project study area (which includes both federal and non-federal land) when added to the aggregate effects of NMDGF and AGFD elk management actions. We have added an analysis of the cumulative effects of the proposed action on wild prey (elk) across the project study area (which includes both federal and non-federal land) when added to the aggregate effects of human caused global climate change.
Resolution: We have revised section 4.7 in the final EIS to add an analysis of the cumulative effects of the proposed action on wild prey (elk) across the project study area (which includes both federal and non-federal land) when added to the aggregate effects of human caused global climate change.

Comment: The evaluation of cumulative effects on land use is insufficient. The DEIS and proposed 10j rule say that wolves will be allowed to occupy non-Federal land, but only Federal land is considered under Land Use.
Our response: Based on our analysis in section 4.2 of the EIS we expect that implementation of the proposed action and alternatives will have no significant direct or indirect impact on land use on either federal or non-federal land within the project study area. NEPA requires only a discussion of those cumulative impacts with the potential for significance and only for those resources that are affected by the proposed action and alternatives (EPA 1999). Therefore, we do not consider cumulative impacts to land use in section 4.7 of the EIS.
Resolution: No further action**.**

Other

Comment: The Service must provide more than unsubstantiated assertions of the environmental consequences of a Proposed Action for a consequence as significant as illegal killing. The DEIS must analyze the Proposed Action in relation to illegal killings, and discuss the environmental effects of illegal

killing which cannot be avoided if the proposal is implemented. (40 C.F.R. 1508.8.) The DEIS fails to explain how the Service will mitigate the impact of illegal killing that will occur with the Proposed Action. The Service must discuss how the adverse impacts from illegal killing can be avoided and whether the mitigation measures will be effective.
Our response: We have incorporated Mexican wolf mortality (from all sources) in our population growth estimates in Appendix D (formerly Appendix F in the DEIS), recognizing that illegal killing will likely continue to occur and possibly increase as the wolf population increases in size. Nonessential experimental populations are treated as threatened for purposes of section 9 of the ESA, and thus all illegal killings will be subject to law enforcement investigation. In addition, the threat of illegal killing of the Mexican wolf is addressed in our final rule to reclassify the Mexican wolf as an endangered subspecies.
Resolution: No further action.

Comment: The Service has failed to analyze and quantify the proposal's impact on future oil and natural gas development and associated economic benefits in the affected area and undermined the effects on other species in the experimental population area that will occur due to Mexican wolf release and occupation.
Our response*:* The majority of oil and natural gas production in New Mexico is located either outside the project study area (i.e., in the San Juan Basin of northwestern New Mexico) or in areas of the Permian Basin of eastern New Mexico that have no suitable habitat within proposed management Zone 3. Because proposed Management Zone 3 has only a small amount of suitable wolf habitat, we expect few, if any, Mexican wolves will occupy it. Should Mexican wolves disperse into this zone, we would more actively manage them under the authorities of the proposed rule to reduce conflict with humans due to depredation or nuisance behavior. Therefore, no significant impacts to land use or economic activity in Zone 3 are expected. Additionally, consultation under Section 7 of the Act is not required except on National Park and National Wildlife Refuge lands, and critical habitat cannot be designated for nonessential experimental populations designated under Section 10(j) of the ESA. Accordingly, a new final 10(j) rule would not impose regulatory restrictions on current or future land use on federal or non-federal land. Scoping for an EIS is used to identify resource areas on which there might be reasonably foreseeable significant adverse impacts from implementation of the proposed action and alternatives. Section 3.5 of the draft EIS addresses those economic components that we consider to be potentially affected by the proposed action and alternatives. For these reasons we do not include oil and natural gas development in the analysis because there is no reasonably foreseeable adverse impact to this economic sector from implementation of the proposed action and alternatives.
Resolution: No further action**.**

Comment: The DEIS provides in Chapter 4, page 82 a list of plans, policies, and ordinances that were submitted to the Service and reviewed in the development of the DEIS. Why did the Service only consider policies, plans, and ordinances that were submitted to them? Do other state, county, or local government entities have policies, plans, or ordinances that should be considered?
Our response: All of the counties within the project study area were included in the list of 87 federal and state agencies, counties and tribes that we invited to participate in the development of the EIS as cooperating agencies. Ultimately 14 counties and the Eastern Arizona Organization of Counties entered into agreements to act as cooperating agencies. However, all counties, soil and water conservation districts and natural resource conservation districts within the project study area were included in periodic communications with stakeholders on the status of the development of the EIS. We requested assistance from, and relied on the expertise of the cooperating agencies and engaged stakeholder governments in gathering applicable policies, land use plans and ordinances for inclusion in the analysis.

Resolution: We have revised subsection 4.8.2 of the final EIS to review for consistency additional plans, policies, and ordinances provided to the Service as part of the commenting process on the draft EIS.

Comment: The proposed rule and DEIS are out of compliance with multiple Presidential Executive Orders, including 12898, 13132, and 13563.
Our response*:* We prepared this EIS in compliance with, and including but not necessarily limited to, the Federal acts and executive orders listed in subsection 4.8.1 of the draft EIS. In compliance with Executive Order 12989, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations (59 FR 7629) we identify and address in sections 3.7 and 4.6 of the draft EIS the potential for disproportionately high and adverse human health or environmental effects of our proposed action and alternatives on minority populations and low-income populations. Executive Order 13563, Improving Regulation and Regulatory Review (76 FR 3821) requires federal agencies to develop plans to conduct a retrospective review of their existing rules and to provide the public with a timely opportunity to comment on proposed and final rules, and to make electronic rulemaking dockets, including the scientific and technical findings relevant to a proposed or final rule, available and searchable online. Our review of our 1998 Final Rule, our proposal to revise this rule, which forms the basis for the proposed action of this EIS, and our proposed rulemaking process which has included extensive opportunity for the public to review and comment is in compliance with E.O. 13563. Executive Order 13132, Federalism (64 FR 43255), concerns the federalism implications of agency actions. Our proposed rule provides an analysis of the federalism implications of the action we have proposed, as will our final rule.
Resolution: No further action.

Comment: The DEIS must, but does not, discuss inconsistencies of the proposed action with any approved local plan. Where an inconsistency exists, the statement should describe the extent to which the agency would reconcile its proposed action with the plan. See 40 C.F.R. 1502.2(d). Chapter 4 at 82-83 of the DEIS indicates that the Service considered a number of local government land use plans. The Service asserts that, under the Constitution, it cannot be made to submit its proposed action to a local government before implementation or be made to adhere to local government requirements. However, the NEPA regulations simply require that FWS discuss inconsistencies and state the extent to which it would reconcile inconsistencies. FWS makes no attempt to do that.
Our response: In subsection 4.8.2 of the draft EIS we state that state and local government directives and resolutions that require federal agencies to submit management plans for review by state or local agencies before implementation, require federal agencies comply with the provisions of county land use policies, ordinances, plans, resolutions and/or procedures or place restrictions on, or assert local government authority over, Service actions taken in accordance with the ESA are inconsistent with federal law and Article 6 of the U.S. Constitution which establishes federal law as the highest form of law in the United States legal system. Therefore, the Service cannot reconcile the proposed action of this EIS with sections of local government policy statements, county and conservation district land use plans and ordinances that clearly contravene the nonessential experimental rule.
Resolution: No further action.

Comment: The Service fails to analyze the impact of the 10(a)(1)(A) permit in the DEIS. The permit is a significant part of the Proposed Revision from which impacts will flow, and therefore analysis of this permit is required under NEPA.
Our response: We concur that this is a necessary component of our analysis.
Resolution: We have included discussion of the impact of the 10(a)(1)(A) permit in section 4.3 of the EIS.

APPENDIX F: DISCLOSURE STATEMENT

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Mexican Wolf Recovery Program
2105 Osuna NE
Albuquerque, New Mexico 87113
Phone: (505) 346-2525 Fax: (505) 346-2542

OCT 29 2014

Mr. Chet Seto
Managing Director
CJ Seto Support Services, LLC.
2300 Knoll Drive, Unit G
Ventura, California 93003

Dear Mr. Seto:

CEQ Regulations at 40 CFR 1506.5(c), which have been adopted by the DOI (43 CFR §46.10), require contractors who will prepare an EIS to execute a disclosure specifying that they have no financial or other interest in the outcome of the project. The term "financial interest or other interest in the outcome of the project" for purposes of this disclosure is defined in the March 23, 1981 guidance "Forty Most Asked Questions Concerning CEQ's National Environmental Policy Act Regulations," 46 FR 8026-18038 at Question 17a and b.

Please review the enclosed disclosure statement. If you find the statement to be accurate and true please sign and return the original to us for filing as part of the official record for the Environmental Impact Statement (EIS) for the Proposed Revision to the Regulations for the Nonessential Experimental Population of the Mexican Wolf (Canis lupus baileyi).

Sincerely,

Sherry Barrett

Sherry Barrett
Mexican Wolf Recovery Coordinator

Enclosure

DISCLOSURE STATEMENT

for CJ Seto Support Services, LLC concerning the preparation of the EIS for the Proposed Revision to the Regulations for the Nonessential Experimental Population of the Mexican Wolf (Canis lupus baileyi)

I, Chet Seto, of CJ Seto Support Services, LLC have made inquiry and to the best of my knowledge and belief declare that executing the contracted work of preparing the Environmental Impact Statement (EIS) for the Proposed Revision to the Regulations for the Nonessential Experimental Population of the Mexican Wolf (Canis lupus baileyi) does not represent an actual or potential conflict of interest and CJ Seto Support Services, LLC does not have any financial or other interest in the outcome of this project.

I understand the term "conflict of interest" to mean that because of other activities or relationships with other persons, the contractor is unable or potentially unable to render impartial assistance or advice to the Government, or the contractor's objectivity in performing the contract work is or might be otherwise impaired, or the contractor may have an unfair competitive advantage. I understand the phrase "no financial or other special interest in the outcome of the project" to include any financial benefits such as a promise of future construction or design work on the project, as well as indirect benefits the consultant is aware of other than the enhancement of the contractor's professional reputation.

Signed: Chet Seto
Chet Seto, Managing Director

Date: 11/4/14

Employers name: CJ Seto Support Services, LLC

Address: 2300 Knoll Drive, Unit G
Ventura, CA 93003

Phone number: 805/644-1214

APPENDIX G: CONFERENCE/BIOLOGICAL OPINION FOR THE PROPOSED REVISION TO THE REGULATIONS FOR THE NONESSENTIAL EXPERIMENTAL POPULATION OF THE MEXICAN WOLF, THE ISSUANCE OF A NEW RESEARCH AND RECOVERY PERMIT FOR THE MEXICAN WOLF RECOVERY PROGRAM AND THE GRAY WOLF, AND FUNDING PROVIDED TO THE MEXICAN WOLF RECOVERY PROGRAM FOR THE PURPOSE OF IMPLEMENTING THE PROGRAM

FINAL CONFERENCE/BIOLOGICAL OPINION – November 17, 2014

CONSULTATION HISTORY

February 24, 1995:	Intra-Service consultation on the *Reintroduction of the Mexican Wolf within its Historic Range in the Southwestern United States*
November 7, 2011:	Intra-Service Biological and Concurrence Opinion on the Renewal of TE-091551-6, Research and Recovery Permit for the Mexican Wolf Recovery Program.
June 9, 2014:	Request for formal Intra-Service consultation on Proposed Revision to the Regulations for the Nonessential Experimental Population of the Mexican Wolf, the Issuance of a New Research and Recovery Permit for the Mexican Wolf Recovery Program and the Gray Wolf, and Funding provided to the Mexican Wolf Recovery Program for the Purpose of Implementing the Program

DESCRIPTION OF THE PROPOSED ACTION

The proposed actions addressed by this conference/biological opinion are the proposed revision to the regulations for the nonessential experimental population of the Mexican wolf (proposed revised rule); issuance of a section 10(a)(1)(A) research and recovery permit that authorizes activities for the management of the Mexican wolf within Arizona, New Mexico, and to a far lesser extent California, Colorado, Nevada, Texas, and Utah; issuance of a section 10(a)(1)(A) research and recovery permit that authorizes activties for the management of gray wolves in Arizona and New Mexico; and funding provided to the Mexican Wolf Recovery Program for the purpose of implementing the program.

The Service is proposing to revise the existing regulations (63 FR 1752, January 12, 1998) (1998 Final Rule), for the experimental population of the Mexican wolf (79 FR 43373, July 25, 2014) and to list the Mexican wolf as an endangered subspecies (78 FR 35664, June 13, 2013). The Service also published a draft environmental impact statement (DEIS) to analyze the impacts of the proposed revisions to the regulations for the nonessential experimental population of the Mexican wolf (79 FR 43373, July 25, 2014). In conjunction with the proposals, if finalized, the Service will issue or revise the Mexican Wolf Recovery Program's section 10(a)(1)(A) research and recovery permit (TE-091551-8) that authorizes take of the Mexican wolf during management activities consistent with a Service-approved management plan or special management measure adopted by the Service pursuant to the provisions of the proposed revised rule, as well as conduct activities related directly to the conservation, protection, and recovery of Mexican wolves and gray wolves within Arizona and New Mexico. In addition, areas of California, Colorado, Nevada, Texas, and Utah that are immediately adjacent to Arizona and New Mexico may on extremely rare instances have a Mexican wolf disperse to the area and thus require the Service to conduct activities in those areas as well. The Service has proposed to delist gray wolves in the lower 48 states with the exception of Mexican wolves (78 FR 35664, June 13, 2013). Within the context of this conference/biological opinion, we treat the Mexican wolf as endangered, except where designated as an experimental population. We also treat the gray wolf as a separate listed entity because proposed delisting does not impact the analyses until such time as the delisting becomes final. The action area between Mexican wolves and gray wolves differs because we only intend to manage gray wolves that are within the Southwestern Region (i.e. Arizona and New Mexico), while we intend to manage Mexican wolves wherever they occur. The Service's Wildlife and Sport Fish Restoration (WSFR) Program may provide funding for implementation of the Mexican Wolf Recovery Program under traditional and non-traditional section 6 grants to participating states, state wildlife grants, landowner incentive program grants, Tribal grants, traditional Federal assistance, or any other funding mechanisms. Other Service programs (e.g., Partners for Fish and Wildlife) may also provide funding that will contribute to the conservation of the Mexican wolf. Additionally, the Service's Mexican Wolf Recovery Program may provide funding to participating partners for the conservation of the Mexican wolf through Cooperative and Grant Agreements, as well as contracts.

The Mexican Wolf Recovery Program is, and has been guided by several statutes, regulations, policies, and authorities. The primary statute directing the Mexican Wolf Recovery Program is the Endangered Species Act of 1973 (ESA) the purpose of which is to provide a means whereby the ecosystems upon which endangered and threatened species depend may be conserved, and to provide a program for the conservation of such endangered species. The Mexican Wolf Recovery Program is currently based on the following documents: (1) the 1982 Mexican Wolf Recovery Plan; (2) 1996 Final Environmental Impact Statement (EIS) titled; *Reintroduction of the Mexican Gray Wolf within its Historic Range in the Southwestern United States* (1996 EIS); (3) January 12, 1998, Final Rule titled, *Endangered and Threatened Wildlife and Plants; Establishment of a Nonessential Experimental Population of the Mexican Gray Wolf in Arizona and New Mexico* (Final Rule), which promulgated 50 CFR §17.84; (4) 1998 Mexican Wolf Interagency Management Plan; and (5) Federal Fish and Wildlife Permit number TE-091551-8. The Mexican Wolf Recovery Program is proposing to revise the 1998 Final Rule and has produced an EIS that analyzes the impact of the proposed revisions. However, the impacts to Mexican wolves and other endangered and threatened species will be based on the management activities, as we do not predict impacts to endangered or threatened species based on the presence of Mexican wolves. A general description of the discretionary management activities are stated in the five goals of the Mexican Wolf Recovery Program below for Mexican wolves within the Mexican Wolf Experimental Population Area (MWEPA), which are designated as a nonessential, experimental population, and Mexican wolves outside the Mexican Wolf Experimental Population Area that are fully protected as Endangered under the ESA.

Captures and Collaring – The Mexican Wolf Recovery Program generally maintains at least two collared Mexican wolves per pack. Mexican wolves of appropriate size are collared prior to initial release from captivity, but wild born Mexican wolves often have to be captured and collared for monitoring purposes. The Mexican Wolf Recovery Program uses several techniques to capture wolves, including leg-hold traps, darting from the ground or during aerial operations, and net-gunning during helicopter operations. All of these capture techniques could potentially cause minor to severe injury or death to the wolf being captured. The Mexican Wolf Recovery Program follows trapping and handling protocols, which require personnel to check traps at least once every 24 hours and to set traps in areas to minimize exposure to heat, cold/wet conditions, human disturbance, and other hazards that may be encountered in the wild. Once a wolf (or nontarget species) is removed from the trap, veterinary care is administered to minimize injuries and ensure the health of the animal (e.g., wound treatment, hypothermia, hyperthermia, and dehydration). All wolf captures are supervised by experienced Mexican Wolf Recovery Program personnel to ensure techniques are followed to minimize injuries and/or deaths. As a result of these efforts, serious injury or death as a result of capture by the project has been an extremely rare occurrence (five animals out of several hundreds of captures).

Non-lethal Techniques – The Mexican Wolf Recovery Program minimizes depredations and human nuisance occurrences by Mexican wolves, including the use of scare devices, taste aversion, and harassment by agency personnel within the MWEPA (e.g., use of rubber bullets, bean bag rounds, cracker shells, and paint-ball guns). Disturbing den or rendezvous sites is also utilized if they occur near an undesirable location (i.e., too close to human inhabitants). The desired outcome of den or rendezvous site disturbance is that wolves will move these sites to a more remote location. The goal of these harassment techniques is to prevent the need to capture and translocate Mexican wolves, or permanently remove and/or lethally control Mexican wolves (lethal control is limited to Mexican wolves within the experimental nonessential area in Arizona and New Mexico 50 CFR 17.84(k)).

Initial Release and Translocation Pen Procedures – The Mexican Wolf Recovery Program is working to increase the Mexican wolf population via translocation, initial releases, and natural recruitment. The Interagency Field Team and other agency personnel handle and temporarily confine Mexican wolves in initial release and translocation pens (hereafter pens). Mexican wolves are transported by helicopter, vehicle (including snowmobile and all-terrain vehicle (ATV)), and/or by mule to the pens. After an acceptable acclimation period, the Mexican wolves are released from the pens, which are constructed of either temporary nylon mesh or chain link panels. The pens are constructed in remote locations on U.S. Forest Service lands at approved initial release and translocation sites. A *Husbandry Manual* developed through the Mexican Wolf Species Survival Plan (see USFWS 1998a: Appendix 4) and the Service document titled *Pre-Release Facility Husbandry and Operations Protocol* are followed to minimize adverse effects to Mexican wolves while in captivity.

Biological Data Collection – The Mexican Wolf Recovery Program collects appropriate biological data using aerial and ground telemetry monitoring; visually observing Mexican wolves near den or rendezvous sites to count the number of pups; obtaining samples such as hair, scat, and blood; and howling surveys.

Mexican Wolves in Captivity – The Mexican Wolf Recovery Program continues to maintain and/or increase the number of Mexican wolves in captivity. These activities include, but are not limited to, breeding, handling, administering health care, and obtaining samples such as blood, tissue, semen, ova, and hair. The Mexican Wolf Recovery Program ensures that Mexican wolves remain healthy and that the highest quality of care exists while minimizing human contact with the captive Mexican wolves. Veterinarians may be present at captures within the captive facility and proper protocols, including those in the *Husbandry Manual*, are followed to minimize adverse effects to Mexican wolves in captivity.

The Mexican Wolf Recovery Program operates two pre-release facilities, the Ladder Ranch Wolf Management Facility and the Sevilleta Wolf Management Facility. Both facilities house Mexican wolves prior to release and after temporary or permanent removal from the wild. The *Husbandry Manual* and Service document *Pre-Release Facility Husbandry and Operations Protocol* are followed to minimize adverse effects to Mexican wolves in captivity.

Lethal Control – Lethal control of Mexican wolves is only proposed to be authorized within the Mexican Wolf Experimental Population Area in Arizona and New Mexico (50 CFR 17.84(k)). Lethal control is a management option for personnel authorized by the Service for management of wolves when reasonable attempts to capture wolves alive fail and when the Service determines that immediate removal of a particular wolf or wolves from the wild is necessary. Additional instances of authorized lethal control or take are detailed in the Proposed Revised Rule (50 CFR 17.84(k)).

Purposeful take associated with implementation of the Mexican Wolf Recovery Program – Since the purpose of the Mexican Wolf Recovery Program is to maintain a captive population and reestablish a wild population within the 10j boundaries, management of the species necessarily results in take. Purposeful take is expected to result from the activities described above, under the Service-approved management plan, or special management measures adopted by the Service pursuant to the provisions of the Proposed Revised Rule (50 CFR 17.84 (k)); as well as conducting activities related directly to the conservation, protection, and recovery of the experimental population of Mexican wolves within Arizona and New Mexico. Harassment from management activities may also extend to wolves outside the MWEPA when Mexican wolves disperse from the MWEPA boundaries and are captured and returned to the Mexican Wolf Experimental Population Area.

