REINTRODUCTION OF THE MEXICAN WOLF WITHIN ITS HISTORIC RANGE IN THE SOUTHWESTERN UNITED STATES

Final Environmental Impact Statement

Fish and Wildlife Service
U.S. Department of the Interior
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November 1996

Prepared with the assistance of the Center for Wildlife Law, Institute of Public Law, University of New Mexico. Cover illustration: Brian Cobble

Cooperating agencies in preparation of the EIS:
Arizona Game and Fish Dept; New Mexico Dept of Game and Fish; San Carlos Apache Tribe; U.S. Dept of Agriculture, APHIS, Animal Damage Control; U.S. Dept of Agriculture, Forest Service; U.S. Dept of the Army, White Sands Missile Range.

States and counties where the Preferred Alternative is located: Arizona: Apache and Greenlee Counties; New Mexico: Catron, *Doña Ana, Grant, *Lincoln, *Otero, Sierra, and *Socorro Counties.
(* indicates counties that are only in the Preferred Alternative if the back-up White Sands Wolf Recovery Area is used.)

Abstract: The U.S. Fish and Wildlife Service (FWS) proposes to reintroduce a nonessential experimental population of Mexican gray wolves (Canis lupus baileyi) within part of the subspecies' historic range in the southwestern United States. The endangered Mexican wolf currently is known to exist only in captivity. Under the Preferred Alternative, commencing in 1997 or as soon thereafter as practical, the FWS will gradually release up to 15 pairs or family groups into the Blue Range area of east-central Arizona. If it is determined to be both necessary and feasible, up to five pairs or family groups may be released into the back-up area, the White Sands Wolf Recovery Area (White Sands Wolf Recovery Area is used, the net long term effect is projected to be between 760 and 2,000 fewer deer than would occur if there were no wolves. Densities of coyotes and mountain lions probably will drop in occupied wolf range. The major regional economic impacts will be reductions in the value of ungulate hunting and in hunting expenditures. Some regional economic benefits are expected from increases in tourism and in nonhunting recreation associated with the wolf. Limited minor land use restrictions may be imposed around occupied release pens, dens, and rendezvous sites, on public lands only, as necessary to prevent disturbance of the wolves. The use of M-44s and choking neck snares in occupied wolf range will be restricted. If the White Sands Wolf Recovery Area is used, some inconvenience, but no major conflicts with military or testing uses, are expected from wolf reintroduction.

The FEIS also analyses potential impacts of three alternatives to the Preferred Alternative: 1) reintroduction of nonessential experimental wolves limited to significantly smaller recovery areas, 2) reintroduction of wolves, in the Blue Range Wolf Recovery Area only, with full "endangered" status under the Endangered Species Act and no restriction of wolf dispersal by managers, and 3) a "No Action" alternative that considers the speculative possibility of natural recolonization of wolves from Mexico into southeastern Arizona, southwestern New Mexico, and Big Bend National Park in Texas.

The FEIS will be given to decision makers in the FWS and Department of Interior for a decision. A Notice of Availability of the FEIS will be published in the Federal Register. A Record of Decision can be approved 30 days after publication of the Notice of Availability. Any decision on Mexican wolf recovery in the southwestern United States will be well publicized. Send information requests to: David R. Parsons, Mexican Wolf Recovery Program, U.S. Fish and Wildlife Service, P.O. Box 1306, Albuquerque, NM 87103.

Approved:

[Signature]

(Date)

Nancy Kaufman
Regional Director, Region 2
U.S. Fish and Wildlife Service
Final Environmental Impact Statement - Reintroduction of the Mexican Wolf Within Its Historic Range in the Southwestern United States

Summary

Introduction

The United States Department of the Interior, Fish and Wildlife Service (FWS), proposes to reintroduce a nonessential experimental population of Mexican gray wolves (Canis Lupus baileyi) within part of the subspecies’ historic range in the southwestern United States. The endangered Mexican wolf currently is known to exist only in captivity. The FWS has prepared a final environmental impact statement (FEIS) on its reintroduction proposal and three alternative approaches to re-establishing the subspecies under the Endangered Species Act (ESA). This Summary outlines the full FEIS.

Cooperating Agencies in Preparation of the EIS

Arizona Game and Fish Dep’t; New Mexico Dep’t of Game and Fish; San Carlos Apache Tribe; U.S. Dep’t of Agriculture, APHIS, Animal Damage Control; U.S. Dep’t of Agriculture, Forest Service; U.S. Dep’t of the Army, White Sands Missile Range.

States and Counties Where the Preferred Alternative is Located

Arizona: Apache and Greenlee Counties; New Mexico: Catron, *Dona Ana, Grant, *Lincoln, *Otero, Sierra, and *Socorro Counties. (* indicates counties that are potentially affected by the Preferred Alternative only if the back-up White Sands Wolf Recovery Area is used.)

Scoping, Public Review, and Changes to the Draft EIS

This FEIS is based on a lengthy period of scoping, preparation, review, and revision of a draft EIS (DEIS). Four public scoping meetings were held in 1991 and 1992 to obtain public input regarding the FWS’s general proposal to reintroduce Mexican wolves. A total of 838 people attended. In addition, public comment periods following the meetings resulted in 1,324 written comments, which the FWS compiled and analyzed. The seven main areas of public concern related to: 1) the FWS’s planning of the Proposed Action and the alternatives to it; 2) impacts of wolf depredation on livestock; 3) economic impacts; 4) ecological and biological impacts of wolf recovery; 5) the viability of the captive Mexican wolf population; 6) impacts on wildlife management; and 7) philosophical and ethical concerns. The interagency Mexican Wolf EIS Interdisciplinary Team, which oversaw the writing of the EIS, considered these issues as well as additional issues.

The DEIS was prepared between 1993 and 1995; it was released in June 1995. The public comment period on the DEIS ended more than four months later, on October 31. Public review was extensive, with participation by almost 18,000 people or organizations, in a variety of ways. Fourteen public open house meetings were held throughout the potentially affected areas; total registered attendance was 1,186. Three formal public hearings were held in Austin, Texas; Phoenix, Arizona; and Socorro, New Mexico; total registered attendance was 951. Each written and transcribed oral comment has been reviewed and considered in the preparation of the FEIS. The public comments are on file and available for inspection at the FWS Regional Office in Albuquerque, New Mexico.

Notable changes from the DEIS to this FEIS are listed below; they largely are in response to comments received on the DEIS or to developments since the DEIS was written. Also, numerous minor corrections, revisions, and updates have been made.

Alternatives

- Re-writing of the Proposed Action as the Preferred Alternative (Alt. A), now specifying use of the biologically preferable Blue Range Wolf Recovery Area (BRWRA) first, with the White Sands Wolf Recovery Area (WSWRA) as a back-up, only to be used if necessary and feasible and if additional information is available that the deer population can support a wolf population. The specific
decision criteria in the DEIS regarding whether to use the BRWRA or WSWRA first have been deleted.

- Deletion of the provision for closing backcountry roads.

- Support for a Citizen Advisory Committee to advise on management.

- Alt. B now proposes reintroductions in both the BRWRA and WSWRA primary recovery zones at the same time.

- Alt. C now proposes full-endangered wolf reintroduction into the BRWRA only. The WSWRA is deleted as a potential reintroduction area under Alt. C, largely because the reintroduction objective could be met with releases to just the BRWRA with subsequent unlimited expansion of the reintroduced population. Related discussion of impacts to the WSWRA and the adjacent potential dispersal areas is deleted.

- Rewording of Alt. D to emphasize the “No Action” aspect and that natural recolonization is very speculative. Costs of this alternative are re-calculated. Less quantification is provided in the impact discussion due to greater emphasis on uncertainty.

Clarifications/Corrections

- More discussion of historic information about wolf depredation on livestock, in Chap. 1 under Reasons for Listing.

- New or more clear definitions of “problem wolves,” “rendezvous sites,” and “disturbance-causing land use activities” in the Glossary, Appendix G. The latter definition includes specific activities and types of public access that may not be allowed within a radius of one mile or less around active pens, dens, and rendezvous sites, as well as exemptions, i.e., activities specifically allowed.

- Deletion of the provision for removing wolves when they are “conflicting with a major land use”; addition of a provision for removing them if they endanger themselves by occurring when and where military or testing activities are scheduled.

- Clarification that modification of wolf habitat (outside the protection areas for pens, dens, and rendezvous sites) by land uses in the recovery areas would not be considered a “take” of nonessential experimental wolves under ESA sec. 9(a).

- Apportionment of potential impacts on deer, elk, hunting, and related economic impacts by whether they would occur in Arizona or New Mexico.

- Discussion of potential impacts on bighorn sheep in the BRWRA.

- More discussion of potential impacts on the San Carlos Apache Reservation.

- Revision and more detailed explanation of cost estimates for each alternative in Appendix B.

Updates

- Updated version of Appendix C, the Proposed Mexican Wolf Experimental Population Rule, as published in the Federal Register.

- Inclusion of the detailed Public Comment Summary and the Agency Comments on the DEIS, both as part of Chap. 5, and both with FWS responses to the comments.

- A summary of the DEIS review process, compilation of the numbers of various types of public comments received, and a listing of personnel involved in the public review process.

- New Mexico League of Women Voters wolf opinion survey results.

- Impacts from wolf reintroduction in Yellowstone and Central Idaho to date.

- Updated version of Appendix C, the Proposed Mexican Wolf Experimental Population Rule, as published in the Federal Register.
**Summary**

- Drought and management impacts on deer, oryx, and feral horse populations on White Sands Missile Range.
- Proposed reductions in permitted grazing to Apache National Forest allotments in BRWRA.
- Mexican spotted owl recovery in Cumulative Impacts section and discussion on impacts on National Forest management.
- Status of captive Mexican wolf population and genetics, and revision of taxonomy and historic range sections.
- More current information on investigations of whether any Mexican wolves remain in the wild in the U.S. or Mexico (none confirmed).

**New Appendices**

**Appendix J** - Update on Yellowstone and Central Idaho Gray Wolf Reintroductions and Economic Benefits of Wolf Recovery, and **Appendix K** - Response to Mr. Dennis Parker’s Comment on the DEIS.