Any person may take (including injure or kill) a Mexican wolf in self-defense or defense of the lives of others, provided that the take is reported within 24 hours to the Service's Mexican Wolf Recovery Coordinator or a designated representative of the Service. If the Service or an authorized agency determines that a wolf presents a threat to human life or safety, the Service or the authorized agency may kill it, capture and euthanize it, or place it in captivity (50 CFR 17.84(k)). In addition, a member of the Mexican Wolf Recovery Program may remove Mexican or gray wolves that constitute a demonstrable but non-immediate threat to human safety, provided that the taking is done in a humane manner; the taking may involve killing or injuring only if it has not been reasonably possible to eliminate such threat by live-capturing and releasing the specimen unharmed, in a remote area (50 CFR 17.21(c)(3)(iv)). Given that the authority to take a wolf in the defense of human life is addressed in the ESA and regulations, it will not be discussed further in this opinion.

Mexican Wolf Experimental Population Area

Section 4(f)(1) of the ESA states that the Secretary of the Interior shall develop and implement recovery plans for the conservation and survival of endangered species. The 1982 Mexican Wolf Recovery Plan (USFWS 1982a), adopted under the authority of the ESA, has two prime objectives: (1) maintaining a captive population, and (2) re-establishing at least 100 wild Mexican wolves in a 5,000 square mile area within the sub-species' historical range. The Recovery Plan did not however specify recovery criteria. The Service appointed a new Recovery Team to develop a revision to the 1982 Mexican Wolf Recovery Plan that will include recovery criteria. A revised Recovery Plan is expected to be completed following the issuance of a revised final rule and 10(a)(1)(A) permit.

The Service's 1996 EIS (USFWS 1996a) analyzed the presence of Mexican wolves throughout the entire Blue Range Wolf Recovery Area, including the primary and secondary recovery zones, with all anticipated associated impacts. On January 12, 1998, the Service published a Final Rule that authorized Mexican wolf reintroduction and recovery efforts in the Apache National Forest in Arizona, and the Gila National Forest in New Mexico (63 FR 1752). The Final Rule designated Mexican wolf populations reestablished in the Experimental Population Area as one experimental nonessential population, which provides for administrative and management flexibility under the ESA by relaxing prohibitions on take (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)), and allows for active management of Mexican wolves. The Final Rule amended Federal Regulations at 50 CFR §17.84 by adding the special rule providing Mexican wolves reestablished in the Blue Range Wolf Recovery Area and in the White Sands Wolf Recovery Area, if used, with the status of nonessential, experimental. To date, wolves are not being released or occupying the White Sands Wolf Recovery Area.

Mexican wolves were reintroduced to the wild in 1998 in Arizona and New Mexico as a nonessential experimental population pursuant to section 10(j) of the ESA. Since 2003, an interagency partnership of Federal, State, County, and Tribal entities has been managing the reintroduction program with the Service acting as the lead agency. The program has been governed by a Memorandum of Understanding (MOU), signed in 2003, between Arizona Game and Fish Department, New Mexico Department of Game and Fish, White Mountain Apache Tribe, U.S. Department of Agriculture-Animal and Plant Health Inspection Service Wildlife Services, U.S. Department of Agriculture Forest Service, and the Service. The New Mexico Department of Game and Fish withdrew from the partnership on June 30, 2011. The remaining lead agencies have primary regulatory jurisdiction and management authority of the Mexican wolf in Arizona and New Mexico. Graham, Greenlee, Gila, and Navajo counties, and the Eastern Arizona Counties Organization in Arizona are designated as cooperators to the reintroduction project with an interest in Mexican wolf management. The MOU, which expired in 2008, was revised and signed by the cooperators in and subsequent to 2010. The Service remains committed to involving partners in managing Mexican wolves to best support the biological processes of the population, while minimizing potential economic impacts of Mexican wolves. Management activities currently conform to the Service's 1998 Mexican Wolf Interagency Management Plan (USFWS 1998b).

The Service proposes to revise the regulations established in our 1998 Final Rule for the experimental population of the Mexican wolf. We also propose to extend the authority of the Mexican Wolf Recovery Program's Section 10(a)(1)(A) research and recovery permit to areas that are outside of the Mexican Wolf Experimental Population Area. In the EIS, we analyze the environmental consequences of a range of alternatives, including the Proposed Action and No Action alternative. The action would be implemented through a final nonessential experimental rule, a revised Section 10(a)(1)(A) research and recovery permit and the provision of federal funding. This BO analyzes the proposed action (e.g. proposed rule), the revised Section 10(a)(1)(A) research and recovery permit, and the provisions for federal funding and their impacts on Mexican wolves and other endangered and threatened species.

Consistent with section 10(a)(1)(A) of the ESA, the Secretary may permit, under such terms and conditions as he/she shall prescribe…acts necessary for the establishment and maintenance of experimental populations pursuant to subsection (j). We are proposing to revise and reissue the Mexican Wolf Recovery Program section 10(a)(1)(A) permit so that it applies to both the MWEPA and areas outside the MWEPA. Under the proposed rule we would expand the area in which initial releases of Mexican wolves from captivity could occur and extend the southern boundary of the MWEPA in Arizona and New Mexico to the United States-Mexico international border. Within the expanded MWEPA, we would designate three Mexican wolf management zones (Figure G-1) and we would conduct management actions within these zones intended to further the conservation of the Mexican wolf while being responsive to the needs of the local community in cases of depredation or nuisance behavior by Mexican wolves. Collectively these changes would represent: (1) geographic boundary changes that: (a) remove the designation of the White Sands Wolf Recovery Area (WSWRA), (b) remove from the MWEPA the small portion of Texas, (c) move the southern boundary of the MWEPA in Arizona and New Mexico from Interstate-10 to the United States-Mexico international border, and (d) designate three wolf management zones within the expanded MWEPA; (2) management changes that: (a) allow initial release, translocations, dispersal, and occupancy of Mexican wolves based on the three wolf management zones, and (3) revise the regulations for the take of Mexican wolves on Federal and non-Federal land within the entire MWEPA (Zones 1, 2 and 3).

Mexican Wolves Outside of Experimental Population Area

The area where Mexican wolves may be reintroduced by the Mexican government may extend to within 30 miles of the U.S. border at the Arizona/New Mexico state line. Dispersal and natural recolonization into areas within the revised MWEPA (south of Interstate Highway 10 (I-10)) are likely if the Mexican government succeeds in establishing a population of Mexican wolves in northern Mexico. Mexican wolves could also disperse from the revised MWEPA into areas to the north of Interstate Highway 40 (I-40) (in Arizona, New Mexico, Colorado, or Utah); west into Nevada or California; or east into Texas where they would be considered endangered. Mexican wolves will likely occupy mountainous/forested habitats in these areas should they become established. All Mexican wolves within the action area, but outside of the MWEPA, are fully protected as endangered under the ESA. The action area is the states of Arizona and New Mexico, the western portion of Texas, the southern portions of Colorado and Utah, the southeastern portion of California, and the southern portion of Nevada. Should a Mexican wolf establish a territory outside of the MWEPA, the Service or an authorized agent will attempt to promptly capture the wolf and translocate it within the MWEPA, put it into the captive population, or transfer it to Mexico, as authorized by a revised Mexican Wolf Recovery Program section 10(a)(1)(A) permit.

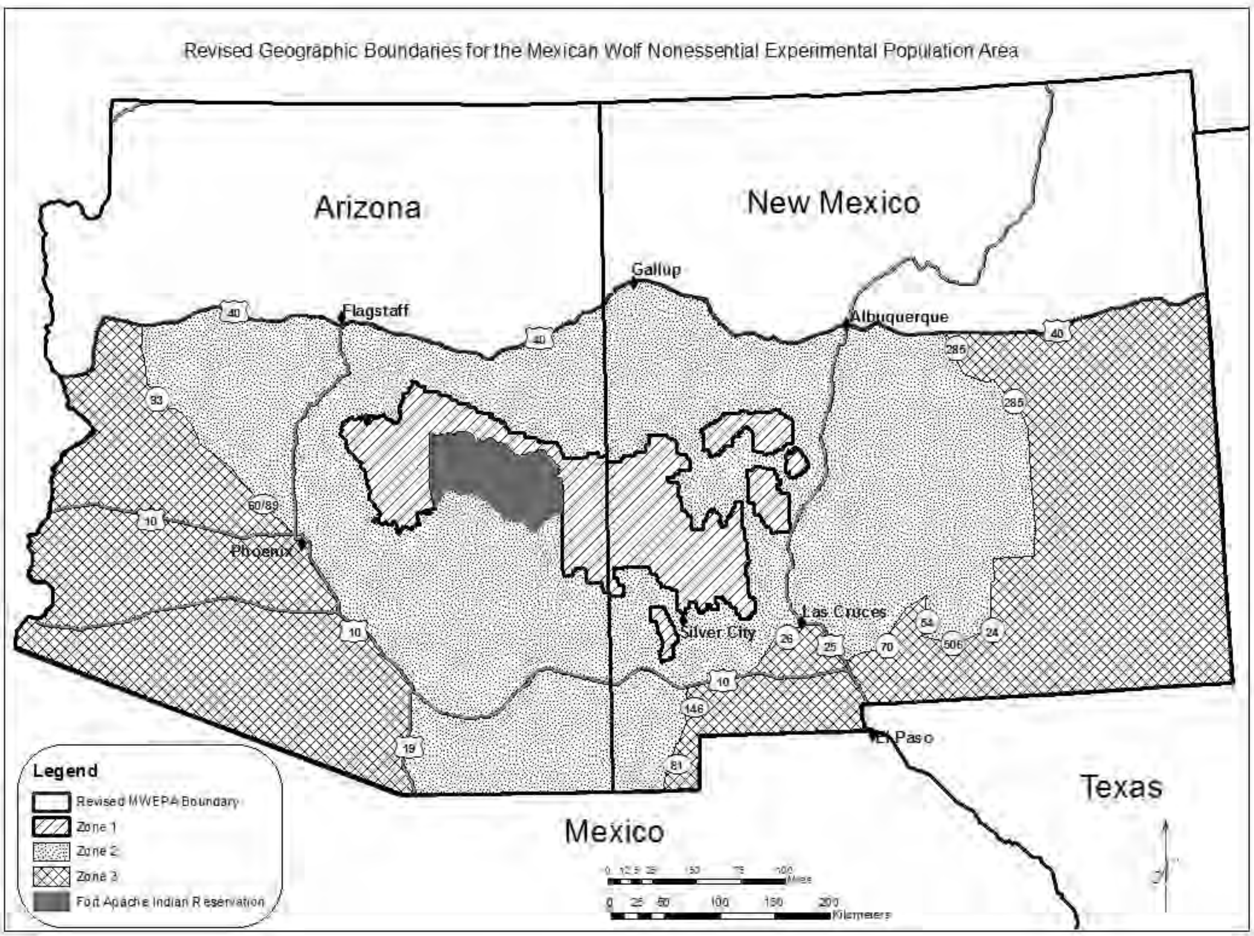

Figure G-1. Revised Mexican Wolf Experimental Population Area.

Specific Wolf Management Activities

Specific activities conducted under the Mexican Wolf Recovery Program within the MWEPA are described in the Proposed Rule. All management activities summarized below pursuant to the goals of the program are implemented for Mexican wolves designated as experimental, nonessential and, excluding lethal control, may be conducted for Mexican wolves outside the MWEPA (i.e., designated 10(j) area) in Arizona and New Mexico, and in California, Colorado, Nevada, Texas, and Utah in the unlikely event that a Mexican wolf disperses into these states.

Capture and maintain at least two collared Mexican wolves per pack:

a. These activities include, but are not limited to: trapping (leg-hold traps), darting (from ground or during aerial operations), net-gunning during helicopter operations, handling, possessing, administering health care, marking utilizing radio-collars or other appropriate monitoring systems, obtaining samples (blood, tissue, semen, ova, and hair), transporting, salvaging, and releasing Mexican wolves.

b. Adult Mexican wolves released from captivity or trapped in the wild within the U.S. are radio-collared (models 400 and 500, Telonics, Inc., Mesa, Arizona). Mexican wolves are then radio-tracked periodically from the ground (i.e., triangulation) and a minimum of once a week from the air, weather permitting (White and Garrot 1990). Location data (i.e., date, UTM location, Mexican wolf identification number, sex, age, number of wolves, behavior, and weather) are entered into the reintroduction project's database, along with reports for specific incidents (e.g., depredations (on domestic animals), Mexican wolf/human conflicts, aversive conditioning, captures, mortalities, translocations, initial releases, predation (on wildlife)).

Minimize depredation and human nuisance occurrence by Mexican wolves:

a. These activities include, but are not limited to: all activities listed in Goal 1.a., above, and non- lethal techniques (e.g., capture; radio collar and release on site; scare devices; guard animals; fladry; taste aversion; harassment by agency personnel using rubber bullets, bean bag rounds, cracker shells, paintball guns, and other human disturbance; den or rendezvous site disturbance; manipulation of movements via food caches; movement of livestock away from core use areas; and any other technique available) to resolve the conflict (see Coppinger et al. 1988, Cluff and Murray 1995, Fritts et al. 2003, Shivik et al. 2003, Bangs et al. 2005, Shivik 2006 for description of techniques and application results).

b. If the problem persists or becomes chronic, then the Mexican wolves may be translocated, permanently removed, and/or lethally controlled (lethal control is limited to Mexican wolves within the MWEPA (10(j)) in Arizona and New Mexico) in accordance with approved management plans, protocols, and the authorization of the Service's Mexican Wolf Recovery Coordinator.

Increase the wild Mexican wolf population and improve the genetic composition via translocation, initial releases, and natural recruitment:

a. These activities include, but are not limited to: all activities listed in Goal 1.a., above, and building temporary mesh and chain link paneled pens at sites that are (1) previously approved by the U.S. Forest Service (USFS), (2) include appropriate level of NEPA analysis and scoping in accordance with USFS policy guidance on building pens, and (3) include consultation on possible effects to other endangered and threatened species based on site specific characteristics and modifications at the individual release area. The pens include some minor disturbance to the ground, which for chain link pens can require archeological clearance from the USFS. Mexican wolves are transported by vehicle, mule, or helicopter to release areas. Food caches are maintained until the Mexican wolves discontinue utilizing the food caches or start killing native prey, and personnel often camp near the release areas to consistently monitor the Mexican wolves. In addition, Mexican wolves are sometimes initially released or translocated via hard release methodology. During hard releases, animals are released from crates directly into the wild. Hard released animals rarely stay in the release area and do not require camping of personnel or building of pens. As such, these actions do not require NEPA analysis or consultation outside of that which is contained within this document. Another method of improving the genetic composition of the Mexican wolf population in the MWEPA is through cross-fostering. Cross-fostering is a management tool that we began using in 2014. Cross-fostering occurs when offspring are removed from their biological parents and placed with surrogate parents. Therefore, we could potentially improve the genetic composition of the experimental population by placing genetically appropriate Mexican wolf pups from captivity with adult Mexican wolves in the MWEPA. However, as this is a new technique for our program, we are uncertain of how successful these cross-fostering actions will be in terms of the cross-fostered animals surviving, breeding, and producing pups, and therefore becoming effective migrants.

<u>Collect appropriate biological data:</u>

a. These activities include, but are not limited to: aerial and ground telemetry monitoring, viewing Mexican wolves near potentially sensitive areas to obtain visual counts on the number of pups and adults in a pack, determining whether Mexican wolves were responsible for depredations and/or native ungulate kills that are discovered, howling surveys for documentation of unknown packs and counts of known packs, collecting samples (blood, tissue, semen, ova, and hair), and collaborating with researchers for data collection and analysis of approved projects.

<u>Continue to maintain and/or increase the number of Mexican wolves in captivity:</u>

a. These activities include, but are not limited to: breeding, handling, possessing, administering health care, obtaining samples (blood, tissue, semen, ova, and hair), transport, salvage, collaborating with researchers for data collection and analysis of approved projects. With prior authorization from the Service's Mexican Wolf Recovery Coordinator, permittees are authorized to transport wild-captured or captive-reared Mexican wolves to various approved sites for research, reintroductions, rehabilitation, breeding, administering health care or treatment of sick or injured animals (including euthanasia in extreme circumstances).

In summary, the Service's Mexican Wolf Recovery Program has pursued a two-pronged strategy consisting of the maintenance of a captive breeding population of Mexican wolves and reintroduction to the wild. The establishment of a Mexican wolf captive breeding program prevented the impending extinction of the Mexican wolf. The 1998 Final Rule set the regulations to successfully establish a population of Mexican wolves in the wild. The purpose of our proposed revisions to the regulations for the experimental population of the Mexican wolf and the Mexican Wolf Recovery Program's section 10(a)(1)(A) research and recovery permit is to further the conservation of the Mexican wolf by improving the effectiveness of the Reintroduction Project in managing the experimental population.

Conservation Measures – The following conservation measures consist of activities and measures established by the Service's Mexican Wolf Recovery Coordinator to minimize take of listed, proposed, and candidate species and will be implemented by all Mexican Wolf Recovery Program participants in the course of carrying out the covered activities described above.

Wolf management activities will not occur in wetlands or marshes, but the Service's Mexican Wolf Recovery Coordinator will direct Recovery Program participants to avoid streams and river banks, lake sides, wetlands, and marshes during the specific Mexican wolf management activities described above. This avoidance is taken to prevent disturbance or destruction of sensitive areas and to prevent the inadvertent movement of pathogens, parasites, and invasive non-native species in aquatic systems; as well as for the safety and well-being of Mexican wolves. The Service's Mexican Wolf Recovery Coordinator will prohibit the use of off-highway-vehicles (OHV) in streams and river banks, lake sides, wetlands, and marshes, except on road crossings open for public and administrative purposes.

Mexican Wolf Recovery Program participants conducting work in the area covered by this Conference/Biological Opinion will be educated in the identification of listed, proposed, and candidate plant species and their habitats in order to avoid inadvertent trampling or removal during surveys or the other specific wolf management activities described above. In addition, when activities described above may occur in an area inhabited by listed, proposed, and candidate plant species, the Service's Mexican Wolf Recovery Coordinator will restrict the use of OHVs in such areas.

Mexican Wolf Recovery Program activities will not be conducted in areas that pose a risk to the health and safety of wolves or permittees, such as mines or caves (typical roost sites for bats). Activities conducted in low desert environments would be rare. Without water or prey species, wolves may pass through low desert environments, but are unlikely to stay long enough to need management actions by Permittees.

Mexican Wolf Recovery Program participants conducting work in the area covered by this Conference/Biological Opinion will be trained annually, through the annual immobilization training, in the capture and handling protocol for large predators, to ensure that any jaguar (*Panthera onca*), Canada lynx (*Lynx Canadensis*), ocelot (*Leopardus pardalis*), or gray wolf (*Canis lupus)* captured in a leg-hold trap will be safely sedated, examined, and released. If appropriate, blood will be drawn, and a radio collar may be affixed to the animal.

Mexican Wolf Recovery Program participants will not camp near Mexican spotted owl nests or roosts during the breeding season and follow Recreational Disturbance Guidelines as outlined on page 294 of the Mexican spotted owl recovery plan, first revision. Flying low over a Mexican spotted owl nest or roost in an aircraft will be avoided during the MSO breeding season.

Mexican Wolf Recovery Program participants conducting work in the area covered by this Conference/Biological Opinion will be educated regarding designated Critical Habitat, primary constituent elements, and how to avoid any potential impacts for listed species within the action area.

Mexican wolves are unlikely to disperse to California, Colorado, Nevada, Texas, and Utah based on habitat connectivity, desert environments, and/or juxtaposition with the MWEPA. These states are included in the action area based on the remote possibility that personnel may need to capture Mexican wolves that have dispersed from the MWEPA into these areas. Before Mexican Wolf Recovery program participants initiate the capture of Mexican wolves in these states, the participants will contact the U.S. Fish and Wildlife Ecological Services office in the state where operations are planned to determine any potential concerns with species not evaluated in this Biological Opinion.

STATUS OF THE SPECIES AND CRITICAL HABITAT (rangewide and/or recovery unit)

Mexican Wolf

The Mexican wolf was listed as an endangered subspecies in 1976 due to near extinction resulting from predator extermination programs in the late 1800s and early to mid-1900s. In 1978, the Service subsumed this and several other gray wolf subspecies listings into a species- level listing for the gray wolf in order to protect the species throughout its range in the coterminous United States and Mexico (USFWS 1978). The 1978 reclassification was undertaken to "most conveniently" handle a listing that needed to be revised because of changes in our understanding of gray wolf taxonomy, and in recognition of the fact that individual wolves sometimes cross subspecific boundaries. In addition, we sought to clarify that the gray wolf was only listed south of the Canadian border. However, the 1978 rule also stipulated that "biological subspecies would continue to be maintained and dealt with as separate entities" (USFWS 1978), and offered "the firmest assurance that [the Service] will continue to recognize valid biological subspecies for purposes of its research and conservation programs" (USFWS 1978). Accordingly, we implemented three gray wolf recovery programs in the following regions of the country: the Western Great Lakes (Minnesota, Michigan, and Wisconsin, administered by the Service's Great Lakes, Big Rivers Region), the Northern Rocky Mountains (Idaho, Montana, and Wyoming, administered by the Service's Mountain–Prairie Region and Pacific Region), and the Southwest (see Mexican wolves status above: Arizona, New Mexico, Texas, Oklahoma, Mexico, administered by the Service's Southwest Region). Recovery plans were developed in each of these areas (the northern Rocky Mountains in 1980, revised in 1987; the Great Lakes in 1978, revised in 1992; and the Southwest in 1982, the revision of which is now underway) to establish and prioritize recovery criteria and actions appropriate to the unique local circumstances of the gray wolf. A separate recovery effort for gray wolves formerly listed as *C. l. monstrabilis* was not undertaken because this subspecies was subsumed with *C. l. baileyi* and thus addressed as part of the recovery plan for the Southwest. No critical habitat has been designated for the Mexican wolf.