**Future Decision Making**

A Notice of Availability of this FEIS is being published in the Federal Register. The FEIS will be given to decision makers in the FWS and Department of Interior. A Record of Decision can be approved 30 days after publication of the Notice of Availability. Any decision on Mexican wolf recovery in the southwestern United States will be well publicized. Send information requests to: David R. Parsons, Mexican Wolf Recovery Program, U.S. Fish and Wildlife Service, P.O. Box 1306, Albuquerque, NM 87103.

\[Signature\]

\[Date\]

Nancy Kaufman
Regional Director, Region 2
U.S. Fish and Wildlife Service

**Background**

**Mexican Gray Wolf Description**

The Mexican wolf is the southernmost and one of the smallest subspecies of the North American gray wolf. Adults weigh 50 to 90 lbs., average 4’6” to 5’6” in total length, and reach 26” to 32” in height at the shoulder. Its pelt color varies. The “lobo”-its popular name-is genetically distinct from other wolves and no confirmed population exists outside captivity. It is one of the rarest land mammals in the world. International experts rate recovery of the Mexican wolf subspecies as the highest priority of all gray wolf recovery programs.

**Reasons for Listing**

Many factors contributed to the Mexican wolf’s demise, but the concerted federal eradication effort in the early 1900s was predominant. Other factors were: commercial and recreational hunting and trapping; killing of wolves by game managers on the theory that more game animals would be available for hunters; habitat alteration; and safety concerns, although no documentation exists of Mexican wolf attacks on humans.

**Reintroduction Procedures**

All Mexican wolves to be released under Alternatives A, B, and C, below, would come from the certified U.S. captive population of 114 animals (as of March 1996) maintained in 24 zoos, wildlife parks, and other facilities located around the country. The wolves have exhibited no major genetic, physical, or behavioral problems affecting their fitness resulting from captivity. The FWS will move male/female pairs identified as candidates for possible release to its captive wolf management facility on the Sevilleta National Wildlife Refuge, north of Socorro, New Mexico. In the event of a decision to proceed with reintroduction, the FWS would select release animals from among the candidate pairs based on reproductive performance, behavioral compatibility, response to the adaptation process, and other factors. Only wolves that are genetically well-represented in the remaining captive population would be used as release stock.
Alternatives

Alternative A (the Preferred Alternative): The U.S. Fish and wildlife Service proposes to reintroduce Mexican wolves, classified as nonessential experimental, into the Blue Range Wolf Recovery Area. Wolves will be released into the primary recovery zone and allowed to disperse into the secondary recovery zone. If feasible and necessary to achieve the recovery objective of 100 wolves, a subsequent reintroduction of wolves into the White Sands Wolf Recovery Area will be conducted.

In 1997, the FWS will begin to reintroduce family groups of captive-raised Mexican wolves into the primary recovery zone of the BRWRA (Fig. 1). The FWS will gradually release up to 15 family groups into the BRWRA and later, if necessary and feasible, up to five family groups into the back-up WSWRA (Fig. 1). Reproduction in the wild would increase the populations to approximately the recovery objective. Wolves will be released into the primary recovery zone and allowed to disperse into the secondary recovery zone.

The recovery objective of the Preferred Alternative is to re-establish 100 wild wolves distributed over more than 5,000 mi² by about the year 2005, consistent with the 1982 Mexican Wolf Recovery Plan. The FWS projects that the population will eventually fluctuate near this level as result of natural processes, such as intra-specific aggression and changes in prey abundance and vulnerability, and management actions, such as problem wolf control and translocation. The FWS and its cooperators will monitor, research, evaluate, and actively manage the wolves, including translocating or removing wolves that disperse outside the wolf recovery areas or that cause significant conflicts.

A federal regulation will designate the population to be released as experimental and nonessential to the continued existence of the subspecies. This Mexican Wolf Experimental Population Rule will delineate the precise geographic boundaries (see Box 1) and prescribe the protective measures and management authority that apply. No formal ESA Section 7 consultation would be required regarding potential impacts of land uses on nonessential experimental Mexican wolves, except on National Wildlife Refuges and National Park Service areas.

Reintroduction will occur under management plans that allow dispersal by the new wolf populations from the immediate release areas (“primary recovery zones”) into designated adjacent areas (“secondary recovery zones”) (Fig. 1). However, the FWS and cooperating agencies will not allow the wolves to establish territories outside these wolf recovery area boundaries unless this occurs on private or tribal lands and the land manager does not object. The FWS would attempt to enter into cooperative management agreements with such landowners regarding control of the wolves. If the land manager objects to the presence of wolves on private or tribal lands, field personnel would recapture and relocate the wolves.

The FWS and the cooperating agencies will use a flexible “adaptive management” approach based on careful monitoring, research, and evaluation throughout the release phase. This will include adjusting the numbers actually released according to the needs and circumstances at the time. Initially, to reduce the likelihood of wolf dispersal onto the White Mountain Apache and San Carlos Apache reservations to the west, the wolf releases will occur on the eastern side of the BRWRA primary recovery zone, close to the Arizona/New Mexico border. The FWS will encourage and support the formation of a Citizen Advisory Committee, or similar management oversight body, to assist the FWS and cooperating agencies in responding to citizen concerns.

The following future circumstances will be considered in decision-making about using the WSWRA subsequent to initial releases in the BRWRA:

- whether using the WSWRA, in combination with the BRWRA, is necessary to achieve the recovery objective of re-establishing 100 wolves; that is, it would be used if it appears that the initial introduction in the BRWRA will not achieve a total population of 100 wolves,

- whether, based on future research, it appears that the WSWRA deer herd could support a wolf population that would contribute to meeting the recovery objective, and

- other future circumstances that could affect the feasibility of using the WSWRA, such as
Figure 1. Mexican Wolf Geographic Boundaries.

- PRIMARY RECOVERY ZONES
- SECONDARY RECOVERY ZONES
- POTENTIAL NATURAL RECOLONIZATION AREAS (Alternative D Only)
Box 1. Geographic boundaries for Mexican wolf reintroduction (see Fig. 1).

**Blue Range Wolf Recovery Area:** all of the Apache National Forest and all of the Gila National Forest.

**BRWRA primary recovery zone:** the area within the Apache National Forest 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).

**BRWRA secondary recovery zone:** the remainder of the BRWRA not in the primary recovery zone.

**White Sands Wolf Recovery Area:** all of the White Sands Missile Range, the White Sands National Monument, and the San Andres National Wildlife Refuge, and the area adjacent and to the west of the Missile Range bounded on the south by the southerly boundary of the U.S. Department of Agriculture Jornada Experimental Range and the northern boundary of the New Mexico State University Animal Science Ranch; on the west by the New Mexico Principal Meridian; on the north by the Pedro Armendaris Grant boundary and the Sierra-Socorro County line; and on the east by the western boundary of the Missile Range.

**WSWRA primary recovery zone:** the area within the White Sands Missile Range bounded on the north by the road from former Cain Ranch Headquarters to Range Road 16, Range Road 16 to its intersection with Range Road 13, Range Road 13 to its intersection with Range Road 7; on the east by Range Road 7; on the south by U.S. Highway 70; and on the west by the Missile Range boundary.

**WSWRA secondary recovery zone:** the remainder of the WSWRA not within the primary recovery zone.

**Mexican wolf experimental population area:** the portion of Arizona lying north of Interstate Highway 10 and south of Interstate Highway 40; the portion of New Mexico lying north of Interstate Highway 10 in the west, north of the New Mexico-Texas boundary in the east, and south of Interstate Highway 40; and that portion of Texas lying north of US Highway 62/180 and south of the Texas-New Mexico boundary.

The Proposed Mexican Wolf Experimental Population Rule was published in the Federal Register on May 1, 1996 (pp. 19237-19248). In summary, the Proposed Rule provides:

- No one will be in violation of the ESA for unavoidable and unintentional take of a wolf within the Mexican wolf experimental population area when the take is incidental to a legal activity, such as driving, trapping, and military testing or training activities, and is promptly reported. Anyone may take a wolf in defense of human life.

- No private or tribal land use restrictions will be imposed for wolf recovery without the concurrence of the private owner or tribal government. On public lands, public access and disturbance-causing land use activities may be temporarily restricted within a one-mile radius around release pens, and around active dens between March 1 and June 30 and around active wolf rendezvous sites between June 1 and September 30.

- On public lands allotted for grazing, livestock owners and their designated agents: (1) may harass wolves for purposes of scaring them away from livestock provided the harassment is promptly reported, and (2) may be allowed to take wolves actually engaged in attacking livestock.
Permission for private parties to take wolves on public grazing lands must meet all of these conditions: 1) six or more breeding wolf pairs occur in the BRWRA, or three or more breeding wolf pairs occur in the WSWRA (if used); 2) previous livestock loss or injury by wolves has been documented by an authorized FWS, ADC, or state employee and efforts to control the offending wolves have been undertaken but have not succeeded; 3) physical evidence exists that an attack occurred at the time of the take; and 4) the take is promptly reported.

On private or tribally-owned land, regardless of location, property owners and livestock owners and their designated agents may harass wolves near livestock, people, buildings, facilities, pets, or other domestic animals at any time and may take wolves attacking livestock under more liberal conditions than those applicable to public grazing lands. That is, such take can occur regardless of the number of recovered wolf pairs in the area and no requirement exists for government agencies to have completed their efforts to take the depredating wolves. However, physical evidence that an attack occurred at the time of the take must be present and the take must be promptly reported.

Any FWS-authorized person may capture and remove or translocate reintroduced wolves consistent with a FWS-approved management plan or special management measure. These may include wolves that: (1) prey on livestock, (2) attack domestic animals other than livestock on private land, (3) impact game populations in ways which may inhibit further wolf recovery, (4) prey on state-endangered desert bighorn sheep on the White Sands Missile Range (if used), (5) are considered problem wolves, are a nuisance, or endanger themselves by their presence in a military impact area, or (6) are necessary for research.

The FWS does not intend to change the “nonessential experimental” designation to “‘essential experimental’ or “endangered” and the FWS does not intend to designate critical habitat for the Mexican wolf.

Any taking of a wolf contrary to the experimental population rule may be referred to the appropriate authorities for prosecution.

Post-release management will follow an interagency cooperative management plan. This will include working with the Arizona Game and Fish Department to meet the requirements of its Cooperative Reintroduction Plan and working with the New Mexico Department of Game and Fish. A wolf management team representing the FWS, the State Game and Fish departments, and other cooperating agencies will determine whether particular actions are necessary. The interagency management plan will cover issues such as release pen siting, veterinary management, depredation control, capture and relocation, research, radio tracking, aerial overflights, prey monitoring, and prey habitat management. Field staff will conduct monitoring and research, trapping, depredation investigation, mortality investigation, control, and other on-the-ground actions.