Mexican wolves tend to be patchy black, brown to cinnamon, and cream in color. The Mexican wolf is somewhat smaller than other gray wolves with adults weighing 23-41 kilograms (50-90 pounds) and height at the shoulder approximately 0.6-0.8 meters (2-2.5 feet). Mexican wolves have been found to be genetically distinct from other North American gray wolf taxa (Wayne and Vilá 2003).

This subspecies of gray wolf historically inhabited the southwestern United States and Mexico. Mexican wolves were associated with montane woodlands characterized by sparsely- to densely- forested mountainous terrain and adjacent grasslands at elevations of 4000-5000 feet where ungulate prey were numerous. Today, elk (*Cervus elaphus*) are the preferred prey of Mexican wolves in the experimental population (Paquet et al. 2001, AMOC and IFT 2005, Reed et al. 2006). Other prey species include deer (*Odocoileus virginianus* and *Odocoileus hemionus*), small mammals, and occasionally birds. Livestock are another source of prey for the Mexican wolf; between 1998 and 2013, 237 confirmed wolf-caused livestock kills (213 cattle, 13 sheep, 5 horses, and 1 mule) were documented in the Blue Range Wolf Recovery Area and Fort Apache Indian Reservation (AMOC and IFT 2005, USFWS 2004, USFWS 2005, USFWS 2006, USFWS 2008; USFWS 2009, USFWS 2010a). However, this should only be considered a minimum count, as some depredations may go undetected (Bangs et al. 1998, Oakleaf et al. 2003, Breck et al. 2011).

Mexican wolves typically live four to five years in the wild, reaching sexual maturity at two years of age. Offspring remain with their family until they disperse to establish a new territory. These hierarchical family units are referred to as packs. Female wolves may produce a litter of several pups each spring. Litter sizes of Mexican wolves in the experimental population documented during opportunistic pup counts are smaller than other gray wolf populations or captive Mexican wolves. Inbreeding depression may be partially responsible for small litter sizes (Fredrickson et al. 2007). In addition, several ecological hypotheses have also been suggested, but data have not been collected to support or refute them. Early pup mortality may also explain the small number of pups observed.

As of the December 31, 2013, annual minimum population count, the experimental population is a minimum of 83 Mexican wolves. Projections had estimated that the population would have reached 100 by 2006. The biological progress of the reintroduction was evaluated in two analyses at three (see Paquet et al. 2001) and five years (see Interagency Field Team 2005) after the inception of the reintroduction effort. Both analyses identified regulatory mechanisms that were slowing the progress of the population, including the internal and external boundaries (and associated regulations limiting release of captive-raised Mexican wolves to a small subset of the recovery area and requiring capture of Mexican wolves that establish territories outside of the recovery area) of the Blue Range Wolf Recovery Area, and provided a number of recommendations to improve the progress of the reintroduction. Many of these recommendations are incorporated into our proposed revisions to the regulations for the Mexican wolf experimental population and the Mexican Wolf Recovery Program's section 10(a)(1)(A) research and recovery permit.

The three fundamental ecological conditions necessary for wolf habitat include large area, adequate prey, and security from human-caused mortality. Threats related to the destruction, modification, or curtailment of habitat do not likely threaten the Mexican wolf at the current time: the area occupied by the current population has remained stable since 2002; additional tribal lands are now available to support reintroduction efforts; and there is no indication that Mexican wolves are food-limited. Future habitat suitability for Mexican wolves in the Southwest and Mexico may decrease over time due to human population growth and resultant development on public and private lands.

In the current population, causes of mortality have been largely human-related (primarily illegal shooting and secondarily vehicular collision). The Service has not identified any individual threats that are so severe as to put the population at immediate risk of extinction. However, the population does not experience a single threat in absence of the others, but rather all threats simultaneously or at least within spatial or temporal proximity to one another (USFWS 2010a). Therefore, management and regulatory mechanisms, illegal shooting, and inbreeding are identified as threats that are hindering the growth and fitness of the population. Although Mexican wolf deaths related to vehicles do occur each year, the incidence of mortality from vehicles can be accommodated by the Mexican wolf population without a significant impact (http://www.fws.gov/southwest/es/mexicanwolf).

Given the wide-range of this species, several Federal actions affect this species every year. Because the current population is designated as nonessential (10(j)), there are several Conference Opinions on release pens; limiting impacts to other species; and avoidance of Mexican Spotted owl designated critical habitat. A complete list of consultations affecting this species in Arizona and New Mexico can be found on our websites: http://www.fws.gov/southwest/es/arizona by clicking on the "Document Library" tab and then on the "Section 7 Biological Opinions" tab; or http://www.fws.gov/southwest/es/Library by clicking on "Biological Opinions" and entering "wolf" under "search by species." Survey work and recovery projects also occur periodically, and are summarized in our files.

Gray Wolf

Gray wolves were originally listed as subspecies or as regional populations of subspecies in the contiguous United States and Mexico. In 1978, gray wolves were reclassified as an endangered population at the species level (*C. lupus*) throughout the contiguous United States and Mexico, except for the Minnesota gray wolf population, which was classified as threatened (43 FR 9607, March 9, 1978). Although a broad range of rules and delisting actions have occurred with the gray wolf (see 78 FR 35664, June 13, 2013 for a full description), for the action area in Arizona and New Mexico, the gray wolf has been considered endangered since 1978. No critical habitat has been designated for the gray wolf in Arizona or New Mexico.

Gray wolf biology is similar to the Mexican wolf and the population has varied by region (see 78 FR 35664, June 13, 2013 for a full description). With the exception of Mexican wolves reintroduced in the experimental zone, gray wolves are not known to persist in Arizona and New Mexico, although two instances have resulted in trapping attempts to confirm lone animals.

With the exception of biological/conference opinions associated with Mexican wolves, consultations on gray wolves have not been conducted in the action area (see above for consultations associated with Mexican wolves).

Jaguar

In 1972, the jaguar (Panthera onca) was listed as endangered (37 FR 6476, FWS 1972) under the Endangered Species Conservation Act of 1969 (ESCA), a precursor to the Endangered Species Act of 1973, as amended (Act; 16 U.S.C. 1531 et seq.). Under the ESCA, the Service maintained separate listings for foreign species and species native to the United States. At that time, the jaguar was believed to be extirpated in the United States; thus, the jaguar was included only on the foreign species list. On July 25, 1979, the Service published a notice (44 FR 43705) stating that, through an oversight in the listing of the jaguar and six other endangered species, the United States populations of these species were not protected by the Act. The notice asserted that it was always the intent of the Service that all populations of these species, including the jaguar, deserved to be listed as endangered, whether they occurred in the United States or in foreign countries. Therefore, the notice stated that the Service intended to take action as quickly as possible to propose the U.S. populations of these species (including the jaguar) for listing. On July 25, 1980, the Service published a proposed rule (45 FR 49844) to list the jaguar in the United States. The proposal for listing the jaguar was withdrawn on September 17, 1982 (47 FR 41145) stating that the Act mandated withdrawal of proposed rules to list species which have not been finalized within two years of the proposal. On July 22, 1997, the Service published a final rule clarifying that endangered status for the jaguar extended into the United States (62 FR 39147, FWS 1997c).

The jaguar is a member of the family Felidae and is the largest cat in the Western Hemisphere. The cinnamon-buff coloration with round, black rosette patterns is very distinctive of this species. Male jaguars are typically 10 to 25 percent larger than females, weighing roughly 120 kilograms (265 pounds) as reported in South America. Brown and López González (2001) report jaguars in northern Mexico being smaller, with males weighing 54.5 kilograms (120 pounds) and females about 36 kilograms (80 pounds).

Jaguars range from South America to northern Mexico and the borderlands of the U.S. and Mexico. In northwestern Mexico, jaguars occur from the rugged barrancas connecting northeastern Sinaloa, southeastern Sonora, and southwestern Chihuahua, north to the border with the U.S. Jaguars persist from a variety of vegetation communities (Seymour 1989), including those found in the arid Southwest (Nowak 1994). Toward and at middle latitudes, they show a high affinity for lowland wet communities, typically swampy savannas or tropical rain forests. However, they also occur in upland vegetation communities in warmer regions of North and South America. Jaguars occur in arid areas, including thornscrub, desertscrub, lowland desert, mesquite grassland, Madrean oak woodland, and pine-oak woodland communities of northwestern Mexico and the southwestern U.S. (McCain and Childs 2008, López Gónzalez and Brown 2002). Like most large carnivores, jaguars have relatively large home ranges. According to Brown and López González (2001), their home ranges are highly variable and depend on topography, available prey, and population dynamics. However, little information is available on this subject outside tropical America, where several studies of jaguar ecology have been conducted. No home range studies have been conducted for jaguars in southwestern U.S. using standard radio-telemetry techniques; although McCain and Childs (2008), based on the use of camera-traps, report one jaguar in southeastern Arizona as having a minimum observed "range" of 1359 km^2 (525 mi^2). Because female jaguar scat was used at some camera traps at various times throughout their research, it is unknown how this could have influenced the observed range of the jaguar in this study.

The list of prey taken by jaguars range-wide includes more than 85 species (Seymour 1989), including peccaries or javelina (*Tayassu sp*.), deer (*Odocoileus sp*.) capybara (*Hydrochoerus hydrochaeris*), paca (*Cuniculus sp*.), armadillos (*Dasypus sp*.), caimans (*Caiman sp*.), livestock (*Bos taurus*), and various turtles, birds, and fish. Although it is thought that javelina and deer are mainstays in the diet of jaguars in the U.S./Mexico borderlands, other available prey, including livestock, are probably taken as well. This is similar to the diet of jaguars in the tropical dry forest of Jalisco, Mexico where white-tailed deer and collared peccary represented the preferred prey species of jaguars (Núñez et al. 2000).

Jaguar females reach sexual maturity at about two years of age, and males at three or four. The cat is believed to mate throughout the year in the wild, although births may increase when prey is plentiful. Like most cats, the jaguar is solitary outside mother-cub groups. Adults generally meet only to court and mate. Both sexes will range more widely than usual during courtship. Typical lifespan in the wild is estimated at around 12–15 years. According to Seymour (1989), in Belize, Rabinowitz (1986) found few wild jaguars over 11 years of age. A male jaguar in Arizona was documented to be at least 15 years of age.

Given the inaccessibility of much of the species' range, particularly the central Amazon, estimating jaguar numbers is difficult. Researchers typically focus on particular bioregions, and thus species-wide analysis is scant. In 1991, 600–1,000 (the highest total) were estimated to be living in Belize. A year earlier, 125–180 jaguars were estimated to be living in Mexico's 4,000 square kilometer (2400 mi²) Calakmul Biosphere Reserve, with another 350 in the state of Chiapas. The adjoining Maya Biosphere Reserve in Guatemala, with an area measuring 15,000 square kilometers (9,000 mi²), may have 465–550 animals. Work employing GPS–telemetry in 2003 and 2004 found densities of only six to seven jaguars per 100 square kilometers in the critical Pantanal region of Brazil (Soisalo and Cavalcanti 2006).

Continual loss of habitat has reduced the jaguar’s historical range of occupation by more than 50% since 1990 (Sanderson et al. 1999). Large areas continue to be converted for agriculture, cattle ranching, and human settlement, bringing humans into direct conflict with jaguars (Conforti and Azevedo 2003). While international trade in jaguars or their parts is prohibited, the cat is still regularly killed by humans, particularly due to conflicts with ranchers and farmers in South America. Livestock depredation is the primary cause of people’s intolerance of these large cats (Sanderson et al. 1999).

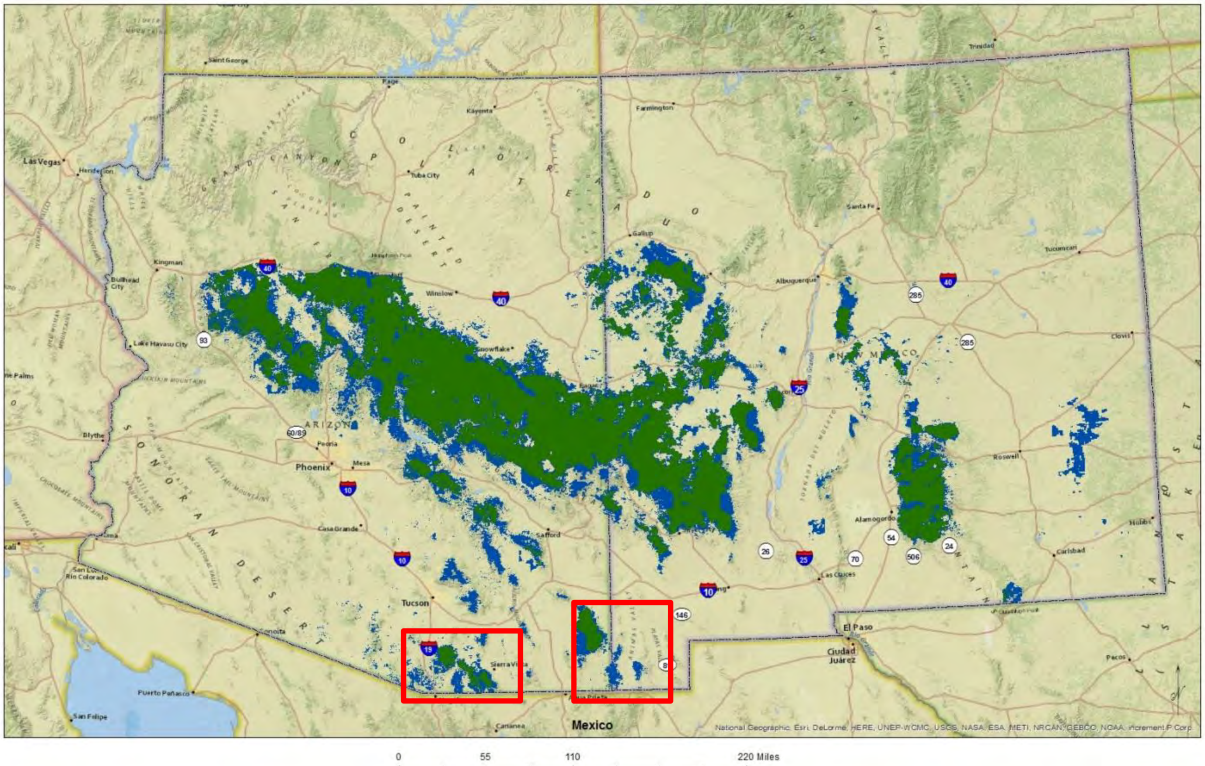

Figure G-2. Suitable habitat of the Mexican wolf south of Interstate 40 (I-40) in Arizona and New Mexico.

The areas in green represent areas where all three habitat models (Oakleaf et al. 2006, Carroll et al. 2006, Carroll et al. 2014) predict Mexican wolf occupancy, while the area in blue represents where only two out of three habitat models predict Mexican wolf occupancy (See the Draft EIS for a complete description of methods). The red boxes show where the overlap between suitable wolf habitat and Jaguar critical habitat occurs.

Of the six units of jaguar critical habit established, five (Atascosa, Patagonia, Whetstone, Peloncillo, and San Luis) overlap with significant areas of suitable habitat for the Mexican wolf (Figure G-2). Final jaguar critical habitat (79 FR 12572) includes the seven primary constituent elements (PCEs) listed below:

Expansive open spaces in the southwestern United States of at least 100 square km (38.6 square mi) in size which: (1) Provide connectivity to Mexico; (2) Contain adequate levels of native prey species, including deer and javelina, as well as medium-sized prey such as coatis, skunks, raccoons, or jackrabbits; (3) Include surface water sources available within 20 km (12.4 mi) of each other; (4) Contain from greater than 1 to 50 percent canopy cover within Madrean evergreen woodland, generally recognized by a mixture of oak, juniper, and pine trees on the landscape, or semi-desert grassland vegetation communities, usually characterized by *Pleuraphis mutica* (tobosagrass) or *Bouteloua eriopoda* (black grama) along with other grasses; (5) Are characterized by intermediately, moderately, or highly rugged terrain; (6) Are below 2,000 m (6,562 ft) elevation; and (7) Are characterized by minimal to no human population density, no major roads, or no stable nighttime lighting over any 1-square-km (0.4-square-mi) area.

While Mexican wolves may compete with jaguars for deer and javelina, we expect Mexican wolves to occur in the designated jaguar critical habitat through natural dispersal and/or translocation of resident Mexican wolves that are already within the jaguar critical habitat area. Thus, we anticipate that effects of the proposed action to jaguar critical habitat will be insignificant and discountable, and therefore we do not address jaguar critical habitat in this biological opinion. In addition, the proposed Revised Rule provides for take of Mexican wolves in response to impacts to wild ungulates, which could be implemented if Mexican wolves were influencing deer numbers in jaguar critical habitat.

A complete list of consultations affecting jaguar in Arizona and New Mexico can be found on our websites: http://www.fws.gov/southwest/es/arizona by clicking on the "Document Library" tab and then on the "Section 7 Biological Opinions" tab; or http://www.fws.gov/southwest/es/Library by clicking on "Biological Opinions" and entering "jaguar" under "search by species." Recent consultations, formal and informal, that have addressed possible impacts to jaguar, include:

- U.S. Army – Biological opinion for ongoing and future military operations and activities at Fort Huachuca, Arizona. May 16, 2014. The operations and activities include tenant-specific activities within Fort Huachuca training areas, air operations associated with Libby Army Air Field, recreational opportunities, resource management, realty actions, and programmed facilities development projects both on post and off post that are master planned to continue to meet mission objectives. The proposed action, Ongoing and Future Military Operations and Activities at Fort Huachuca, Arizona, may result in disturbance to jaguars and their habitat, as well as possible, but highly unlikely, injury or death of a jaguar. That said, because the proposed action may benefit jaguar by reducing the risk of severe fire and managing for open space and wildlife, we anticipate the net effect of the proposed action on jaguars will be beneficial. After reviewing the current status of the jaguar, the environmental baseline for the action area, and the effects of the proposed action, it is our biological opinion that the project, as proposed, is not likely to jeopardize the continued existence of the jaguar.
- Arizona Game and Fish Department – Research and Recovery Permit. September 22, 2010. The activities authorized in their permit are only the accidental capture, chemical immobilization, data collection, attachment and use of a radio telemetry or satellite collar, and subsequent release of a jaguar.
- U.S. Department of Homeland Security. September 4, 2008. The activities to construct or retrofit, operate, and maintain communication and sensor towers; construct new road segments and repair existing roads; use mobile surveillance systems; and deploy unattended ground sensors. The proposed actions may result in degradation of jaguar habitat and disturbance to jaguars. Though activities associated with the proposed action could be detrimental to jaguars, conservation measures included in the project description will minimize and help offset disturbance to jaguars and degradation of their habitat.
- Bureau of Land Management – Safford and Tucson Field Offices' Livestock Grazing Program in southeastern Arizona. September 26, 1997. Adverse effects to jaguars were expected to occur from the proposed action by means of habitat loss and predator control activities. The anticipated level of take was considered to be exceeded if: (1) any predator control activities associated with the proposed action are directed at, or ultimately result in death or injury of a jaguar; (2) the injury or mortality of any jaguar that occurs as a result of any activities associated with the proposed action; and (3) jaguar habitat is not maintained in riparian corridors of the project area. Several conservation recommendations were also provided.

- Nationwide Wildlife Services Program. June 22, 1999. Adverse effects to jaguars could occur from certain animal damage control methods, including the use of leg-hold and box traps, snares, M-44s, etc. The anticipated level of take was considered to be exceeded if animal damage control activities are directed at jaguars, or if one jaguar is unintentionally trapped, injured, or killed.
- Department of Homeland Security. August 29, 2007. (AESO/AE 22410-2007- F-0416), addressed effects of DHS's construction of pedestrian fence (and other associated activities such as road construction and maintenance) along the U.S./Mexico international border near Sasabe, Pima County; Nogales, Santa Cruz County; and near Naco and Douglas, Cochise County. Adverse effects to jaguars were expected to occur from the proposed action by impeding jaguar movement between Mexico and the U.S., disturbing jaguars, and degrading their habitat. No incidental take was anticipated and a couple of conservation recommendations were provided.

This is not a comprehensive list of consultations that cover jaguars. Survey work and recovery projects also occur periodically, and are summarized in our files.