Alternative B: Reintroduction of Mexican wolves, classified as nonessential experimental, into both the Blue Range Wolf Recovery Area and the White Sands Wolf Recovery Area primary recovery zones. Wolves dispersing from the primary recovery zones will be captured and returned to the primary zones or captivity.

In 1997, the FWS will begin to reintroduce family groups of captive-raised Mexican wolves into both the BRWRA and the WSWRA primary recovery zones and actively prevent the populations from expanding beyond these zones (Fig. 1). In the BRWRA primary recovery zone the FWS will release about eight family groups over four years with the goal of reaching a population of 20 wild wolves by 2001. In the WSWRA primary recovery zone the FWS will release about four family groups over two years with the goal of reaching a population of 14 wild wolves by 1999. The total recovery objective will be 34 wolves.
The FWS will designate the population as nonessential experimental under the ESA. The FWS will adopt basically the same Mexican Wolf Experimental Population Rule as under Alt. A, but it would apply to the smaller areas. The FWS and its cooperators will follow the same release, monitoring, and management procedures as under Alt. A, but on a smaller scale due to the smaller areas involved. Control will be accomplished through a combination of aggressive monitoring and management methods to promptly recapture wolves that leave the primary recovery zones. Wolves could be translocated between the two areas as needed.

**Alternative C: Reintroduction of Mexican wolves, classified as endangered, into the Blue Range Wolf Recovery Area only. Wolves will be released into the primary recovery zone and unlimited dispersal will be allowed. Wolves will receive full protection under the Endangered Species Act.**

In 1997, the FWS will begin to reintroduce family groups of captive-raised Mexican wolves under their current full-endangered status into the primary recovery zone of the BRWRA in east-central Arizona, following the same release procedures as under Alts. A and B. The FWS will gradually release up to 15 family groups into the BRWRA. No releases will occur in the WSWRA. The recovery objective of the alternative is to re-establish 100 wild wolves distributed over more than 5,000 mi² by about the year 2002, consistent with the Mexican Wolf Recovery Plan. The FWS and its cooperators will monitor and conduct research on the wolves, but they will not actively manage them.

The ESA allows unrestricted dispersal; that is, the FWS will not restrict the population to the designated wolf recovery areas, as under Alternative A, or to the smaller primary recovery zones, as under Alternative B. No attempts will be made to recapture or return wolves with the possible exception of individual depredators.

The wolves will have the full protection against “take” by humans provided by the ESA. Anyone who would “harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to engage in any such conduct” against a Mexican wolf will be violating the ESA. The only exceptions will be takings to protect human life or by special permit “for scientific purposes or to enhance the propagation or survival of the affected species,” 16 USC sec. 1539(a)(1)(A).

Land use restrictions could be imposed under this alternative. Restrictions could include limiting the use of predator control methods that might kill or injure wolves, closing roads, modifying livestock grazing, and imposing other protections to limit any jeopardy resulting from human activities. Other federal agencies would be expected to pursue their responsibilities under the ESA to conserve, and not harm, a recolonizing population. This would include managing to maintain and create high quality ungulate and wolf habitat.

**Alternative D: No Action**

Under the No Action alternative, the FWS will take no action other than continuing its present course. It will neither release wolves nor take any other steps to directly ensure Mexican wolf recovery. The FWS will neither adopt an experimental population rule nor designate any wolf recovery areas. The agency will continue to support the captive population objectives established in the SSP Master Plan, but the agency will not support breeding for maximum growth.

Based on its current ESA obligations, the FWS would still encourage protection and expansion of wild wolf populations under this alternative, if any were discovered. No evidence exists to indicate a likelihood of natural recolonization in U.S. portions of the historic Mexican wolf range, but the FWS will support continued research on this possibility. Natural recolonization is considered extremely speculative. Based on historical wolf abundance, recent sighting reports alleged to be wolves, proximity to Mexico, and other factors, the most suitable areas for potential natural recolonization by wild wolves probably would be the mountainous parts of southeastern Arizona and southwestern New Mexico, and Big Bend National Park in southern Texas. This alternative analyzes these three areas. No confirmed sighting reports have come from these areas or from Mexico in recent years.

Any wolves that did naturally recolonize would be fully protected as an endangered species in the United States. It would be illegal to harm or harass
them except under very narrow circumstances authorized by an ESA permit.

Land use restrictions could be imposed under this alternative depending on if, and where, wolves occurred. Restrictions could include limiting the use of predator control methods that might kill or injure wolves, closing roads, modifying livestock grazing, and imposing other protections to limit any jeopardy resulting from human activities. Other federal agencies would be expected to pursue their responsibilities under the ESA to conserve, and not harm, a recolonizing population. This would include managing to maintain and create high quality ungulate and wolf habitat.

Impacts

Table 1 summarizes the features of the four alternatives. Table 2 outlines their projected environmental consequences. The FEIS provides detailed explanations of the impacts, descriptions of the methods of impact analysis, and supporting references.
Table 1. Summary of Mexican wolf re-establishment alternatives.

**Key:** BR = Blue Range Wolf Recovery Area; WS = White Sands Wolf Recovery Area.

<table>
<thead>
<tr>
<th>Alternative</th>
<th>Description</th>
<th>Areas Analyzed</th>
<th>Definite Boundaries Around Recovery Areas?</th>
<th>Endangered Species Act Protection Status</th>
<th>Area Wolf Population Goal</th>
<th>Estimated Area to be Occupied by Wolves (square miles)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Nonessential experimental releases allowing dispersal into secondary recovery zones; BR first, BS back-up</td>
<td>BR and WS</td>
<td>Yes</td>
<td>Per experimental population rule</td>
<td>BR and WS (if used): Total = 100</td>
<td>BR and WS (if used): Total = 5,000</td>
</tr>
<tr>
<td>B</td>
<td>Nonessential experimental releases preventing dispersal from primary zones</td>
<td>BR and WS primary recovery zones only</td>
<td>Yes</td>
<td>Per experimental population rule</td>
<td>BR - 20</td>
<td>BR - 1,000</td>
</tr>
<tr>
<td>C</td>
<td>Releases under full ESA protection</td>
<td>BR only plus likely dispersal areas</td>
<td>No</td>
<td>Endangered</td>
<td>BR - 100+</td>
<td>BR - &gt;5,000</td>
</tr>
<tr>
<td>D</td>
<td>No releases; research and support possible natural recolonization</td>
<td>Southeastern Arizona, Southwestern New Mexico, and Big Bend National Park, Texas</td>
<td>No</td>
<td>Endangered (if wolves discovered)</td>
<td>(speculative)</td>
<td>(speculative)</td>
</tr>
</tbody>
</table>

Estimated Area (Continued Below)

<table>
<thead>
<tr>
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</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Yes/No</td>
<td>3/9</td>
<td>25%</td>
<td>None</td>
<td>Medium</td>
<td>7,247,000 (over 14 years)</td>
</tr>
<tr>
<td>B</td>
<td>WS/No</td>
<td>3/3</td>
<td>30%</td>
<td>None</td>
<td>High</td>
<td>5,890,000 (over 10 years)</td>
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<tr>
<td>C</td>
<td>Yes/No</td>
<td>5/6</td>
<td>25%</td>
<td>Some possible</td>
<td>Low</td>
<td>5,692,000 (over 10 years)</td>
</tr>
<tr>
<td>D</td>
<td>SE Ariz./No</td>
<td>Decades</td>
<td>No estimates</td>
<td>Some possible (if wolves discovered)</td>
<td>Low</td>
<td>150,000 to $217,000 per year (period indeterminate)</td>
</tr>
</tbody>
</table>

1 In addition, about one-third of the captive-raised wolves that are released annually are expected to quickly die, disappear, disperse from the recovery area, or require recapturing for a variety of reasons, and not to become part of the established population.

2 See Appendix B for cost accounting.
Table 2. Summary of key projected impacts under each alternative.

**Notes:** Chap. 4 provides background for all information summarized here. All impacts in the back-up White Sands Wolf Recovery Area under Alt. A depend on whether the area is used. This table emphasizes quantifiable adverse impacts and is not a cost-benefit summary. Monetary losses are in 1994 dollars.

Key: BR = Blue Range Wolf Recovery Area; WS = White Sands Wolf Recovery Area.

<table>
<thead>
<tr>
<th>Alternative</th>
<th>Net impact of wolf recovery on wild prey populations (low to high range)</th>
<th>Impact on annual hunter take in area (low to high range)</th>
<th>Annual lost value of hunting (low to high range)²</th>
<th>Annual lost hunter expenditures in region (low to high range)²</th>
<th>Number of cattle killed annually (low to high range)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A (Preferred Alt.)</td>
<td>BR: 4,800-10,000 fewer deer; 1,200-1,900 fewer elk</td>
<td>BS: 1,200-3,000 fewer deer</td>
<td>BS: 1,000-2,400 fewer deer</td>
<td>WS: $3,000-$7,100</td>
<td>BS: $2,900-$7,000</td>
</tr>
<tr>
<td>B</td>
<td>RR: 970-1,900 fewer deer; 230-350 fewer elk</td>
<td>BS: 57-110 fewer deer</td>
<td>RR: $123,100-$214,800</td>
<td>BS: $58,200-$101,500</td>
<td>BS: 0.05-0.1</td>
</tr>
<tr>
<td>C</td>
<td>BK: 3,700-8,800 fewer deer; 70-1,700 fewer elk</td>
<td>BS: 240-480 fewer deer</td>
<td>BS: $582,800-$1,119,200</td>
<td>RR: $470,700-$902,700</td>
<td>BS: 1.34</td>
</tr>
<tr>
<td>D¹</td>
<td>not modelled</td>
<td>not modelled</td>
<td>not modelled</td>
<td>not modelled</td>
<td>not estimated (none in Big Bend NFI)</td>
</tr>
</tbody>
</table>

¹ Figures given compare prey populations under the wolf reintroduction scenario, at a point in time five years after the wolf population goal for the area is achieved, to what the prey populations are projected to be if wolves are not reintroduced.

These figures likely overstate the actual losses. Hunters may not actually hunt less overall because of fewer deer and elk in the wolf recovery areas, but instead turn their attention to substitute areas or species. Further, deer and elk hunting in Arizona and New Mexico are dominated by resident hunters. Most of the money not spent by residents as hunter expenditures in the region probably will be spent in some other sector of the state economy.