Ocelot

The ocelot (*Leopardus pardalis*), a medium-sized spotted cat, belongs to the genus Leopardus, which also includes the margay (*Leopardus wiedii*) and the oncilla (*Leopardus tigrinus*). The ocelot is divided into as many as 11 subspecies that range from the southwestern U.S. to northern Argentina (USFWS 2010b). Two subspecies occur in the United States: the Texas/Tamaulipas ocelot (*L. pardalis albescens*) and the Arizona/Sonora ocelot (*L. p. sonoriensis*) (Hall 1981).

The ocelot was listed as endangered in 1972 under the authority of the Endangered Species Conservation Act of 1969 (ESCA) (37 FR 6176). The 1969 ESCA maintained separate lists for foreign and native wildlife. The ocelot appeared on the foreign list, but due to an oversight, not on the native list. Following passage of the Act in 1973, the ocelot was included on the January 4, 1974, list of "Endangered Foreign Wildlife" that "grandfathered" species from the lists under the 1969 ESCA into a new list under the Act (USFWS 1974). The entry for the ocelot included "Central and South America" under the "Where found" column in the new Act list. Endangered status was extended to the U.S. portion of the ocelot's range with a final rule published July 21, 1982 (47 FR 31670, USFWS 1982b)). The "Historic range" column for the ocelot's entry in the rule reads, "U.S.A. (TX, AZ) south through Central America to South America." The entry on the current list is essentially the same, and reads, "U.S.A. (TX, AZ) to Central and South America" (50 CFR §17.11). The ocelot was upgraded to CITES Appendix I in 1986 (Nowell and Jackson 1996) and is considered endangered in Mexico (SEMARNAT 2002). The ocelot is listed as endangered by the State of Texas and is protected from hunting and live collection in Arizona where it is listed as a species of "special concern." In the 1982 final rule (47 FR 31670), the Service made a determination that the designation of critical habitat was not prudent because such a designation would not be in the best interests of the conservation of the species.

Ocelots historically occurred in Arkansas, Arizona, Texas, and possibly Louisiana, California, and Florida in the U.S. southward through Mexico, Central and South America to Peru, Uruguay, and northern Argentina (Navarro-Lopez 1985). Currently, the ocelot ranges from extreme southern Texas and southern Arizona through the coastal lowlands of Mexico to Central America, Ecuador and northern Argentina. The ocelot also is known from Trinidad and Isla de Margarita, Venezuela, but not from the Antilles (Tewes and Schmidly 1987, Sunquist and Sunquist 2002).

Habitats used by the ocelot throughout its range vary from tropical rainforest, pine forest, gallery forest, riparian forest, semi-deciduous forest, and dry tropical forest, to savanna, shrublands, and marshlands.

The ocelot generally requires dense vegetation and its prey consists primarily of rabbits, rodents, birds, and lizards.

As of July 2011, there were fewer than 35 total known individual ocelots (with the possibility that more cats inhabit surrounding ranches), found in 2 counties at the northern limit of the species' distribution in Texas. A much larger population of the Texas/Tamaulipas ocelot (*L. p. albescens*) occurs in Tamaulipas, Mexico, but is geographically isolated from ocelots in Texas (USFWS 2010c).

Confirmation that the Arizona portion of the range is occupied by the Arizona/Sonoran ocelot (*L. p. sonoriensis*) has recently been gathered through the use of remote and video cameras and the discovery of a road killed ocelot (Sky Island Alliance 2010, unpubl. data, AGFD 2010, unpubl. data, AGFD 2011, unpubl. data). There is no evidence of a breeding population of ocelots in Arizona, as no females have been reported. If there is a population of ocelots in Arizona, the density is thought to be extremely low due to the scarcity of sightings and the number of remote cameras deployed to monitor jaguars, although a number of ocelots have been documented just south of the U.S. border in Sonora, Mexico (USFWS 2010c). However, no ocelot specific monitoring program has been undertaken in Arizona (Haines et al. 2005). Prior to these sightings, the last known ocelot in Arizona was killed in the Huachuca Mountains in 1964 (Hoffmeister 1986, Lopez Gonzalez et al. 2003).

Habitat conversion, fragmentation, and loss comprise the primary threats to the ocelot today. Human population growth and development continue throughout the ocelot's range. Small population sizes in Texas and isolation from conspecifics in Mexico threaten the ocelot in Texas with inbreeding. Connectivity among ocelot populations or colonization of new habitats is inhibited by road mortality among dispersing ocelots. Issues associated with border barrier development and patrolling the boundary between the United States and Mexico further exacerbate the isolation of Texas and Arizona ocelots from those in Mexico. Commercial exploitation and illegal hunting were significant threats to the species when the ocelot was originally listed. Although some hunting of the ocelot continues, and regulations remain challenging to enforce, the harvest and export of ocelots has significantly declined and is controlled by the CITES.

Ocelot populations appear to be rebounding in parts of its range, perhaps due to a decrease of hunting since the end of the 1980s. In the absence of hunting, the ocelot seems tolerant of human settlement and activities if large forests and sufficient prey are available (USFWS 2010c).

The species has a recovery priority number of 5C, meaning that it has a low potential for recovery with a relatively high degree of conflict. Recovery for the ocelot was originally addressed in Listed Cats of Texas and Arizona Recovery Plan (with Emphasis on the Ocelot) (USFWS 1990). A draft revised recovery plan was made available for public comment in 2010 (USFWS 2010b), with the goal of improving the status of the species to the point that it no longer needs the protection of the ESA. The draft revised recovery plan has not been finalized as of the date of this biological opinion. The draft recovery strategy calls for:

- the assessment, protection, and restoration of sufficient habitat to support viable populations of the ocelot in the borderlands of the U.S. and Mexico;
- the reduction of effects of human population growth and development to ocelot survival and mortality;
- the maintenance or improvement of genetic fitness, demographic conditions, and health of the ocelot;

- the assurance of long-term viability of ocelot conservation through partnerships, the development and application of incentives for landowners, application of existing regulations, and public education and outreach;
- the use of adaptive management, in which recovery is monitored and recovery tasks are revised by the USFWS in coordination with the Recovery Team as new information becomes available; and
- the support of international efforts to ascertain the status and conservation of the ocelot in Sonora and south of Tamaulipas.

The major focus of the draft revised recovery plan is on two cross-border management units, the Texas/Tamaulipas Management Unit and the Arizona/Sonora Management Unit (ASMU). The boundaries of the ASMU are defined as the original range of the subspecies (L. p. sonoriensis) as described by Hall (1981) which generally extends from central Arizona south to central Sinaloa.

Draft delisting criteria for the ASMU are: 1) the ASMU population is estimated through reliable scientific monitoring to be above 2,000 animals for 10 years; 2) significant threats to this population have been identified and addressed; and 3) habitat linkages to facilitate an ASMU metapopulation have been identified and are conserved for the foreseeable future.

A complete list of consultations affecting ocelots in Arizona can be found on our website: http://www.fws.gov/southwest/es/arizona by clicking on the “Document Library” tab and then on the “Section 7 Biological Opinions” tab; or http://www.fws.gov/southwest/es/Library by clicking on “Biological Opinions” and entering “ocelot” under “search by species.” There have been many consultations, formal and informal, that have addressed possible impacts to ocelots throughout their range in the U.S. However, most have been for ocelots in Texas. The following formal consultation includes the ocelot in Arizona:

- U.S. Army – Biological opinion for ongoing and future military operations and activities at Fort Huachuca, Arizona. May 16, 2014. The operations and activities include tenant-specific activities within Fort Huachuca training areas, air operations associated with Libby Army Air Field, recreational opportunities, resource management, realty actions, and programmed facilities development projects both on post and off post that are master planned to continue to meet mission objectives. The proposed action, Ongoing and Future Military Operations and Activities at Fort Huachuca, Arizona, may result in disturbance to ocelots and their habitat, as well as possible injury or death of an ocelot. That said, because the proposed action may benefit ocelot by reducing the risk of severe fire and managing for open space and wildlife, we anticipate the net effect of the proposed action on ocelots will be beneficial. After reviewing the current status of the ocelot, the environmental baseline for the action area, and the effects of the proposed action, it is our biological opinion that the project, as proposed, is not likely to jeopardize the continued existence of the ocelot.
- Arizona Game and Fish Department – Research and Recovery Permit. September 22, 2010. The activities authorized in their permit are only the accidental capture, chemical immobilization, data collection, attachment and use of a radio telemetry or satellite collar, and subsequent release of an ocelot.

This is not a comprehensive list of consultations that cover ocelots. Survey work and recovery projects also occur periodically, and are summarized in our files.

California Condor

The California condor (*Gymnogyps californianus*) was listed as endangered on March 11, 1967 (32 FR 4001). Critical habitat was designated in California on September 24, 1976 (41 FR 187, USFWS 1976). Critical habitat has not been designated outside of California. The California Condor Recovery Plan, Third Edition was signed on April 25, 1996 (USFWS 1996b). The California condor remains one of the world's rarest and most imperiled vertebrate species.

Despite intensive conservation efforts, the wild California condor population declined steadily until 1987, when the last free-flying individual was captured. During the 1980s, captive condor flocks were established at the San Diego Wild Animal Park and the Los Angeles Zoo, and the first successful captive breeding was accomplished at the former facility in 1988. Following several years of increasingly successful captive breeding, captive-produced condors were first released back to the wild in California in early 1992 and in Arizona starting in 1996.

The first release of condors into the wild in northern Arizona occurred on December 12, 1996. They were released within a designated nonessential experimental population area in northern Arizona and southern Utah (USFWS 1996c). The area is bounded by Interstate 40 on the south, U.S. Highway 191 on the east, Interstate 70 on the north, and Interstate 15 to U.S. Highway 93 on the west. The nonessential experimental population status applies to condors only when they are within the experimental population area. For the purposes of section 7 consultation, when condors are on lands not within the National Wildlife Refuge System or the National Park System, but within the experimental population area, they are treated as if proposed for listing. When condors are on National Wildlife Refuge or National Park System lands within the designated experimental population area, they are treated as a threatened species. Any condors outside of the experimental population area are fully protected as endangered.

Condors are scavengers and rely on finding their food visually, often by investigating the activity of ravens, coyotes, eagles, and other scavengers. Most California condor foraging in northern Arizona occurs in open areas and throughout the forested areas of the rims of the Grand Canyon. Typical foraging behavior includes long-distance reconnaissance flights, lengthy circling flights over a carcass, and hours of waiting at a roost or on the ground near a carcass. Condors are also attracted to human activity; newly released individuals and young inexperienced juveniles are more likely to investigate human activity.

Roost sites include cliffs and tall trees, including snags. Nesting sites for California condors include various types of rock formations such as caves, crevices, overhung ledges, and potholes.

As of April 30, 2014, a total of 238 California condors existed in the wild; what is known as the Southwest (Arizona) population of California condors contained 75 individuals. That latter figure includes 65 free-flying individuals previously released into the population and 10 wild-fledged individuals. Ninety two fatalities and missing California condors have been documented in northern Arizona since 1996. Of 14 chicks that have hatched since 2003, 10 wild-fledged individuals currently exist in the population. Most mortality in northern Arizona has been related to human activity including lead poisoning and shootings.

As part of the program to manage condors within the nonessential experimental population area, all condors released in the area are instrumented and monitored with radio and/or satellite telemetry. Individual condors are tracked and monitored by The Peregrine Fund personnel. Sick or injured condors are rescued, sent to rehabilitation, and re-released when recovered. Dead condors are recovered by The Peregrine Fund field personnel to determine cause of death.

Since critical habitat has only been designated for California condors in California (USFWS 1976), and Mexican wolves are not expected to disperse into the area designated as critical habitat, the proposed action will notaffect critical habitat for the condor. Therefore, we do not address critical habitat for the California condor in this Biological Opinion/Conference Opinion.

A complete list of consultations affecting California condors in Arizona can be found on our websites: http://www.fws.gov/southwest/es/arizona by clicking on the "Document Library" tab and then on the "Section 7 Biological Opinions" tab; or http://www.fws.gov/southwest/es/Library by clicking on "Biological Opinions" and entering "California condor" under "search by species." There have been several consultations, formal and informal, that have addressed possible impacts to California condor, including:

- Bureau of Land Management – Arizona Strip Resource Management Plan. November 7, 2007. California condors may be disturbed, and nesting and foraging areas degraded, by components of the proposed action including vegetation management, fire and fuels management, and mineral development.
- Injury or mortality of condors is most likely from ingesting contaminants. Depending on location and extent, authorization of watershed, restoration, noxious weed, and vegetation treatments; prescribed fire and fuels reduction projects; sale and use of vegetation 81 products; and range improvement projects may result in modification of foraging and nesting areas used by condors. This modification may degrade the function of the areas to support species that become food for condors. It is possible that such actions may also degrade the characteristics of condor roost and nest locations. Noise and human activity associated with these actions may disturb the normal foraging and breeding behavior of individuals. Disturbance of normal behavior may result in less efficient foraging and reduced reproductive success. Under some circumstances, condors are known to be attracted to human activity, which could lead to adverse human-condor interactions and result in injury or death of individuals. Condors often ingest foreign materials; trash or other debris at work sites could be ingested by the birds, which could directly result in injury or death.
- Condor habitat could be degraded as a result of fire management. Fire (wildfire, wildland fire use, and prescribed fire) may result in large-scale and long-term degradation of areas that support species that are food for condors. Fire may result in loss of characteristics of roost and nest locations that are selected by condors. Fire may result in disturbance of the normal foraging and breeding behavior of individuals.
- Aircraft may be used in the project area in association with a variety of authorized projects including animal damage control, fire suppression and reconnaissance, law enforcement, construction and maintenance of range and/or wildlife improvement projects, herbicide application, and wildlife inventories. A condor would be injured or killed if it collided with an aircraft, with objects slung below or behind an aircraft, or with objects dropped from aircraft such as chemical retardant. Collisions with cell towers, power lines, and other types of aerial communication towers are possible, but there have been no reported condor mortalities due to such collisions to date.
- Grand Canyon National Park – Colorado River Management Plan. January 3, 2006. Components of the CRMP include boating, hiking, camping, swimming, and other activities that are associated with river-running recreation, and helicopter flights transporting passengers to and from the river. Boating can take several forms including private and commercial, and non-motorized and motorized trips. A variety of watercraft is used by river-runners ranging from kayaks to large motorized pontoon rafts. One of the purposes of the river trips is to stop at various attractions for appreciation or further exploration. Because certain attractions are very well-known and popular, a concentration of use can and does occur at various locations.

- California condors may be affected by the special flight rules (overflights) that may overlap a portion of the project area. In the biological opinion developed for the special flight rules, we anticipated that an unquantifiable number of condors would be affected by these rules. Take was expected to be in the form of harassment or accidental displacement when startled individuals are flushed from a perch site by the proposed low- level flights. Additional take in the form of killing, estimated at one bird in five years, was anticipated from collisions.
- Grand Canyon National Park – Fire Use Program. January 26, 2000, August 22, 2003, August 18, 2006, and September 15, 2009 (not a comprehensive list of consultations on this program). Wildland fire use, which previously was known as prescribed natural fire, is the practice of determining whether to allow naturally ignited fires to continue to burn in order to meet resource management goals. Wildland fires can be managed in a variety of ways, ranging from simple monitoring of a fire's progress to full suppression. A combination of management techniques can be applied on various portions of a single fire.
- Based upon observations made during the wildland fires of 2001, the Park helicopter and condors are sharing the same airspace. Although there have been no collisions or near collisions, the potential does exist. There are no data available documenting the number of collisions between aircraft and birds within the Park. Increased aviation activity associated with wildland fire use, and the possible attraction of condors to other wildland fire use activity, will increase the overall risk of a collision.
- Condors may be affected by condor-human interactions. We have conducted informal and formal consultations with Grand Canyon National Park on projects such as previous prescribed fire and wildland fire-use programs, wildfires, construction projects, and exotic plant management. The consultations have primarily focused on the effects of disturbance and condor-human interactions. Where possible, conservation measures were developed and implemented to help reduce the possibility of the adverse interactions.
- Condor-human interactions may also result from recreation activities that occur in Grand Canyon National Park. Condors are also affected by the use of lead ammunition by hunters in areas adjacent to Grand Canyon National Park, resulting in mild contamination of individuals, more serious contamination requiring chelation and recovery, or death.

This is not a comprehensive list of consultations that cover California condors. Survey work and recovery projects also occur periodically, and are summarized in our files.

Canada Lynx

The Canada Lynx (*Lynx Canadensis*) was listed as threatened in the contiguous United States Distinct Population Segment (DPS) on March 24, 2000 (65 FR 16052). This DPS did not include lynx found in the State of New Mexico. Based on a series of lawsuits and settlements, the Service has since listed the Canada Lynx DPS in the contiguous United States as where found, which would include portions of New Mexico (79 FR 54782; September 12, 2014). Critical habitat was initially designated for the lynx in Minnesota, Montana, and Washington on November 9, 2006 (71 FR 66008), and later revised to include larger areas in Minnesota, Montana, and Washington, and additional areas in the states of Idaho, Maine, and Wyoming (74 FR 8616, February 25, 2009). Critical habitat continues to be proposed for these six states, but is not proposed for Colorado or New Mexico because the habitat in the southern Rocky Mountains does not contain the essential physical and biological features of lynx habitat, and is not essential for the conservation of the species (79 FR 54782; September 12, 2014). Since critical habitat has not been designated for lynx in the southern Rocky Mountains, and the scope of the actions covered in this Biological Opinion/Conference Opinion does not extend into states with proposed or designated critical habitat, there will be no effects to critical habitat for the lynx. Therefore, we do not address critical habitat for the lynx in this Biological Opinion/Conference Opinion.

The lynx is a medium-sized cat with relatively long legs; large, well-furred paws, long tufts on the ears, and a short black-tipped tail. The ear tufts and short black-tipped tail distinguish the lynx from the more common bobcat (*Lynx rufus*). Lynx generally measure 30 to 35 inches (75 to 90 centimenters) long and weigh 14 to 31 pounds (6-14 kilograms). The lynx's large feet and long legs make it adapted to hunting in deep snow.

The lynx is broadly distributed across North America, primarily associated with expansive, continuous boreal forest from eastern Canada to Alaska (Agee 2000, Aubry et al. 2000, Mowat et al. 2000). These areas largely overlap with the lynx's primary prey, snowshoe hare (*Lepus americanus*). In the contiguous United States, these boreal forests become discontinuous and patchy, which limits both lynx and hares to low density levels where they occur (Agee 2000, Aubry et al. 2000). Bobcats and coyotes (*Canis latrans*) are potential competitors with lynx, but are at a disadvantage in areas of fluffy or deep snow (Buskirk et al. 2000).

In Colorado and Northern New Mexico (the portion of the action area in this BO where lynx and Mexican wolves may overlap on extremely rare occasions), all lynx presence is the result of 218 lynx that were captured and translocated to high elevation forest in Colorado from 1999 to 2006 (Shenk 2010, Devineau et al. 2010). Some of these lynx established home ranges in Colorado and produced kittens in some years. Some of these lynx also dispersed into northern New Mexico and Arizona, but production was not documented in these individuals (Devineau et al. 2010, 79 FR 54782; September 12, 2014). Areas in New Mexico are considered incapable of supporting a self-sustaining lynx population (79 FR 54782; September 12, 2014). Further, the hare population and lynx habitat in Colorado is considered marginal at best to support populations of lynx into the future (Ruggiero et al. 2000, Steury and Murray 2004). Much uncertainty persists on the ultimate fate of the lynx populations in Colorado, however, should lynx populations remain, it could prove beneficial for the conservation of the lynx DPS (79 FR 54782; September 12, 2014).

A list of consultations affecting Canada lynx can be found on our websites: http://www.fws.gov/mountain-prairie/species/mammals/lynx/consultation.htm. We do not summarize all previous Biological Opinions on lynx primarily due to limited intersection of those Biological Opinions with the current action area and effects associated with this action. However, the following consultation relates to trapping in the southern Rocky Mountains, which is pertinent to the present Biological Opinion:

- United States Forest Service and Bureau of Land Management – Land and Resource Management Plans and Land Use Plans. October 25, 2000. Each National Forest and BLM District mapped lynx habitats and assessed potential project impacts by using the direction in the Lynx Conservation Assessment and Strategy (LCAS). Plans within portions of the Northern Rockies, Southern Rockies, Great Lakes, and within the Northeast geographic areas allow levels of human access via forest roads that may present a risk of incidental trapping or shooting of lynx or access by other competing carnivores. The risk of road-related adverse effects is primarily a winter issue. Guidance included working cooperatively with States and tribes to reduce incidental take of lynx related to trapping and noted that the LCAS includes conservation measures that would benefit individual lynx that may otherwise be adversely affected by incidental or illegal trapping. This Biological Opinion goes on to state that although we are concerned about the illegal or incidental trapping, we have no information to indicate the loss of these individuals is negatively affecting the overall ability of the DPS to persist. At the present time, mortality of lynx through legal trapping has been virtually eliminated in the continuous United States. Overall the Biological Opinion concluded that USFS and BLM land management plans, as implemented in accordance with Conservation Agreements, would not jeopardize the continued existence of lynx.

ENVIRONMENTAL BASELINE

The environmental baseline includes past and present impacts of all Federal, State, or private actions in the action area, the anticipated impacts of all proposed Federal actions in the action area that have undergone formal or early section 7 consultation, and the impact of State and private actions which are contemporaneous with the consultation process. The environmental baseline defines the current status of the species and its habitat in the action area to provide a platform to assess the effects of the action now under consultation.

Description of the Action Area

The only area where Mexican wolves currently occur in the United States is the Apache and Gila National Forests in east-central Arizona and west-central New Mexico, encompassing 17,775 km² (6,845 mi²) (USFWS 1996a). However, we are proposing revisions to the regulations for the Mexican Wolf Experimental Population and the Mexican Wolf Recovery Program's section 10(a)(1)(A) research and recovery permit (TE-091551-8 dated 04/04/2013). In summary we propose to:

- Modify the geographic boundaries in which Mexican wolves are managed south of Interstate-40 in Arizona and New Mexico under section 10(j) of the Endangered Species Act
- Modify the management regulations that govern the initial release, translocation, removal and take (see the definition of "*take*" provided in the List of Definitions) of Mexican wolves
- Issue a section 10(a)(1)(A) permit for Mexican wolves and gray wolves inside the MWEPA and areas outside of the MWEPA.

These proposed revisions would allow Mexican wolves to occupy a far greater area than is currently allowed under the existing regulations. In addition, Mexican wolves are known to disperse great distances (see Interagency Field Team 2005: Figure 6). Thus, the entire states of Arizona and New Mexico are included in the action area. Mexican wolves are unlikely to disperse to California, Colorado, Nevada, Texas, and Utah based on habitat connectivity, desert environments, and/or juxtaposition with the MWEPA. However, these states are included in the action area based on the remote possibility that personnel may need to capture Mexican wolves that disperse from the MWEPA and translocate them back to the MWEPA or transfer them to captivity or Mexico (Figure G-1). Thus the action area is the states of Arizona and New Mexico, the western portion of Texas, the southern portions of Colorado and Utah, the southeastern portion of California, and the southern portion of Nevada.

Mexican Wolf

The Mexican wolf population in the United States is wholly contained within the action area. All information concerning the current status of the Mexican wolf and its habitat in the action area is provided in the status of the species section above.

Gray Wolf

Individual gray wolves may disperse to Arizona or New Mexico from established populations in Wyoming or Idaho. While not expected to occur frequently, we would expect to manage gray wolves within the action area of Arizona and New Mexico. For instance, an animal observed on the Kaibab Plateau in northern Arizona in 2014 could be a gray wolf or a hybrid dog released in the area. In either case, the Service would intend to manage these animals to either protect gray wolves or remove hybrid dogs. Historical populations have varied in other regions of the United States (see 78 FR 35664, June 13, 2013 for a full description).

Molecular genetic evidence from limited historical specimens supports morphometric evidence of an intergradation zone between Mexican wolf and northern gray wolves (Leonard *et al.* 2005). This research shows that, within the time period that the historical specimens were collected (1856–1916), a northern clade (i.e., group that originated from and includes all descendants from a common ancestor) haplotype was found as far south as Arizona, and individuals with southern clade haplotypes (associated with Mexican wolves) occurred as far north as Utah and Nebraska. Leonard *et al.* (2005) interpret this geographic distribution of haplotypes as indicating gene flow was extensive across the subspecies' limits during this historical period, and Chambers *et al*. (2012, p. 37) agree this may be a valid interpretation. Thus, we consider infrequent gray wolf dispersal to northern New Mexico and Arizona as consistent with historical patterns. Similarly, we consider dispersal by Mexican wolves to northern Arizona and New Mexico as consistent with historical patterns.

Jaguar

Historically, jaguars in the U.S. occurred in California, Arizona, New Mexico, Texas, and possibly Louisiana. The last jaguar sightings in California, Texas, and Louisiana were documented in the late 1800s or early 1900s. Jaguars were once known to occur in small numbers in Arizona and New Mexico (Brown and López González 2001). Sightings in the U.S in the late 20th century to the present have occurred mainly along the U.S./Mexico international border. Three records of a female with kittens have been documented in the U.S., the last in 1910 (Lange 1960, Nowak 1975, Brown 1989), and no females have been confirmed in the U.S. since 1963 (Brown and López González 2000). As a result, jaguars in the U.S. are thought to be part of a population, or populations, that occur largely in Mexico.

Some threats (i.e., legal or illegal killing of jaguars) that contributed to the historical decline of the jaguar in the U.S. have been reduced or eliminated, however, other threats exist. For example, infrastructure projects (e.g., vehicle barriers, pedestrian fences) along the U.S./Mexico international border are expected to impede movement of jaguars across the border. Because jaguars in Arizona are believed to be part of a population centered in northern Mexico, preventing jaguar movement and exchange between the U.S. and Mexico will likely have deleterious effects on jaguars, particularly those in Arizona and New Mexico. Fences designed to prevent the passage of humans will also prevent passage of jaguars.

Recently (1996 through 2014), six individual male jaguars have been documented in the U.S. One was observed and photographed on March 7, 1996, in the Peloncillo Mountains in New Mexico near the Arizona border (Glenn 1996, Brown and López González 2001). The Peloncillo Mountains run north-south to the Mexican border, where they join the foothills of the Sierra San Luis and other mountain ranges connecting to the Sierra Madre Occidental. Another was observed and photographed on August 31, 1996 in the Baboquivari Mountains of southern Arizona (Childs 1998, Brown and López González 2001). In February 2006, another jaguar was observed and photographed in the Animas Mountains in Hidalgo County, New Mexico (McCain and Childs 2008). From 2001 to 2007, two jaguars were photographed (one repeatedly) using infra-red camera traps in south-central Arizona, near the Mexico border.

In February 2009, a male jaguar was captured in a leg-hold snare in Peñasco Canyon near Nogales, Arizona. The snare was placed by researchers from the Arizona Game and Fish Department who were trapping mountain lions and black bears as part of a large carnivore movement study. The jaguar, identified as Macho B; was sedated, assessed for health and vigor, and fixed with a GPS tracking device before being set free. Within days after being released, the GPS collar indicated Macho B was not moving, so researchers searched for and located him. Veterinarians from the Phoenix Zoo determined that

Macho B was suffering from renal (kidney) failure and, after gaining Service authorization, euthanized him (Office of Inspector General 2010). A new male jaguar has been documented in the Whetstone and Santa Rita mountains since 2011, based on remote camera pictures.

Jaguar habitat use patterns are affected by many variables, including human infrastructure and activities. Conde et al. (2010) found significant differences in habitat use between male and female jaguars in the Mayan Forest of the Yucatan Peninsula by modeling occupancy as a function of land cover type, distance to roads, and sex. Although both male and female jaguars preferred tall forest, short forest was used by females but avoided by males. Whereas females significantly avoided roads, males did not and ventured into low-intensity cattle ranching and agriculture. Other studies have also shown that jaguars selectively use large areas of relatively intact habitat away from certain forms of human influence. Zarza et al. (2007) report that towns and roads had an impact on the spatial distribution of jaguars (jaguars used greater than expected areas located more than 6.5 km [4 mi] from human settlements and 4.5 km [2.8 mi] from roads) in the Yucatan peninsula. In the state of Mexico, Monroy-Vichis et al. (2007) report that one male jaguar occurred with greater frequency in areas relatively distant from roads and human populations. In some areas of western Mexico, however, jaguars (both sexes) have frequently been recorded near human settlements and roads (Núñez-Pérez, Subcomité Técnico Consultativo para la Conservación y Manejo sustentable del Jaguar y otros felinos de México, August 2, 2011, electronic mail). In Marismas Nacionales, Nayarit, a jaguar den was recently located very close to an agricultural field, apparently 1 km (0.6 mi) from a small town (Núñez-Pérez, Subcomité Técnico Consultativo para la Conservación y Manejo sustentable del Jaguar y otros felinos de México, August 2, 2011, electronic mail).

No formal habitat use studies have been conducted (with the exception of Núñez et al.'s [2002] examination of arroyo use) in the northwestern most portion of the jaguar's range. However, results of a study in the municipality of Nácori Chico, Sonora, showed that jaguar kill sites of wild prey (i.e., white-tailed deer and peccary)(Rosas-Rosas, Colegio de Postgraduados Campus San Luis Potosí, August 6, 2011, electronic mail) and cattle were positively associated with oak forest and semi-tropical thornscrub vegetation types, whereas they were negatively associated with upland mesquite (Rosas-Rosas et al. 2010). Sites of cattle kills were also positively associated with proximity to permanent water sources and roads (Rosas-Rosas et al. 2010). General jaguar habitat associations have been described in this region by various authors. In western Mexico, including Nayarit and Jalisco, jaguars primarily occur in tropical deciduous forest, although other formerly important habitats are the mangrove forests and swamps of the Agua Bravo and Marismas Nacionales straddling the borders of Nayarit and Sinaloa (Brown and López-González 2001). In Jalisco, oak and pine forest are used by jaguars, some of them located between 2,700 and 2,800 m (8,858-9,186 ft)(Núñez-Pérez, Subcomité Técnico Consultativo para la Conservación y Manejo sustentable del Jaguar y otros felinos de México, August 2, 2011, electronic mail). Although jaguars are not primarily associated with these vegetation communities, it is important to consider oak woodlands and pine forests as potential jaguar corridors (Núñez-Pérez, Subcomité Técnico Consultativo para la Conservación y Manejo sustentable del Jaguar y otros felinos de México, August 2, 2011, electronic mail to FWS).

Several studies have helped refine a general understanding of habitats that have been or might be used by jaguars in Arizona and New Mexico, including studies by the Sierra Institute Field Studies Program (2000), Hatten et al. (2002), Menke and Hayes (2003), Robinson et al. (2006), Sanderson and Fisher (2013). As Johnson et al. (2011) explain, however, any conclusions about the conservation importance of the habitat types in which jaguars have occurred or might occur in Arizona and New Mexico are preliminary and can vary widely, depending on what assumptions are factored into the analyses, such as the number and reliability of jaguar occurrence records and the significance of single "point in time" occurrence observations as predictors of habitat use by jaguars.

Hatten et al. (2005) used Geographic Information System (GIS) to characterize potential jaguar habitat in Arizona by overlaying 25 historical jaguar sightings on landscape and habitat features believed important (e.g., vegetation biomes and series, elevation, terrain ruggedness, proximity to perennial or intermittent water sources, human density). The amount of Arizona land area identified as potential jaguar habitat ranged from 21 to 30 percent, depending on the input variables. All jaguar records were observed in four biomes. Of these, 56 percent were observed in scrub grasslands of southeastern Arizona, 20 percent in Madrean evergreen forest (woodland), 12 percent in Rocky Mountain montane conifer forest, and 12 percent in Great Basin conifer woodland. Related to water, when springs, rivers, and creeks were combined, all of the jaguar records were within 10 km (6.2 mi) of a water source. Sixty percent of jaguars were observed between 1,220 and 1,829 m (4,003-6,001 ft) in elevation, largely in the scrub grassland biome of southeastern Arizona. The remaining jaguar sightings were between 1,036 and 2,743 m (3,399-8,999 ft). With respect to topography, 92 percent of jaguar sightings occurred in intermediately rugged to extremely rugged terrain, with the remainder (8%) in nearly level terrain.

More recently, Sanderson and Fisher (2013) modeled jaguar habitat in the Northwestern Jaguar Recovery Unit (NRU)(see description below) following a variant of the Hatten et al. (2005) method. Habitat factors used to characterize potential jaguar habitat were: 1) percentage of tree cover; 2) ruggedness index; 3) human influence; 4) ecoregion; 5) elevation (some model versions only); and 6) distance from water. Altogether, 13 habitat model versions were produced with input from the Technical Subgroup of the Jaguar Recovery Team. The habitat models were also translated into carrying capacity. The final habitat model (version 13) suggests a potential carrying capacity of more than 3,400 jaguars over an area of over 226,000 km2. This capacity was further broken down into smaller geographic areas or “subunits” of the NRU which, from south to north, may have the potential to contain: about 1,318 jaguars in the Jalisco Core Area, about 929 jaguars in the Sinaloa Secondary Area, about 1,124 jaguars in the Sonora Core Area, and about 42 jaguars in the Borderlands Secondary Area (which includes portions of northern Sonora, southern Arizona, and southeastern New Mexico). The current populations are substantially below these carrying capacities, but are not zero according to recent observations in all four subunits (Sanderson and Fisher 2013).

Ocelot

At one time the ocelot was thought to be extirpated from Arizona. However, verified detections have occurred on a regular basis since 2009. Two male ocelots have been detected in the Huachuca Mountains, adjacent and largely contiguous with the Canelo Hills, beginning with one individual in February 2011 and eventually including two, with the most recent single-cat detection occurring in July 2014. One of the ocelots occurring in the Huachuca Mountains was detected in the Patagonia Mountains during the summer of 2014, but was subsequently photographed back in the Huachuca Mountains.

Another male ocelot was detected in 2009 in the Whetstone Mountains. In April 2012, a deceased specimen found along Highway 60 between Superior and Globe was collected and was determined to be a wild adult. A male ocelot was detected repeatedly in April, May, and June of 2014 in various locations in the Santa Rita Mountains.

In addition to the recent Arizona sightings, a number of ocelots have been documented just south of the U.S. border in Sonora, Mexico (USFWS 2010c). Specifically, with the use of camera traps, at least four ocelots have been documented since February 2007 in the Sierra Azul, 30-35 miles southeast of Nogales; and one ocelot was documented in 2009 in the Sierra de Los Ajos, about 30 miles south of the U.S. border near Naco, Mexico. Lopez Gonzalez et al. (2003) obtained 36 verified ocelot records for Sonora, 21 of which were obtained after 1990. A population of 2,025 + 675 ocelots in Sonora was estimated by Lopez Gonzalez et al. (2003) based on the distribution of these records and the availability of potential habitat.

The nearest recently-documented (2011) female ocelot with young (one kitten) was located about 48 km (30 mi) south of the international border in the Sierra Azul of Sonora, Mexico (Avila-Villegas and Lamberton-Moreno 2012).

If the male ocelots documented in the Huachuca and Whetstone mountains dispersed from the nearest breeding population, assuming the nearest breeding population is the one previously mentioned, it means the cats moved about 55 km (35 miles) to the Huachuca Mountains (email from Tim Snow, AGFD, March 18, 2013) and 110 km (70 miles) to the Whetstone Mountains (Avila-Villegas and Lamberton-Moreno 2012).

Prior to these findings, the last known ocelot in Arizona was lawfully shot on Pat Scott Peak in the Huachuca Mountains in 1964 (Hoffmeister 1986, Lopez Gonzalez et al. 2003). The Arizona/Sonora ocelot population is isolated from the Texas/Tamaulipas ocelot by the Sierra Madre highlands and the dry areas of the Mexican Plateau, and once ranged from southeastern Arizona into Mexico's States of Sonora and northern Sinaloa (Goldman 1943).

Connectivity among ocelot populations or colonization of new habitats is inhibited by road mortality of dispersing ocelots. Issues associated with border barrier development and patrolling the boundary between the United States and Mexico further exacerbate the isolation of Texas and Arizona ocelots from those in Mexico.

California Condor

Condors were first released within a designated nonessential experimental population area in northern Arizona and southern Utah in January 2002. The area is bounded by Interstate 40 on the south, U.S. Highway 191 on the east, Interstate 70 on the north, and Interstate 15 to U.S. Highway 93 on the west. The nonessential experimental population status applies to condors only when they are within the experimental population area. California condors outside the California Condor Experimental Population Area have full protection as endangered species under the ESA. However, individual condors found within the action area are considered part of the nonessential experimental population; either released birds or their progeny. Generally, if California condors leave the California Condor Experimental Population Area, they will be captured by the Service and Cooperators and returned to the 10(j) area.

A five-year review of the effort indicates that, as of January 2002, 47 condors had been released in nine release events (Arizona Condor Review Team 2002). Reintroduction efforts have been complicated by predation, lead poisoning, bird-human interactions, and shootings. As of the date of the published review, 18 birds had died and four had been returned to captivity due to behavioral concerns. After the first five years, there were 25 free-flying condors in northern Arizona with an additional eleven individuals in a flight pen for release early in 2002.

In 2001, condors began to demonstrate reproductive behavior in Grand Canyon National Park. One pair produced an egg which did not result in surviving progeny. Two pairs exhibited nesting behavior in 2002, with one egg known to be produced. However, both of those nests also failed to result in surviving young condors. According to the Grand Canyon National Park, roughly 70 condors occur in northern Arizona and southern Utah (http://www.nps.gov/grca/naturescience/california-condors.htm).

As of April 30, 2014, a total of 238 California condors existed in the wild; what is known as the Southwest (Arizona) population of California condors contained 75 individuals. That latter figure includes 65 free-flying individuals previously released into the population and 10 wild-fledged individuals. Ninety two fatalities and missing California condors have been documented in northern Arizona since 1996. Of 14 chicks that have hatched since 2003, 10 wild-fledged individuals currently exist in the population. Most mortality in northern Arizona has been related to human activity, including lead poisoning and shootings.

Canada Lynx

In 1997, the Colorado Parks and Wildlife began a lynx reintroduction into southern Colorado in areas where biologists thought that quality habitat existed. Initial setbacks required modified release methodology in 1999 and 2000 (Devineau et al. 2011), but overall reintroductions of 218 individual lynx have resulted in establishment of a population of lynx that has shown reproduction and high adult survival (Devineau et al. 2010, Colorado Parks and Wildlife 2014). At least 122 of the reintroduced lynx died by June of 2010 (Shenk 2010), but overall survival rates are sufficient to maintain a population if recruitment and reproduction were to continue at similar rates to that observed from 2003 to 2010 (Shenk 2010). Colorado Parks and Wildlife has declared the lynx reintroduction effort a success based on meeting established benchmarks of: (1) a high rate of survival immediately after release (Devineau et al. 2011), low mortality rates of released lynx over the long term (Devineau et al. 2010), lynx utilization of good habitat at densities sufficient for breeding (Devineau et al. 2010), successfully breeding (Shenk 2010), successful recruitment of wild-born lynx into the population (Shenk 2010), and on balance, lynx recruitment is equal or exceeds mortality over an extended period of time (http://cpw.state.co.us/learn/Pages/SOC-LynxResearch.aspx). Based on this success, Colorado Parks and Wildlife has entered into a period of monitoring occupancy, rather than intensive individual animal research (Ivan 2011).

Although some questions remain about the long-term viability of the lynx population, should lynx populations remain it could prove beneficial for the conservation of the lynx DPS (79 FR 54782; September 12, 2014). In addition, it is likely that lynx will continue to occur in southern Colorado and parts of northern New Mexico in the near term as a result of reintroductions.

EFFECTS OF THE ACTION

Effects of the action refer to the direct and indirect effects of an action on the species or critical habitat, together with the effects of other activities that are interrelated and interdependent with that action, which will be added to the environmental baseline. Interrelated actions are those that are part of a larger action and depend on the larger action for their justification. Interdependent actions are those that have no independent utility apart from the action under consideration. Indirect effects are those that are caused by the proposed action and are later in time, but are still reasonably certain to occur.

Mexican Wolf

There are no direct effects to Mexican wolves from the Proposed Revision to the Regulations for the Experimental Population of the Mexican Wolf, the issuance of a 10(a)(1)(A) permit authorizing take resulting from discretionary management activities, or providing funding for the implementation of the Mexican wolf recovery program. Indirect effects to the species may include disruption of essential behaviors, incidental injury, or death during the implementation of the Mexican wolf recovery program in the action area. The ultimate goal of the Mexican Wolf Recovery Program is to recover the species so that it no longer needs protection under the ESA. The recovery and long-term conservation of the Mexican wolf in the southwestern U.S. and northern Mexico is likely to “depend on establishment of a metapopulation or several semi-disjunct but viable populations spanning a significant portion of its historic range in the region” (Carroll et al. 2006). As specified in our 1998 Final Rule, the reintroduction of the Mexican wolf into the BRWRA was envisaged “as the first step toward recovery of the Mexican wolf in the wild” (63 FR 1752, January 12, 1998). The MWEPA, as proposed to be configured, was created to support the reintroduction of the Mexican wolf with the intent that this experimental population, once successfully reestablished, would contribute to recovery. Attempting to recover a species from the brink of extinction is obviously a beneficial effect to the species. However, management activities discussed in the project description may have adverse effects to individual Mexican wolves and thus must be evaluated under Section 7 of the ESA. The following discussion describes the effects to individual Mexican wolves from the management activities of the Mexican Wolf Recovery Program as explained in the project description.

Captures and Collaring – Collars have been known to cause some minor injuries, especially if improperly fitted. There has been one instance of a Mexican wolf being injured through an improperly fitted collar. Since the first releases in 1998, only two Mexican wolves in the experimental population have been severely injured during captures by agency personnel. In addition, three capture-related wild Mexican wolf mortalities have occurred as a result of project activities (USFWS 2001, USFWS 2006a, USFWS 2014). Thus, five instances of severe injuries or death have occurred as a result of wild capture efforts. As of December 2013, Mexican wolves have been captured 348 times by project personnel and thus the rate of severe injury or death is 1.4 % of all captures. There may be negative effects (injury or death) from capturing and collaring Mexican wolves, but the overall effects on the survival and recovery of this species in the wild are beneficial. The monitoring of Mexican wolves through the use of radio telemetry has proven to be beneficial in the collection of biological data, monitoring human and livestock conflicts, targeting proactive management in areas of potential livestock conflicts, and helping to reduce adverse effects on non-target individuals and non-target species, thus, reducing adverse effects to the species as a whole.