² All projected impacts in the potential natural recolonization areas are speculative.

(continued on next page)
<table>
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<tr>
<th>Alternative</th>
<th>Value of cattle killed annually (low to high range)*</th>
<th>Economic benefits</th>
<th>Impacts on ADC activities</th>
<th>Impacts on government policies and plans</th>
<th>Impacts on land use and military activities</th>
<th>Impacts on recreation</th>
</tr>
</thead>
<tbody>
<tr>
<td>A (Preferred Alt.)</td>
<td>BR: $640-$21,600</td>
<td>HR: increased recreational use value and expenditures</td>
<td>BR: M-44 and neck snare restrictions; limits on other tools</td>
<td>BR: conflict with local ordinances</td>
<td>BR: minor access restrictions near pens, dens, and rendezvous sites</td>
<td>BR: increased visitation</td>
</tr>
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<td>WS: $10-$200</td>
<td>WS: little impact</td>
<td>WS: little impact</td>
<td>WS: limited conflict with local ordinances</td>
<td>WS: very limited access restrictions; inconvenience for security administration</td>
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</tr>
<tr>
<td>B</td>
<td>BR: $20-$600</td>
<td>BR: limited increased recreational use value and expenditures</td>
<td>BR: limited M-44 and neck snare restrictions; limits on other tools</td>
<td>BR: no conflict</td>
<td>BR: minor access restrictions near pens, dens, and rendezvous sites</td>
<td>BR: limited increased visitation</td>
</tr>
<tr>
<td></td>
<td>WS: $0</td>
<td>WS: no impact</td>
<td>WS: no impact</td>
<td>* * noconflict</td>
<td>WS: very limited access restrictions; inconvenience for security administration</td>
<td>WS: no Impact</td>
</tr>
<tr>
<td>C</td>
<td>BR: $640-$21,600</td>
<td>BR: increased recreational use value and expenditures</td>
<td>RR: M-44 and neck snare restrictions; limits on other tools</td>
<td>BR: conflict with local ordinances; potential conflict with San Carlos and White Mountain Apaches’ tribal sovereignty</td>
<td>BR: access restrictions near pens, dens, and rendezvous sites; restrictions on grazing and other activities</td>
<td>BR: Increased visitation</td>
</tr>
<tr>
<td>D</td>
<td>not estimated (none in Big Bend N P)</td>
<td>All 3 areas: increased recreational use value and expenditures</td>
<td>All 3 areas: M-44 and neck snare restrictions; limits on other tools</td>
<td>All 3 areas: no conflict</td>
<td>All 3 areas: access restrictions near pens, dens, and rendezvous sites; restrictions on grazing and other activities</td>
<td>All 3 areas: increased visitation</td>
</tr>
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* Livestock losses may be compensated by a private depredation compensation fund.
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Chapter 1

Purpose and Need for Action
CHAPTER 1
Purpose and Need For Action

Introduction

This final environmental impact statement (FEIS) addresses the reintroduction of the endangered Mexican gray wolf (*Canis lupus baileyi*), a subspecies of the gray wolf, within part of its historic range in the southwestern United States. Formerly found in many of the mountainous areas of the Southwest and Mexico, the Mexican wolf has been extirpated from the United States and may have been extirpated from Mexico, where it has not been confirmed to exist since the early 1980's. The only known Mexican wolves reside in captivity in a breeding program overseen by the United States Department of Interior, Fish and Wildlife Service (FWS), Region 2, headquartered in Albuquerque, New Mexico, in cooperation with Mexican authorities.

This chapter begins with a discussion of the purpose and need for the reintroduction action proposed by the FWS. Then, an overview description of the Mexican wolf is provided. The public scoping process that helped define the issues to be covered in the draft environmental impact statement (DEIS), then in this FEIS, is then reviewed. Chap. 1 concludes with a list of the various permits and approvals that may be needed to implement a decision arising out of this federal environmental impact assessment process.

Purpose

The Mexican Wolf Recovery Plan, adopted under the authority of the Endangered Species Act (ESA), has two prime recovery objectives: maintaining a captive population and re-establishing at least 100 wild wolves in a 5,000 mi² area within the subspecies' historic range (Mex. Wolf Rec. Team 1982). The purpose of the proposed action (Alternate A, now designated as the Preferred Alternative) in this FEIS is to begin implementing the re-establishment objective of the Recovery Plan by releasing Mexican wolves from the captive population into the wild.

Commencing in 1997, or as soon thereafter as practical, the FWS will gradually release up to 15 pairs or family groups into the Blue Range area of east-central Arizona. Also, if it is determined to be necessary and feasible, up to five pairs or family groups may be released into the back-up area, the White Sands Missile Range of south-central New Mexico. The objective is to re-establish 100 wild Mexican wolves distributed over 5,000 mi² by the year 2005. The FWS and cooperating agencies will closely monitor and study the reintroduced wolves. Management of the reintroduction will be constantly evaluated and adapted as new circumstances arise.

This proposal represents the beginning of recovery for the Mexican wolf in the wild within a small part of its former range and the proposal contributes to conservation of the gray wolf species as a whole. Full recovery of the Mexican wolf subspecies likely will require additional reintroduction projects elsewhere and may take several decades to accomplish. Full recovery is beyond the scope of this EIS.