Non-lethal Techniques – From 1998-2003, 11 Mexican wolves were removed from the wild that displayed poor behavioral characteristics and were located close to humans, and 14 Mexican wolves were removed that depredated repeatedly on livestock (Interagency Field Team 2005: Table 5). Harassing Mexican wolves using techniques such as rubber bullets is intrusive and primarily causes minor injuries (rubber bullets could cause death to animals if personnel are too close or hit the animal in vulnerable areas), but these techniques are meant to assist in the overall recovery of the species by keeping human and livestock conflicts to a minimum and Mexican wolves in the wild. Further, data suggest that animals living in the wild for a greater proportion of their lives are more likely to be successful and are less likely to succumb to mortality or removal (Interagency Field Team 2005). Thus, the use of non-lethal techniques are expected to result in fewer permanent removals and more Mexican wolves successfully breeding and reproducing in the wild. Further, staff utilizing less-than-lethal projectiles are trained and evaluated by law-enforcement personnel in the effects of the non-lethal projectiles and gun-handling safety. As a result of this training, no significant injuries to Mexican wolves or staff have occurred as a result of using less-than-lethal munitions. Further, the 10(a)(1)(A) permit and the proposed rule authorize use of less-than-lethal munitions by certain residents, ranchers, and/or private landowners with a documented history of interaction with problem Mexican wolves, who go through training and are issued a sub-permit and receive appropriate training. Non-lethal techniques, such as less-than-lethal munitions, allow agency staff and sub-permitted individuals the ability to provide Mexican wolves with a negative association with humans or livestock with only minor, non-permanent injury to the Mexican wolf, which will reduce overall conflicts between Mexican wolves and humans. While there may be negative effects (injury or death) to individual Mexican wolves from the use of non-lethal projectiles, the overall effects on the survival and recovery of this species in the wild are beneficial, as the use of non-lethal projectiles will reduce negative interactions between wolves and humans.

Initial Release and Translocation Procedures – Mexican wolves that are initially released have generally been reared in captivity and are used to being in pens. Therefore, no negative effects are anticipated while Mexican wolves are penned before being initially released. Mexican wolves that are translocated have previous wild experience and often have never experienced time in a pen. These animals are generally held for shorter time periods or often hard released (not put into a pen in the wild but rather released from a crate) to the wild. Although Mexican wolves could injure themselves while in the release pens, the level of precautions (e.g., rigorous caretaker routines and husbandry protocols) minimizes adverse effects to Mexican wolves. The only instance of mortality related to Mexican wolves being held in the pens was caused by disease. In 1999, one Mexican wolf pup died of parvovirus, while being held in an initial release pen. No other mortalities have occurred within initial release and translocation pens or during transport, which includes over 197 initially released or translocated animals, or an injury rate of 0.5% of all Mexican wolves that are initially released or translocated. Further, the Mexican Wolf Recovery Program takes steps that provide the greatest likelihood of a successful reintroduction, including minimizing human contact (e.g., public access is restricted around the pens and supplemental food may be provided after release to assist with acclimation to the wild). While there may be negative effects (injury or death) from holding Mexican wolves in captivity, the overall effects on the survival and recovery of this species in the wild are beneficial, as these actions will provide for the expansion of the population and an increase in the genetic diversity of Mexican wolves in the wild.

Biological Data Collection – All of the data collection and monitoring techniques (i.e., aerial and ground telemetry monitoring; visually observing Mexican wolves near den sites to count the number of pups; collecting hair, blood, semen, ova, and scat; and howling surveys) may result in short-term disturbance. These actions will result in an increased understanding of Mexican wolves in the wild and may guide future research and provide information for management decisions that would benefit the species' survival and recovery. . There may be negative effects (harassment) from biological data collection, but the overall effects on the survival and recovery of this species in the wild are beneficial, as the collection of biological data will increase our ability to manage and recover the Mexican wolf.

Mexican Wolves in Captivity – Maintaining and/or increasing the number of Mexican wolves in captivity includes, but is not limited to, breeding, handling, administering health care, and obtaining samples such as blood, tissue, semen, ova, and hair. The program ensures that Mexican wolves remain healthy and that the highest quality of care exists while minimizing human contact of the captive Mexican wolves. The captive Mexican wolf program is the only source population of Mexican wolves for reintroduction into the wild and satisfies the primary purpose of the Mexican Wolf Recovery Program. There may be negative effects (harassment) from holding Mexican wolves in captivity, but the overall effects on the survival and recovery of this species in the wild are beneficial. Veterinarians may be present at captures within the captivity facility and proper protocols, including those in the *Husbandry Manual*, are followed to minimize adverse effects to Mexican wolves in captivity.

Lethal Control –If, after reasonable attempts to capture problem Mexican wolves alive fail, and when the Service determines that immediate removal of a particular Mexican wolf or wolves from the wild is necessary, lethal take is also authorized under the proposed Revised Rule and 10(a)(1)(A) permit. Lethal control outside of the MWEPA is not included in the 10(a)(1)(A) permit. The lethal removal of an individual will adversely affect that individual and its short-term contribution to the species' recovery program and population through loss of future offspring, contribution to its pack, and genetic contribution. For this reason nonlethal control methods are preferred and encouraged, as depredating Mexican wolves captured alive are generally translocated to an area where they are less likely to depredate, or they may be put back into the captive population. However, when lethal control is used, it is a last resort and the effects on the recovery program are weighed in any decision to use lethal control on an individual Mexican wolf. Recent literature suggests that consistent and responsible depredation management programs for wolves may reduce illegal killing (Olson et al. 2014), and that lethal control implemented near the time (within 7 days) of the depredation reduced the likelihood of future depredations (Bradley et al., in review). While there may be negative effects (death) from lethal control of individual wolves, the overall effects on the survival and recovery of this species in the wild are beneficial by reducing human and livestock conflicts with the Mexican wolf experimental population. Further, growth of the population is expected to continue despite lethal control of individual animals (Bradley et al., in review).

Mexican wolves not covered by the 10(j) Rule – Mexican wolves that disperse north of Interstate-40 in New Mexico and Arizona, or into other peripheral states (California, Colorado, Nevada, Texas, and Utah) will be fully protected as endangered species under the ESA. Any Mexican wolves that have dispersed from the experimental population and that establish a territory outside of the MWEPA, will be captured and: (1) translocated back inside of the MWEPA, (2) transferred to captivity for a period of time, or (3) transferred to Mexico, in accordance with the stipulations of the 10(a)(1)(A) permit. While we recognize the importance of natural dispersal and colonization/recolonization of unoccupied habitat which expands the species' range (Mech and Boitani 2003) our purpose in proposing revisions to the 1998 Final Rule is to further the conservation of the Mexican wolf by improving the effectiveness of the Reintroduction Project in managing the experimental population in the MWEPA. For this reason, until we complete a recovery plan that describes where additional populations should go, letting Mexican wolves above 1-40 would not improve the effectiveness of trying to establish Mexican wolves in the MWEPA. Capture and translocation or incorporation of a Mexican wolf into the captive breeding population has inherit risks such as injury or death, but the documented occurrences of this are extremely low, as discussed above. There may be negative effects (injury, death) from capturing and returning Mexican wolves to the MWEPA, but the overall effects on the survival and recovery of this species in the wild are beneficial by allowing the Service to focus efforts on establishing a population south of Interstate 40 within the MWEPA.

Gray Wolf

There are no direct effects to gray wolves from the proposed revised rule, the issuance of a 10(a)(1)(A) permit for Mexican wolves and gray wolves, nor providing funding for the implementation of the Mexican wolf recovery program. Indirect effects to gray wolves may occur under the section 10(a)(1)(A) research and recovery permit to to capture and manage a gray wolf in Arizona or New Mexico. Effects may include disruption of essential behaviors, incidental injury, or death during the implementation of the Mexican wolf recovery program in the action area. The effects to gray wolves from the management activities of the Mexican Wolf Recovery Program as explained in the project description, would be similar to the analysis above for Mexican wolves. However, because gray wolves are an endangered species in the action area only the following management actions would be allowed under a 10(a)(1)(A) permit: (1) Capture and Collaring, (2) Non-Lethal Techniques, (3) Biological Data Collection, and (4) Translocation(s) in response to depredation scenarios. There may be negative effects (injury, death) from capturing, use of non-lethal techniques, or translocations, but the overall effect on the survival and recovery of the species in the wild are beneficial. Overall, management of gray wolves within Arizona and New Mexico should be extremely limited because there are few resident gray wolves in Utah and Colorado. Gray wolves may also be inadvertently captured in a trap intended for a Mexican wolf. Effects may include injury or death. There may be negative effects (injury, death) from the management activities associated with gray wolves, but the overall effects on the survival and recovery to the species in the wild are beneficial by providing information on dispersal and habitat use and reducing conflicts with humans and livestock.

Jaguar

There are no direct effects to jaguars from the proposed revised rule, the issuance of a 10(a)(1)(A) permit for Mexican wolves and gray wolves, nor providing funding for the implementation of the Mexican wolf recovery program. Indirect effects to the jaguar may include incidental injury or death during the implementation of the Mexican wolf recovery program within the action area. Mexican wolves and jaguars will likely compete for the same prey where the two species overlap. Mexican wolves may push jaguars off of kills or the opposite depending on the individual interaction. Jaguar-killed cattle or other ungulates may be investigated if Mexican wolves are also in the area, resulting in disturbance to jaguar kills. Food caches for Mexican wolves may potentially influence the movement of jaguars if they are utilizing the caches. Traps for Mexican wolves are placed in areas of high Mexican wolf utilization (Mexican wolf territories) based on either radio collar data or sign, and for a short period of time to accomplish goals (≤ 3 weeks), thus, limiting the potential for incidental jaguar capture. Overall, given the limited overlap of jaguar and Mexican wolf distribution in New Mexico and Arizona, it is unlikely that incidental capture of jaguars will occur. However, leg-hold traps have padded jaws to reduce the likelihood of injury to captured animals, and personnel receive annual training from a licensed veterinarian; and they have appropriate drugs and emergency supplies to safely handle non-target captures, including jaguars.

The primary Mexican wolf management activity that could affect a jaguar is the use of leg-hold trapping. Jaguars have been documented in Santa Cruz, Pima, and Cochise counties, Arizona; and Hidalgo County, New Mexico. However, jaguars are in extremely low numbers along the U.S.-Mexico border and thus, the chance of one being caught in a trap intended for a Mexican wolf is extremely low. As stated above, leg-hold traps are used frequently by the Mexican Wolf Recovery Program to catch Mexican wolves that need to be radio-collared or translocated. Jaguars could potentially be incidentally captured in traps meant for Mexican wolves, especially if trapping is being conducted in areas occupied by jaguars. Traps are sometimes placed near carcasses to attract Mexican wolves, which may also attract jaguars, but it is unlikely that a jaguar would be captured without jaguar specific lures or baits. If captured, a jaguar could suffer dehydration, injury, or death especially if the animal is not detected for some time. However, wolf traps are visually checked at least every 24 hours, and more often if weather conditions dictate. Additionally, personnel are trained in emergency procedures annually and fluids are given to trapped animals that are sedated. A jaguar would have to be sedated in order to free it from the trap. There may be negative effects (harassment, injury or death) if a jaguar were accidentally captured in a trap, However, the data collected from an individual jaguar accidentally captured could provide information on habitat use, occurrence, and movements that may guide future research proposals and provide information for management decisions that would have beneficial effects on the species' survival and recovery.

Ocelot

There are no direct effects to ocelots from the proposed revised rule, the issuance of a 10(a)(1)(A) permit for Mexican wolves and gray wolves, nor providing funding for the implementation of the Mexican wolf recovery program. Indirect effects to the ocelot may include incidental injury or death during the implementation of the Mexican wolf recovery program within the action area. The primary activity that may affect the ocelot is the use of leg-hold trapping. As stated above, leg- hold traps are used frequently by the Mexican wolf recovery program to catch Mexican wolves that need to be radio-collared or translocated. An ocelot could potentially be caught in traps meant for Mexican wolves, especially if trapping is being conducted south of Interstate 10 in Arizona. Other felids (e.g., bobcats, mountain lions) have been caught in leg-hold traps in the past during Mexican wolf trapping efforts (J. Oakleaf, pers. comm. 2010). If Mexican wolves begin occurring along the U.S.-Mexico border and Mexican wolves need to be captured, an ocelot could potentially be subjected to incidental capture. Ocelots are in extremely low numbers along the U.S.-Mexico border and thus, the chance of one being caught in a trap intended for a Mexican wolf is extremely low. As mentioned above however, ocelots were documented in Cochise County, Arizona in 2009, and in the Huachuca Mountains in 2011, with the use of camera traps. Although it is unlikely that an ocelot would be caught in a trap because ocelots are at such low densities and because their habitat of choice is dense underbrush, where wolf trapping would be unlikely to occur, ocelots could be at risk of incidental capture if wolf trapping activities occur in or near areas considered ocelot habitat. Similar to the adverse effects to a jaguar, an ocelot could suffer dehydration or injury or death, especially of the animal is not detected for some time. However, Mexican wolf traps are visually checked every 24 hours or more often if weather conditions dictate. Additionally, personnel are trained in emergency procedures annually and fluids are given to trapped animals that are sedated. The animal may need to be sedated in order to free it from the trap. While there may be negative effects (harassment, injury, death) from accidentally capturing an ocelot, the overall effects on the survival and recovery of this species in the wild are beneficial, as the data collected from an individual ocelot accidentally captured could provide information on habitat use, occurrence, and movements that may guide future research proposals and provide information for management decisions.

California Condor

There are no direct effects to California condors from the proposed revised rule, the issuance of a 10(a)(1)(A) permit for Mexican wolves and gray wolves, nor providing funding for the implementation of the Mexican wolf recovery program. Indirect effects to the California condor may include incidental injury or death during the implementation of the Mexican wolf recovery program within the action area. Although condors can travel long distances, the population of condors exists within the Grand Canyon and within the Vermillion Cliffs in southern Utah. The only activities that could adversely affect the California condor are the change in distribution of California condors if they locate food caches left for Mexican wolves or gray wolves, the use of leg-hold trapping, and helicopter capture of Mexican wolves or gray wolves. Food caches are generally provided when Mexican wolves are released or to divert Mexican wolves or gray wolves from killing livestock. In both cases, the provision of food caches is temporary, rarely lasting six months. Therefore, the change in distribution of condors attracted to such food caches would be temporary. Wolf traps are often placed in the vicinity of wolf-killed ungulates. Because condors only eat carrion and traps are sometime placed near a carcass, there is a small possibility that a condor could be incidentally captured. Because condors are very curious birds and feed exclusively on animal carcasses, they could be captured if trapping were to occur within areas occupied by condors. Similar to the adverse effects to a jaguar, a California condor could suffer dehydration, injury or death, especially of the animal is not detected for some time. However, wolf traps are visually checked every 24 hours or more often if weather conditions dictate. Additionally California condors may be affected by the helicopter capture operations in Grand Canyon or Vermillion Cliffs area, if they are necessary to capture dispersing Mexican wolves or gray wolves. Should the helicopter capture operations be necessary, and the Mexican Wolf Recovery Program would only use this technique if trapping was not feasible or failed to capture the animal, take would be expected in the form of harassment or accidental displacement when startled individuals are flushed from a perch site by low- level flights.

Canada Lynx

There are no direct effects to lynx from the proposed revised rule, the issuance of a 10(a)(1)(A) permit for Mexican wolves or gray wolves, nor provision of funding for the implementation of the Mexican wolf recovery program. Indirect effects to the lynx may include incidental injury or death during implementation of the Mexican wolf recovery program within the action area. The primary activity that may affect the lynx is the use of leg-hold trapping. Mexican wolves would be captured if they established territory wholly outside of the MWEPA. Gray wolves may be captured if they disperse into Arizona or

New Mexico. As stated above, leg- hold traps are used frequently by the Mexican wolf recovery program to catch Mexican wolves and gray wolves that need to be radio-collared or translocated. A lynx could potentially be caught in traps meant for Mexican wolves or gray wolves, especially if trapping is being conducted in northern New Mexico or southern Colorado. Other felids (e.g., bobcats, mountain lions) have been caught in leg-hold traps in the past during wolf trapping efforts (J. Oakleaf, pers. comm. 2010). Similar to the adverse effects to a jaguar and ocelot, a lynx could suffer dehydration, injury or death, especially of the animal is not detected for some time. However, wolf traps are visually checked every 24 hours or more often if weather conditions dictate. Additionally, personnel are trained in emergency procedures annually and fluids are given to trapped animals that are sedated. The animal may need to be sedated in order to free it from the trap. Mexican wolves are unlikely to occur in areas occupied by lynx because they will be captured prior to existing in these areas. The MWEPA does not overlap with lynx range and lynx and Mexican and gray wolf habitat differ, reducing the likelihood of lynx being present in the area of most Mexican or gray wolf management activities. However, lynx could be at risk of incidental capture if wolf trapping activities occur in or near areas considered lynx habitat outside of the MWEPA.

CUMULATIVE EFFECTS

Cumulative effects include the effects of future State, tribal, local or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the Act.

Because of the extent of Federal lands in the action area potentially affected by the specific Mexican wolf and gray wolf management activities, most site specific (i.e. construction of mesh pen sites for release or translocation of Mexican wolves) activities for Mexican wolves will be subject to additional section 7 consultation relative to the impact to other threatened and endangered species at specific sites. Livestock production and hunting as well as urban, suburban, and rural development are expected to continue to dominate private lands within the action area. As urban centers continue to expand, the demand for outdoor recreation will increase. Roads, housing developments, and retail space will continue to fragment habitat and reduce the likelihood that suitable habitat that is not occupied will be recolonized in the future. The rate at which these effects are occurring has slowed down with the declining economy, but as recovery of the economy continues the rate of these impacts will be similar to that of a few years ago. In some cases, these activities may directly or indirectly affect habitat or individual Mexican wolves, gray wolves, jaguars, ocelots, California condors, or lynx. Many illegal activities associated with cross- border smuggling and illegal immigration also occur in the action area. These activities result in creation of trails and routes that can degrade habitats, and individuals involved in these illegal activities often build cooking or warming fires, some of which escape and become wildfires. In excessively dry areas, vehicles may also start fires.

Non-federal trapping activities also occur within the action area and thus would be considered a cumulative effect. From 1998 through 2013, the Mexican Wolf Recovery Program has documented a minimum of 25 incidents of Mexican wolves caught by recreational trappers. Some of those Mexican wolves caught have been released unharmed, but at least seven Mexican wolves have been severely injured and at least three Mexican wolves have died as a result of injuries or activities associated with being captured in a leg-hold trap. Mexican wolves could be caught in non-project associated leg-hold traps in the future (J. Oakleaf, pers. comm. 2011). Neck snares are rarely used in the southwest because they typically require dense vegetation and well used trails to place the loop on.

CLIMATE CHANGE

All of North America is very likely to warm during this century, and the annual mean warming is likely to exceed the global mean warming in most areas. The lowest winter temperatures are likely to increase more than the world-wide average in northern North America, and the highest summer temperatures are likely to increase more in the southwest U.S. than the average world- wide temperature increases. Annual mean precipitation is very likely to increase in Canada and the northeast U.S., and likely to decrease in the southwest U.S. (IPCC 2007).

Average Northern Hemisphere temperatures during the second half of the 20th century were very likely higher than during any other 50-year period in the last 500 years and likely the highest in at least the past 1,300 years. It is very likely that over the past 50 years cold days, cold nights and frosts have become less frequent over most land areas, and hot days and hot nights have become more frequent. It is also likely that heat waves have become more frequent, and the frequency of heavy precipitation events has increased over most areas. The IPCC (2007) predicts that changes in the global climate system during the 21st century are very likely to be larger than those observed during the 20th century. For the next two decades, a warming of about 0.2°C (0.4°F) per decade is projected. Afterwards, temperature projections increasingly depend on specific emission scenarios. By the end of the 21st century, average global temperatures are expected to increase 0.6°C to 4.0°C (1.1°F to 7.2°F) with the greatest warming expected over land. Localized projections suggest the southwestern U.S. may experience the greatest temperature increase of any area in the lower 48 states. The IPCC says it is very likely that hot extremes, heat waves, and heavy precipitation will increase in frequency. There is also high confidence that many semi-arid areas like the western U.S. will suffer a decrease in water resources due to climate change.

Mexican wolf

We do not know whether the climate changes that have already occurred have affected Mexican wolf populations or distribution, nor can we predict how the species will be affected by the type and degree of climate changes forecast by a range of models. However, ongoing and future changes in climate have the potential to adversely affect the Mexican wolf within the next 50 to 100 years. Reductions or distributional shifts in large animal populations may result in a decreased food supply for Mexican wolves in their current range. Stochastic threats such as drought and wildfires in Mexican wolf habitat may make this species especially vulnerable. Monitoring of habitat and populations will be needed to address the potential threat of climate change. The result of predicted climate change trends could include reduced summer base flow in streams, increased runoff and erosion during storm events, and the earlier onset of summer low-flow conditions (Mote et al. 2005). Reduced water in the system may reduce or localize big game populations in the summer months, however, it is not clear how these changes may affect habitat for the Mexican wolf nonessential experimental population.

Gray Wolf

We do not know whether the climate changes that have already occurred have affected gray wolf populations or distribution, nor can we predict how the species will be affected by the type and degree of climate changes forecast by a range of models. However, ongoing and future changes in climate have the potential to adversely affect the gray wolf within the next 50 to 100 years. Reductions or distributional shifts in large animal populations may result in a decreased food supply for gray wolves in their current range. Stochastic threats such as drought and wildfires in gray wolf habitat may make this species especially vulnerable. Monitoring of habitat and populations will be needed to address the potential threat of climate change. The result of predicted climate change trends could include reduced summer base flow in streams, increased runoff and erosion during storm events, and the earlier onset of summer low-flow conditions (Mote et al. 2005). Reduced water in the system may reduce or localize big game populations in the summer months, however, it is not clear how these changes may affect habitat for the gray wolf populations.

Jaguar

We do not know whether the climate changes that have already occurred have affected jaguar populations or distribution, nor can we predict how the species will be affected by the type and degree of climate changes forecast by a range of models. However, ongoing and future changes in climate have the potential to adversely affect the jaguar within the next 50 to 100 years. Reductions or distributional shifts in large animal populations may result in a decreased food supply for jaguars in their current range. Stochastic threats such as drought and wildfires in jaguar habitat may make this species especially vulnerable. Monitoring of habitat and populations will be needed to address the potential threat of climate change.

Ocelot

We do not know whether the climate changes that have already occurred have affected ocelot populations or distribution, nor can we predict how the species will be affected by the type and degree of climate changes forecast by a range of models. However, ongoing and future changes in climate have the potential to adversely affect the ocelot within the next 50 to 100 years. Stochastic threats such as drought and wildfires in ocelot habitat may make this species especially vulnerable. Monitoring of habitat and populations will be needed to address the potential threat of climate change. Therefore, we will continue to monitor the species and its habitat, and will adapt our recovery and management strategies when necessary to address the changing conditions.

California Condor

It is difficult to predict potential effects of climate change on California condors. Snyder and Snyder (2000) addressed the potential of adverse weather conditions on condors. They considered the weather in most of the current range of the species to be relatively benign, and observed that events such as hurricanes and tornados are quite rare where condors currently occur. However, they did cite an instance of two condors that may have died from battering during a violent hailstorm in Santa Barbara County, California, in 1936. Climate change in the Southwest is likely to result in warmer temperatures and drier but more variable precipitation. Increased temperatures may affect the ability of condors to effectively thermoregulate for normal behavior. Hotter and drier conditions may also result in fewer or smaller open water sources. Snyder and Snyder (2000)) discussed the possibility of injury or mortality of condors at water sources from which the birds may not be able to extricate themselves. Another possible effect of climate change may be reductions or distributional shifts in large animal populations. Reductions may result in a decreased food supply for condors in their current range, which would also affect survival and reproduction. Distributional shifts could range from beneficial to detrimental for condors, depending on large mammal and condor distribution of patterns. Finally, climate change may result in more, larger, and longer-lasting fire events. Such fire events can also affect condors by destroying or reducing roost sites, prey availability, and smoke- free conditions for condor reproduction.

Canada Lynx

Lynx are dependent on deep persistent snow cover across their worldwide distribution. Bobcats and coyotes (*Canis latrans*) are potential competitors with lynx, but are at a disadvantage in areas of fluffy or deep snow (Buskirk et al. 2000). Snow cover is predicted to be reduced as a result of climate changes and has the potential to limit lynx habitat and utilization (79 FR 54782; September 12, 2014). Reduced snow depth and duration has the potential to reduce the lynx competitive advantage over bobcats, which are not as adept at hunting hares in deep snow (Carroll 2007). The Service concluded that climate change is a significant issue of concern for the future conservation of the lynx DPS in the contiguous United States, and that climate change is likely to substantially reduce the amount of lynx habitat (79 FR 54782; September 12, 2014).

Within the action area, the hare population and lynx habitat in Colorado are considered marginal at best to support populations of lynx into the future (Ruggiero et al. 2000, Steury and Murray 2004). There is much uncertainty regarding the ultimate fate of the lynx populations in Colorado, however, should lynx populations persist, it could prove beneficial for the conservation of the lynx (79 FR 54782; September 12, 2014). The effects of climate change would likely further reduce the available habitat and perhaps limit lynx populations. In addition, climate change would further erode connectivity with larger populations of lynx required to maintain the demographic and genetic robustness of the lynx population in the absence of additional translocations (79 FR 54782; September 12, 2014).

CRITICAL HABITAT

This Biological Opinion does not rely on the regulatory definition of "destruction or adverse modification" of critical habitat at 50 CFR §402.02 for species' effects analysis. Instead, we rely upon the statute and the August 6, 2004, Ninth Circuit Court of Appeals decision in *Gifford Pinchot Task Force v. U.S. Fish and Wildlife Service* (No. 03-35279) to complete critical habitat effect analyses. Critical Habitat for the listed aquatic plants, aquatic invertebrates, and fish within the action area will be avoided because of safety concerns for Mexican wolves and the physical constraints of conducting management activities in aquatic, riparian, or marsh habitats. Therefore, Critical Habitat for those species will not be affected.

Management activities may occur in designated critical habitat for Mount Graham red squirrel (*Tamiasciurus hudsonicus*, Mexican spotted owl (*Strix occidentalis lucida*), southwestern willow flycatcher (*Empidonax traillii extimus*), desert tortoise (*Gopherus agassizii*), New Mexico ridge- nosed rattlesnake (*Crotalus willardi obscurus*), San Francisco Peaks groundsel (*Senecio franciscanus*), and jaguar. However, none of the proposed actions will adversely affect the primary constituent elements to the point that critical habitat units will not function for the survival and recovery of the listed species due to the small area involved in any particular management activity, the lack of any permanent habitat altering activity, and the temporal nature of Mexican wolf management activities in any given location.

CONCLUSION

Mexican wolf

After reviewing the current status of Mexican wolf, the environmental baseline for the species, the proposed revised rule, the issuance of a 10(a)(1)(A) permit authorizing take, and the cumulative effects, it is the Service's biological opinion that implementation of the Mexican wolf project, as proposed, is not likely to jeopardize the continued existence of the Mexican wolf. No critical habitat has been designated for this species; therefore, none will be affected. In making this determination we considered the following:

1. Mexican wolves from the section 10(j) nonessential experimental population are by definition not essential to the survival of the species.
2. Mexican wolves that are removed from the action area outside the MWEPA will be captured and either re-released in the MWEPA, transferred to Mexico for re-release, or placed in a captive breeding facility.
3. The small percentage of project-related captures that have resulted in severe injuries or death (5 of 348 to date) does not represent a significant risk to the species' survival or recovery in the wild.

4. The level of injury or death that may occur to Mexican wolves as a result of the proposed action will be low, based on past experience in implementing management actions in the nonessential experimental population. The reproductive capacity of the remaining breeding population, both captive and in the wild, will minimize any long-term impact on survival or recovery in the wild.
5. Data collection and monitoring techniques (i.e., aerial and ground telemetry monitoring, visually observing Mexican wolves near den or rendezvous sites to count the number of pups, and howling surveys) may result in short-term disturbance, but are likely to have extremely minor effects on Mexican wolves.

Gray wolf

After reviewing the current status of the gray wolf, the environmental baseline for the species, the issuance of a 10(a)(1)(A) permit authorizing take, and the cumulative effects, it is the Service's biological opinion that issuance of a 10(a)(1)(A) permit, as proposed, is not likely to jeopardize the continued existence of the gray wolf. No critical habitat has been designated for this species; therefore, none will be affected. In making this determination we considered the following:

1. Gray wolf populations are robust in other parts of the United States.
2. The small percentage of project-related captures that have resulted in severe injuries or death (5 of 348 to date) does not represent a significant risk to the gray wolves survival or recovery in the wild.
3. The level of injury or death that may occur to gray wolves as a result of the proposed action will be low, based on past experience in implementing management actions in the nonessential experimental population. The reproductive capacity of wild populations in the northern Rocky Mountains will minimize any long-term impact on survival or recovery in the wild.
4. Data collection and monitoring techniques (i.e., aerial and ground telemetry monitoring, visually observing gray wolves near den or rendezvous sites to count the number of pups, and howling surveys) may result in short-term disturbance, but are likely to have extremely minor effects on gray wolves.

Jaguar

After reviewing the current status of jaguar, the environmental baseline for the species, the proposed revised rule, the issuance of a 10(a)(1)(A) permit authorizing take, and the cumulative effects, it is the Service's biological opinion that implementation of the Mexican wolf project, as proposed, is not likely to jeopardize the continued existence of the jaguar. Critical habitat designated for this species will not be affected due to the small area involved in any particular management activity, the lack of any permanent habitat altering activity, and the temporal nature of Mexican wolf management activities in any given location.

In making this determination we considered the following:

1. The MWEPA only overlaps with the extreme northern extent of the jaguar's range, where jaguar numbers are very low, reducing the likelihood of a jaguar being present in the area of most Mexican wolf management activities.
2. While Mexican wolf management activities could occur anywhere within Arizona or New Mexico, most of these activities will be centered in the central portions of the states versus the southern areas, where jaguars have most recently been documented, reducing the likelihood of adverse effects to jaguars.

3. The implementation of conservation measures will reduce the likelihood of a jaguar being captured in a leg-hold trap and reduce the effects to an individual jaguar if one is captured.

Ocelot

After reviewing the current status of ocelot, the environmental baseline for the species, the proposed revised rule, the issuance of a 10(a)(1)(A) permit authorizing take, and the cumulative effects, it is the Service's biological opinion that implementation of the Mexican wolf recovery program, as proposed, is not likely to jeopardize the continued existence of the ocelot. No critical habitat has been designated for this species; therefore, none will be affected.

In making this determination we considered the following:

1. The MWEPA only overlaps with the extreme northern extent of the ocelot's range, where ocelot numbers are very low, reducing the likelihood of an ocelot being present in the area of most Mexican wolf management activities.
2. The implementation of conservation measures will reduce the likelihood of an ocelot being captured in a leg-hold trap and reduce the impact to an individual ocelot if one is captured
3. No known ocelot has been accidentally captured to date.
4. The loss of one individual through a capture accident, while locally causing an adverse effect on the recolonization of this part of the range, would not affect the species' population or range..

California Condor

After reviewing the current status of California condor, the environmental baseline for the species, the proposed revised rule, the issuance of a 10(a)(1)(A) permit authorizing take, and the cumulative effects, it is the Service's biological opinion that implementation of the Mexican wolf recovery program, as proposed, is not likely to jeopardize the continued existence of the California condor. Critical habitat has only been designated for this species in California, outside of the action area; therefore, none will be affected. In making this determination we considered the following:

1. California condors from the section 10(j) nonessential experimental population are by definition not essential to the survival of the species.
2. California condors (condors released into the nonessential experimental area and their offspring) will be visually identifiable. If, and when these condors move away from the California Condor Experimental Population Area, they will be captured and returned; thus, reducing the potential for activities under the Mexican wolf recovery program to impact California condors.
3. The implementation of conservation measures will reduce the likelihood of a California condor being captured in a leg-hold trap and reduce the effects to an individual condor if one is captured.
4. The loss of one individual through a capture accident would not affect the species' range or population.

Canada Lynx

After reviewing the current status of lynx, the environmental baseline for the species, the proposed revised rule, the issuance of a 10(a)(1)(A) permit authorizing take, and the cumulative effects, it is the Service's biological opinion that implementation of the Mexican wolf recovery program, as proposed, is not likely to jeopardize the continued existence of the lynx. No critical habitat has been designated for this species within the action area; therefore, none will be affected.

In making this determination we considered the following:

1. The MWEPA does not overlap with lynx range, reducing the likelihood of lynx being present in the area of most Mexican wolf management activities.
2. Mexican wolves may disperse north of the MWEPA, but any Mexican wolves that have dispersed from the experimental population and that establish territories outside of the MWEPA will be captured.
3. Management of gray wolves in northern New Mexico and the capture of Mexican wolves that disperse outside of the MWEPA may result in harm or injury to lynx, however because the lynx and wolves occupy different habitats, the chance of such effects is low.
4. The implementation of conservation measures will reduce the likelihood of an lynx being captured in a leg-hold trap and reduce the impact to an individual lynx if one is captured
5. No known lynx has been accidentally captured to date, although trapping has been extremely limited in areas of potential overlap.
6. The loss of one individual through a capture accident would not affect the species' range or population.

The conclusions of this Conference/Biological Opinion are based on full implementation of the project as described in the Description of the Proposed Action section of this document, including any Conservation Measures that were incorporated into the project design. The Conference Opinion addresses the Mexican wolf when inside the MWEPA and not on National Park Service or National Wildlife Refuge lands. The Biological Opinion addresses the Mexican wolf when inside the MWEPA and on National Park Service or National Wildlife Refuge lands, or when outside of the MWEPA.

INCIDENTAL TAKE STATEMENT

Section 9 of the Act and Federal regulations pursuant to section 4(d) of the Act prohibit the take of endangered and threatened species, respectively, without special exemption. "Take" is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. "Harm" is further defined (50 CFR §17.3) to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. "Harass" is defined (50 CFR §17.3) as intentional or negligent actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding or sheltering. "Incidental take" is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the Act provided that such taking is in compliance with the terms and conditions of this Incidental Take Statement.

The measures described below are non-discretionary, and must be undertaken by the Mexican Wolf Recovery Program so that they become binding conditions of any grant or permit issued, as appropriate, for the exemption in section 7(o)(2) to apply. The Mexican Wolf Recovery Program has a continuing duty to regulate the activity covered by this incidental take statement. If the Mexican Wolf Recovery Program fails to assume and implement the terms and conditions of the incidental take statement, the protective coverage of section 7(o)(2) may lapse. In order to monitor the impact of incidental take, the Mexican Wolf Recovery Program must keep records of impacts to the Mexican wolf and report the progress of the action and its impacts on the jaguar, ocelot, California condor, or lynx to the species' lead Ecological Services Field Office as specified in the incidental take statement [50 CFR §402.14(i)(3)].

AMOUNT OR EXTENT OF TAKE

Mexican wolf

The Service anticipates incidental take as follows:

- Up to all Mexican wolves that disperse outside of the 10(j) boundaries (e.g., endangered Mexican wolves) will be incidentally taken in the form of harassment
- Up to three Mexican wolves that disperse outside of the 10(j) boundaries (e.g., endangered Mexican wolves) will be incidentally taken in the form of permanent disablement or mortality as a result of the proposed actions.
- Within the 10(j) boundaries, up to all Mexican wolves wil be incidentally taken in the form of harassment
- Within the 10(j) boundaries, up to three Mexican wolves will be incidentally taken in the form of permanent disablement or mortality as a result of the proposed action.

Unavoidable and unintentional take means accidental, unintentional take which occurs despite reasonable care, is incidental to management activities described in this conference/biological opinion, and is not done on purpose. Incidental take in all forms will be exceeded if incidental take in the form of mortality or permanent disablement is greater than the take described above. This incidental take is in addition to any purposeful or incidental take authorized in 50 CFR 17.84(k) for the management of the section 10(j) non-essential experimental population of Mexican wolves.

Gray Wolf

The Service anticipates up to all gray wolves that within the action area of Arizona and New Mexico will be incidentally taken in the form of harassment, and up to one gray wolf will be incidentally taken in the form of permanent disablement or mortality as a result of the proposed actions. Unavoidable and unintentional take means accidental, unintentional take which occurs despite reasonable care, is incidental to management activities described in this conference/biological opinion, and is not done on purpose. Incidental take in all forms will be exceeded if incidental take in the form of mortality or greater than one individual.

Jaguar

The Service anticipates one jaguar will be taken as a result of this proposed action. The incidental take is expected to be in the form of harassment, injury, or mortality. This incidental take may be from the incidental capture in a leg-hold trap intended to capture Mexican wolves under the Service-approved management plan and special management measure adopted by the Service pursuant to the provisions of §17.84 (k), as well as to conduct activities related directly to the conservation, protection, and recovery of reintroduced nonessential experimental populations of Mexican wolves within Arizona and New Mexico. Incidental take in all forms will be exceeded if incidental take in the form of mortality or permanent disablement is greater than one individual..

Ocelot

The Service anticipates one ocelot will be taken as a result of this proposed action. The incidental take is expected to be in the form of harassment, injury or mortality. This incidental take may be from the incidental capture in a leg-hold trap intended to capture Mexican wolves under the Service-approved management plan and special management measure adopted by the Service pursuant to the provisions of §17.84 (k), as well as from conducting activities related directly to the conservation protection, and recovery of reintroduced nonessential experimental populations of Mexican wolves within Arizona and New Mexico. Incidental take in all forms will be exceeded if incidental take in the form of mortality or permanent disablement is greater than one individual.

California Condor

The Service anticipates one California condor may be taken, if outside of the California condor 10j boundaries, as a result of implementing this proposed action. The incidental take is expected to be in the form of harassment, injury, or mortality. This incidental take may be from the incidental capture in a leg-hold trap intended to capture Mexican wolves or gray wolves under the Service-approved management plan and special management measure adopted by the Service pursuant to the provisions of §17.84 (k), as well as to conduct activities related directly to the conservation protection, and recovery of reintroduced nonessential experimental populations of Mexican wolves within Arizona and New Mexico. It may also occur as a result of implementing the section 10(a)(1)(A) permit outside of the MWEPA in northern Arizona and New Mexico or in southern Colorado, Utah, or California to capture and manage gray wolves or Mexican wolves that disperse from the MWEPA. Incidental take in all forms will be exceeded if incidental take in the form of mortality or permanent disablement is greater than one individual.

Canada Lynx

The Service anticipates one lynx will be taken as a result of this proposed action. The incidental take is expected to be in the form of harassment, injury or mortality. This incidental take may be from the incidental capture in a leg-hold trap intended to capture Mexican wolves under the Service-approved management plan and special management measure adopted by the Service pursuant to the provisions of §17.84 (k), as well as from conducting activities related directly to the conservation protection, and recovery of reintroduced nonessential experimental populations of Mexican wolves within Arizona and New Mexico. This incidental take may also occur as a result of implementing the section 10(a)(1)(A) permit outside of the MWEPA in northern New Mexico or in southern Colorado to capture and manage gray wolves or Mexican wolves that disperse from the MWEPA. Incidental take in all forms will be exceeded if incidental take in the form of mortality or permanent disablement is greater than one individual.

Effect of the Take

In this biological opinion, the Service determines that this level of anticipated take in the form of harassment of all Mexican gray wolves and the mortality or permanent disablement of up to three Mexican wolves outside of the MWEPA; harassment of up to all Mexican wolves and mortality or permanent disablement of up to three Mexican wolves outside of the MWEPA; and the mortality or permanent disablement of one gray wolf, one jaguar, one ocelot, one California condor, if outside of the California condor 10j boundaries, and one lynx is not likely to result in jeopardy to the species for the reasons stated in the Conclusions section above.

Reasonable and Prudent Measures

The Service believes the following reasonable and prudent measures are necessary and appropriate to minimize take of the Mexican wolf, gray wolf, jaguar, ocelot, California condor, and lynx:

1. The Mexican Wolf Recovery Program will follow approved management plans, protocols, and guidance when conducting specific Mexican wolf and gray wolf management activities.

2. The Mexican Wolf Recovery Program will take every precaution to avoid the incidental capture of jaguars, ocelots, California Condors, gray wolves and lynx in leg-hold traps.
3. The Mexican Wolf Recovery Program will monitor any effects to the gray wolf, jaguar, ocelot, California Condors, and lynx from activities conducted within the program.

Terms and Conditions

To be exempt from the prohibitions of section 9 of the ESA, the Mexican Wolf Recovery Program must comply with the following terms and conditions, which implement the reasonable and prudent measures, described above and outline required reporting and monitoring requirements. These terms and conditions are non-discretionary.

The following terms and conditions implements reasonable and prudent measure.

Number 1:

a. The Mexican Wolf Recovery Program will follow the most current management plan for Mexican wolf.
b. The Mexican Wolf Recovery Program will follow the most current management plans, protocols, and guidance for gray wolf, jaguar, ocelot, California Condors, and lynx.

The following terms and conditions implement the reasonable and prudent measure.

Number 2:

a. The Mexican Wolf Recovery Program will coordinate with the appropriate endangered species biologists and/or managers about sightings or other documentations of jaguars, ocelots, California Condors, and lynx, and gray wolves to avoid trapping these species incidentally. Sightings or other documentations of these species will be reported to the appropriate species leads.
b. Leg-hold traps set to target Mexican wolves and gray wolves should be visually checked a minimum of once every 24 hours so that if a jaguar, ocelot, California Condor or lynx is caught, biologists can release the animal quickly in order to minimize harm.
c. Biologists conducting trapping activities will be trained, through the annual immobilization training, on preventative measure to avoid capture of jaguars, ocelots, and lynx. This training will include capture and handling protocol for large cats to ensure that a jaguar, ocelot or lynx captured in a leg-hold trap will be safely sedated, examined, and released.
d. Biologist conducting trapping activities will be trained, through the annual immobilization training, on techniques for safely removing a California condor from a trap in the event that a California condor is accidentally captured in a leg-hold trap. Training will include, but is not limited to a description of techniques for safely removing a condor from a trap and locations of the nearest raptor rehabilitation center in case a condor is injured.

The following terms and conditions implement reasonable and prudent measure.

Number 3:

a. In order to monitor the impacts of incidental take, the Mexican Wolf Recovery Program will report the progress of the action and its impact on the species mentioned above to the lead office for the species pursuant to 50 CFR402.14(i)(3).

b. Reporting the progress of the action for monitoring purposes should be accomplished at least once a year and can be accomplished informally such as documenting a discussion about monitoring in a meeting or through electronic mail.

Review requirement: The reasonable and prudent measures, with their implementing terms and conditions, are designed to minimize incidental take that might otherwise result from the proposed action. If, during the course of the action, the level of incidental take is exceeded, such incidental take would represent new information requiring review of the reasonable and prudent measures provided. The Mexican Wolf Recovery Coordinator must immediately provide an explanation of the causes of the taking and review the need for possible modification of the reasonable and prudent measures with the lead office for the species.

The Fish and Wildlife Service will not refer the incidental take of any migratory bird or bald eagle for prosecution under the Migratory Bird Treaty Act of 1918, as amended (16 U.S.C. §§703-712), or the Bald and Golden Eagle Protection Act of 1940, as amended (16 U.S.C. §§ 668-668d), if such take is in compliance with the terms and conditions (including amount and/or number) specified herein.

Upon locating a dead, injured, or sick listed species initial notification must be made to the Service's Law Enforcement Office – 4901 Paseo del Norte NE, Suite D, Albuquerque, NM, 87113, telephone 505/346-7828 within three working days of its finding. Written notification must be made within five calendar days and include the date, time, and location of the animal, a photograph if possible, and any other pertinent information. The notification shall be sent to the Law Enforcement Office with a copy to this office. Care must be taken in handling sick or injured animals to ensure effective treatment and care, and in handling dead specimens to preserve the biological material in the best possible state.

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the Act directs Federal agencies to utilize their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information.

1. We recommend that the Mexican Wolf Recovery Program actively promote recovery of Mexican wolves to suitable habitat in Mexico and promote establishment of Mexican wolves in the U.S. through natural dispersal.

In order for the Service to be kept informed of actions minimizing or avoiding adverse effects or benefiting listed species or their habitats, we request notification of the implementation of any conservation recommendations.

REINITIATION NOTICE

This concludes the Biological/Conference Opinion for the proposed revision to the regulations for the nonessential experimental population of the Mexican wolf; issuance of a section 10(a)(1)(A) research and recovery permit that authorizes activities for the management of the Mexican wolf within Arizona, New Mexico, and to a far lesser extent California, Colorado, Nevada, Texas, and Utah; issuance of a section 10(a)(1)(A) permit for the gray wolf in Arizona and New Mexico; and funding provided to the Mexican Wolf Recovery Program for the purpose of implementing the program.

The Federal agency shall request reinitiation of consultation if: 1) the amount or extent of incidental take is exceeded; 2) new information reveals effects of the agency action that may affect the species in a manner or to an extent not considered in the conference/biological opinion; 3) the agency action is subsequently modified in a manner that causes an effect to the species that was not considered in this opinion; or 4) a new species is listed or critical habitat designated that may be affected by the action.

For further information please contact John Oakleaf at 505/761.4782.

_____________/S/_________________
Sheryl L. Barrett
Mexican Wolf Recovery Coordinator

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Figure G-3. Action Area in Arizona and New Mexico. Figure also shows the proposed experimental population area boundary, within which all Mexican wolves are considered "experimental." Mexican wolves are unlikely to disperse to California, Colorado, Nevada, Texas, and Utah based on habitat connectivity, desert environments, and/or juxtaposition with the MWEPA. These states are included in the action area based on the remote possibility that personnel may need to capture and translocate Mexican wolves from these areas.

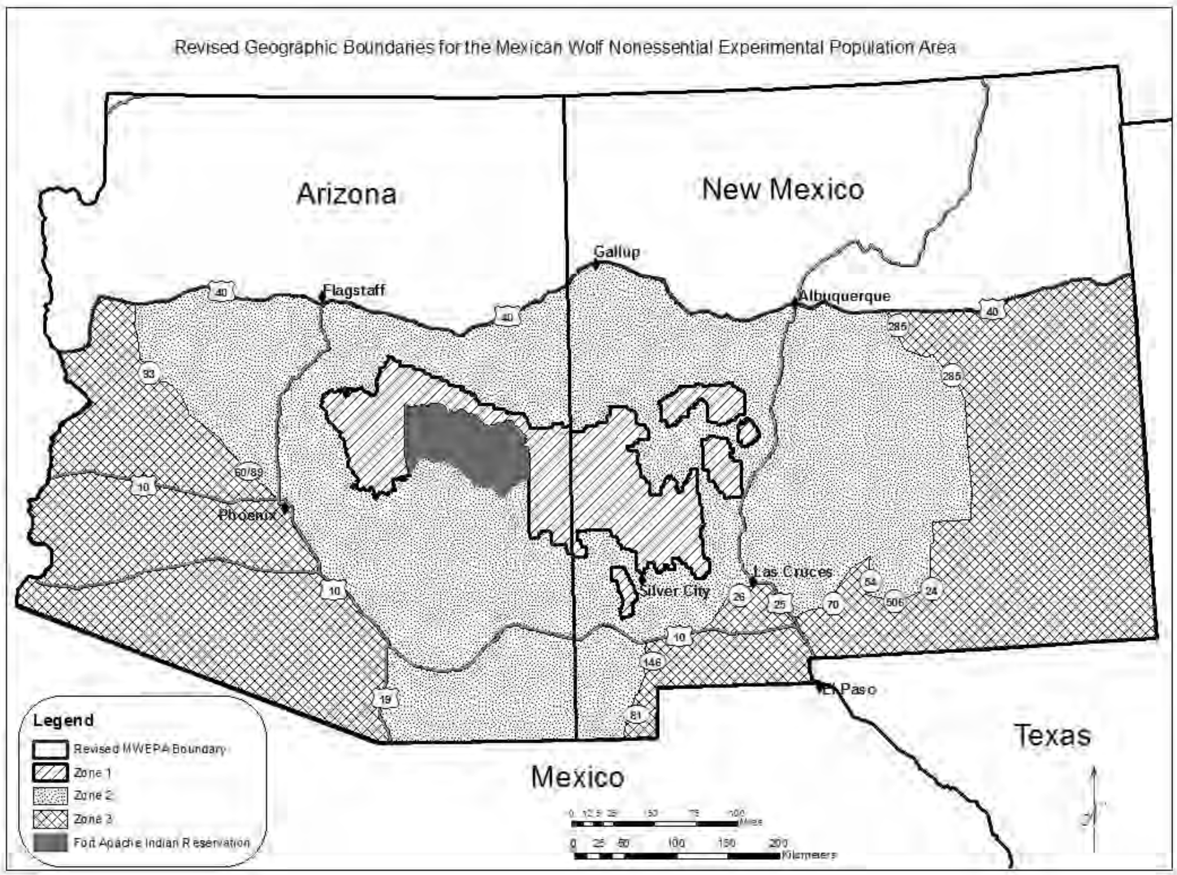

Figure G-3. Revised Geographic Boundaries for the Mexican Wolf Nonessential Population Area

Appendix A: Concurrences

The proposed action is anticipated to have no effect on the following species in Arizona and New Mexico for the reasons indicated in the table, the proposed action is anticipated to have no effect on species in California, Colorado, Nevada, Texas and Utah because of reason 1 and are not specifically listed in the table below:

Species	Status	Reason for No Effect Determination
Plants		
Acuna Cactus (*Echinomastus erectocentrus var.*	E	3
Arizona cliff-rose (*Purshia* (=*Cowania*) *subintegra*)	E	3
Arizona hedgehog cactus (*Echinocereus triglochidiatus* var. *arizonicus*)	E	3
Brady pincushion cactus (*Pediocactus bradyi*)	E	3
Canelo Hills ladies'-tresses (*Spiranthes delitescens*)	E	1, 2
Cochise pincushion cactus (*Coryphantha robbinsorum*)	T	3
Fickeisen plains cactus (*pediocactus peeblesianus*	E	3
Gierisch mallow (*Sphaeralcea gierischii*)	E	3
Gypsum wild-buckwheat (*Eriogonum gypsophilum*)	T	1, 6
Holmgren milk-vetch (*Astragalus holmgreniorum*)	E	1
Holy Ghost ipomopsis (*Ipomopsis sancti-spiritus*)	E	1
Huachuca water-umbel (*Lilaeopsis schaffneriana* var.	E	1, 2
Jones Cycladenia (*Cycladenia jonesii* (=*humilis*))	T	1
Kearney's blue-star (*Amsonia kearneyana*)	E	1
Knowlton's cactus (*Pediocactus knowltonii*)	E	3
Kuenzler hedgehog cactus (*Echinocereus fendleri* var.	E	1
Lee pincushion cactus (*Coryphantha sneedii* var. *leei*)	T	1
Mancos milk-vetch (*Astragalus humillimus*)	E	3
Mesa Verde cactus (*Sclerocactus mesae-verdae*)	T	3
Navajo sedge (*Carex specuicola*)	T	2
Nichol's Turk's head cactus (*Echinocactus horizonthalonius* var. *nicholii*)	E	1
Pecos (=puzzle, =paradox) sunflower (*Helianthus*	T	6
Peebles Navajo cactus (*Pediocactus peeblesianus*	E	3, 6

Species	Status	Reason for No Effect Determination
Pima pineapple cactus (*Coryphantha scheeri var.*	E	1,3
Sacramento Mountains thistle (*Cirsium vinaceum*)	T	6
Sacramento prickly poppy (*Argemone pleiacantha* ssp. *pinnatisecta*)	E	6
San Francisco Peaks ragwort (*Packera franciscanus*)	T	6
Sentry milk-vetch (*Astragalus cremnophylax* var.	E	6
Siler pincushion cactus (*Pediocactus* (=*Echinocactus*,=*Utahia*) *sileri*)	T	3
Sneed pincushion cactus (*Coryphantha sneedii* var.	E	1
Todsen's pennyroyal (*Hedeoma todsenii*)	E	3
Welsh's milkweed (*Asclepias welshii*)	T	6
Zuni fleabane (*Erigeron rhizomatus*)	T	3
Invertebrates		
Alamosa springsnail (*Tryonia alamosae*)	E	2
Chupadera springsnail (*Pyrgulopsis chupaderae*)	E	2
Kanab ambersnail (*Oxyloma haydeni kanabensis*)	E	2
Koster's springsnail (*Juturnia kosteri*)	E	2
Noel's Amphipod (*Gammarus desperatus*)	E	2
Pecos assiminea snail (*Assiminea pecos*)	E	1, 2
Roswell springsnail (*Pyrgulopsis roswellensis*)	E	2
San Bernardino springsnail (*Pyrgulopsis bernardina*)	T	2
Socorro isopod (*Thermosphaeroma thermophilus*)	E	2
Socorro springsnail (*Pyrgulopsis neomexicana*)	E	2
Three Forks springsnail (*Pyrgulopsis trivialis*)	E	2
Fish		
Apache trout (*Oncorhynchus apache*)	T	2
Arkansas River shiner (*Notropis girardi*)	T	2
Bonytail chub (*Gia elegans*)	E	2
Beautiful shiner (*Cyprinella formosa*)	T	2
Chihuahua chub (*Gila nigrescens*)	T	2
Desert pupfish (*Cyprinodon macularius*)	E	2
Gila chub (*Gila intermedia*)	E	2

Species	Status	Reason for No Effect Determination
Gila trout (*Oncorhynchus gilae*)	T	2
Gila topminnow (incl. Yaqui) (*Poeciliopsis occidentalis*)	E	2
Gila trout (*Oncorhynchus gilae*)	T	2
Humpback chub (*Gila cypha*)	E	2
Little Colorado spinedace (*Lepidomeda vittata*)	T	2
Loach minnow (*Tiaroga cobitis*)	E	2
Pecos bluntnose shiner (*Notropis simus pecosensis*)	T	2
Pecos gambusia (*Gambusia nobilis*)	E	2
Pikeminnow (=squawfish) (*Ptychocheilus Lucius*)	E	2
Razorback sucker (*Xyrauchen texanus*)	E	2
Rio Grande silvery minnow (*Hybognathus amarus*)	E	2
Sonora chub (*Gila ditaenia*)	T	1, 2
Spikedace (*Meda fulgida*)	E	2
Virgin River Chub (*Gila seminuda (=robusta*))	E	1, 2
Woundfin (*Plagopterus argentissimus*)	E	1, 2
Yaqui catfish (*Ictalurus pricei*)	T	2
Yaqui chub (*Gila purpurea*)	E	2
Amphibians		
Chiricahua leopard frog (*Rana chiricahuensis*)	T	2
Jemez Mountains salamander (*Plethodon neomexicanus*)	E	2
Sonora tiger salamander (*Ambystoma tigrinum stebbinsi*)	E	1, 2
Reptiles		
desert tortoise (*Gopherus agassizii*)	T	1, 3, 6
Mexican gartersnake (*Thamnophis eques magalops*)	T	1, 2
Narrow-headed gartersnake (*Thamnophis rufipunctatus*)	T	1, 2
New Mexico ridge-nosed rattlesnake (*Crotalus willardi obscurus*)	T	6
Birds		
California least tern (*Sterna antillarum browni*)	E	2
Least tern (*Sterna antillarum*)	E	2

Species	Status	Reason for No Effect Determination
Lesser prairie-chicken (*Tympanuchus pallidicinctus*)	T	1
Piping plover (*Charadrius melodus*)	E, T	2
Yuma clapper rail (*Rallus longirostris yumanensis*)	E	2
Mammals		
Hualapai Mexican vole (*Microtus mexicanus*	E	4, 6
New Mexico meadow jumping mouse (*Zapus hudsonius*	E	2, 4
Sonoran pronghorn (*Antilocapra americana sonoriensis*)	E	1, 6

Table G-1. List of Species Unaffected the Proposed Action

1. Species is not located within an area that has had past or current wolf management actions, and the species will not be affected because wolves are not reasonably certain to occur, and thus wolf management actions are not reasonably certain to occur, in the occupied range of the species.
2. Species occurs in aquatic habitat, riparian, and/or marsh lands where wolf management actions under the permit are not taken due to safety concerns for Mexican gray wolves and physical constraints of the habitat.
3. Species occurs in steep, rocky terrain or low desert where wolf management actions under the permit would not occur due to safety concerns for Mexican gray wolves and physical constraints of the habitat.
4. Species is small and will not be incidentally trapped, no habitat destruction will occur, and species not likely to be disturbed during critical time periods.
5. Wolf management actions will not occur in an area where the species roosts due to safety concerns for Mexican wolves, physical constraints of the habitat, and safety concerns of Permittees.
6. Species range, life history, and/or habitat requirements are such that disturbance by wolf management activities is unlikely to have any effect on the species.
7. Mexican wolf management activities are unlikely to have any effect on the species.
8. Experimental, non-essential population. Wolf management actions are expected to have little effect.

Appendix B: Concurrences

Black-footed Ferret

The black-footed ferret (*Mustela nigripes*) was listed as endangered (32 FR 4001; March 11, 1967) without critical habitat in 1967. A Recovery Plan was completed in June 1978 and revised in August 1988. A final rule to reintroduce and establish an experimental nonessential population of black-footed ferrets into Aubrey Valley, Arizona was published in 1996 (61 FR 11320, March 20, 1996). The proposed action of funding and implementing the Mexican wolf recovery program may affect, is not likely to adversely affect, the black-footed ferret based upon the following: (1) Black-footed ferret populations are not located within an area that has had past or current wolf management actions and although it is possible that wolves could pass through the area, they are not reasonably certain to occur there, and (2) Activities that are included in the action will not alter habitat.

Lesser Long-nosed Bat & Mexican Long-nosed Bat

The lesser long-nosed bat (*Leptonycteris curasoae yerbabuenae*), previously known as Sanborn's long-nosed bat (*Leptonycteris sanborni*), and the Mexican long-nosed bat (*Leptonycteris nivalis*) were listed as endangered in 1988 (53 FR 38456; September 30, 1988) without critical habitat.

A Recovery Plan for the lesser long-nosed bat was completed in March 1997. A Recovery Plan for the Mexican long-nosed bat was completed in September 1994. The proposed action of funding and implementing the Mexican wolf recovery program, may affect, is not likely to adversely affect, either bat species based upon the following: (1) Lesser long-nosed and Mexican long-nosed bats roost in areas that would pose safety issues for wolves and Permittees, so wolf management activities would not be expected in or near roost sites.

Mount Graham Red Squirrel

The Mount Graham red squirrel (*Tamiasciurus hudsonicus grahamensis*) was listed as endangered (52 FR 20994; June 3, 1987) with critical habitat (55 FR 425, February 5, 1990). A Recovery Plan was completed in May 1993 and a revised draft Recovery Plan was noticed in the Federal Register on May 27, 2011. The proposed action of funding and implementing the Mexican wolf recovery program, may affect, is not likely to adversely affect, the Mount Graham red squirrel or adversely modify its designated Critical Habitat based upon the following: (1) Mount Graham red squirrels occupy an area at higher elevations in the Pinaleno Mountains in spruce/fir and old growth Douglas-fir forests and activities that are included in the action will not alter habitat, and (2) nighttime hazing activities would not be conducted within occupied Mount Graham red squirrel habitat.

Masked Bobwhite

The masked bobwhite (*Colinus virginianus ridgewayi*) was listed as endangered (32 FR 4001, March 11, 1967; 35 FR 8495, June 2, 1970)) without critical habitat in 1967. A Recovery Plan was completed in February 1978 and revised in 1984 and 1995. A refuge population and captive rearing was established in 1985 at Buenos Aires National Wildlife Refuge in the southern Altar Valley in Pima County, Arizona. The proposed action of funding and implementing the Mexican wolf recovery program, may affect, is not likely to adversely affect, the masked bobwhite based upon the following: (1) the masked bobwhite population is very small and within a protected area, and (2) the masked bobwhite population is not located within an area that has had past or current wolf management actions and although it is possible that wolves could pass through the area, they are not reasonably certain to occur there, and (3) activities within masked bobwhite habitat would not likely to be of long duration.

Mexican spotted owl

The Mexican spotted owl was listed as threatened in 1993 (58 FR 14248) and critical habitat was designated in 2004 (69 FR 53182). We appointed the Mexican Spotted Owl Recovery Team in 1993, which produced the Recovery Plan for the Mexican Spotted Owl (Recovery Plan) in 1995 that was revised in 2012 (U.S. Fish and Wildlife Service 1995, 2012). The proposed action of funding and implementing the Mexican wolf recovery program, may affect, but is not likely to adversely affect, the Mexican spotted owl and designated critical habitat, based upon the following: (1) activities that are included in the action will not alter the key habitat components of Mexican spotted owl restricted and protected habitat, or the primary constituent elements of designated critical habitat, (2) wolf management activities are extremely unlikely to occur in nest/roost core areas, will be of very short-duration, and will not result in modification to MSO feeding, sheltering, or breeding behaviors, (3) Mexican Wolf Recovery Program participants will not camp near Mexican spotted owl nests or roosts during the breeding season and follow Recreational Disturbance Guidelines as outlined on page 294 of the Mexican spotted owl recovery plan, first revision, and (4) flying low over a Mexican spotted owl nest or roost in an aircraft will be avoided during the MSO breeding season.

Northern Aplomado Falcon

The northern aplomado falcon (*Falco femoralis septentrionalis*) was listed as endangered (51 FR 6686, January 25, 1986) without critical habitat. A Recovery Plan was completed in June 1990. A final rule to reintroduce and establish an experimental nonessential population of northern aplomado falcons into Arizona and New Mexico was published in 2006 (71 FR 42298, July 26, 2006). The proposed action of funding and implementing the Mexican wolf recovery program, may affect, but is not likely to adversely affect, the northern aplomado falcon based upon the following: (1) the experimental nonessential northern aplomado falcon population is not located within an area that has had past or current wolf management actions and although it is possible that wolves could pass through the area, they are not reasonably certain to occur there.

Southwestern Willow Flycatcher

The southwestern willow flycatcher (*Empidonax traillii extimus*) was listed as endangered (60 FR 10694, February 27, 1995) with critical habitat (70 FR 60886, October 19, 2005). Revised critical habitat was finalized on January 3, 2013 (78 FR 343). A Recovery Plan was completed in August 2002. The proposed action of funding and implementing the Mexican wolf recovery program may affect, is not likely to adversely affect, the southwestern willow flycatcher based upon the following: (1) the southwestern willow flycatcher nests in riparian habitats along streams, lakesides, and other wetlands and nests are found in dense thickets, Migration habitat is also believed to occur primarily along riparian corridors, wolf management actions under the permit are not taken in riparian habitats due to safety concerns for Mexican gray wolves and because of the physical constraints of the habitat, and (2) activities that are included in the action will not alter habitat, and (3) hazing activities would not occur during nesting season.

End.

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Mexican wolf in Blue Range Wolf Recovery Area
Photograph by Mexican Wolf Interagency Field Team

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