Need

The FWS is acting under the ESA, which directs the Secretary of Interior to develop and implement recovery plans for species and subspecies such as the Mexican wolf that are in danger of human-caused extinction, 16 USC sec. 1533(f). The FWS also agreed to make “expeditious” progress toward Mexican wolf recovery under a 1993 settlement of a lawsuit filed by several private groups that advocate wolf recovery.
Other federal agencies are required by the ESA to take actions within their authority to conserve threatened and endangered species, 16 USC sec. 1531(c)(1). This is to be done in consultation with the FWS, 16 USC sec. 1536(a)(1). States that have entered into cooperative agreements with the Secretary of Interior, which include Arizona, New Mexico, and Texas, also have responsibilities to conserve threatened and endangered species, 16 USC sec. 1535. The State of New Mexico has its own endangered wildlife law that provides for conservation of listed species including the gray wolf, the Wildlife Conservation Act (Secs. 17-2-37 through 17-2-46, NMSA 1978) and State Game Commission Regulation No. 682 (Amending the Listing of Endangered Species and Subspecies of New Mexico 1990). Arizona’s Game and Fish Department also has a policy supporting endangered species recovery (AGFD 1987). The Department has drafted a “Cooperative Reintroduction Plan for the Mexican Wolf in Arizona” that calls for a joint reintroduction effort with the FWS in the Blue Range area (Groebner et al. 1995).

Additional duties to recover the Mexican wolf arise from international law. Both Mexico and the United States signed the Convention on Nature Protection and Wildlife Preservation in the Western Hemisphere, which took effect in 1942. Its preamble states the parties desire “to protect and preserve in their natural habitat representatives of all species and genera of their native flora and fauna.” Mexican wolf recovery would serve to implement this convention (anon. 1985).

Recovery programs for the gray wolf are underway elsewhere in the United States; however, they involve less rare subspecies. Experts have rated recovery of the Mexican wolf subspecies as the highest priority of all such programs. The subspecies is genetically distinct from other wolves (Wayne et al. 1992), and no confirmed population exists outside captivity. It is one of the rarest land mammals in the world.

**Overview of the Mexican Wolf**

**Description**

The Mexican wolf is among the smallest of the North American gray wolves. Adults weigh 50 to 90 lbs., average 4’6” to 5’6” in total length, and reach 26” to 32” in height at the shoulder (Young and Goldman 1944, Brown 1983). Its pelt color varies. The “lobe”-its popular name-is the southernmost subspecies of what once was the most wide-ranging species of the North American mammals (Paradiso and Nowak 1982).

Appendix A summarizes what is known about Mexican wolf life history and ecology. However, little scientific research was done while the animal existed in the wild. The only field data came from a period of rapidly dwindling numbers when human activities had disrupted pack structures and natural prey populations.

**Taxonomy**

Hall and Kelson (1959), relying heavily on the prior work of Young and Goldman (1944), described 24 subspecies of gray wolves (*Canis lupus*) in North America, five of which occurred in the southwestern United States and Mexico: *C. l. baikyi*, *C. l. mogollonensis*, *C. l. monstrabilis*, *C. l. nubilus*, and *C. l. youngi*. A taxonomic revision proposed by Bogan and Mehlhop (1980 and 1983), and adopted by the Mexican Wolf Recovery Team and the FWS (Mex. Wolf Rec. Team 1982, USFWS 1984), lumped *C. l. mogollonensis* and *C. l. monstrabilis* into *C. l. baikyi*. In a recent recategorization of North American gray wolves, Nowak (1995) proposed reducing the original 24 named subspecies to five, of which *C. l. baikyi* is one. However, Nowak’s recategorization differs from that proposed by Bogan and Mehlhop in that Nowak includes *C. l. mogollonensis* and *C. l. monstrabilis* with *C. l. nubilus* rather than with *C. l. baikyi*. It should be noted that no individual taxonomist or publication has official or ruling status on questions of mammalian taxonomy.
The classifications proposed by Hall and Kelson (1959), Bogan and Mehlhop (1980), and Nowak (1995) were based on comparisons of morphological characteristics, primarily skull measurements. They all concluded that *C. l. baileyi* is a morphologically distinct subspecies of gray wolf. Molecular genetic analyses have identified distinct attributes of Mexican wolves (Garcia-Moreno 1995, Hedrick 1995, see Appendix K). Thus, consensus exists among experts that *C. l. baileyi* is a distinct gray wolf subspecies. However, the lingering question of which of the formerly recognized subspecies (Hall and Kelson 1959) belong to *C. l. baileyi* continues to confuse the delineation of the Mexican wolf’s historic distribution.

**Historic Distribution**

As indicated above, the drafters of the original Mexican Wolf Recovery Plan accepted the recommendations of Bogan and Mehlhop (1980) and included the ranges of the former *C. l. mogollonensis* and *C. l. monstrabilis* in the range of *C. l. baileyi* (Mex. Wolf Rec. Team 1982). However, in Nowak’s (1995) opinion, the original core geographic range of *C. l. baileyi* extended just north of the Gila River, which bisects the Gila National Forest. This brings into question the taxonomic affinity of specimens collected from the Gila National Forest area (Nowak 1995). Nowak does not describe the limits of the northeastern portion of his proposed range for the Mexican wolf, but the line on his map appears to bisect White Sands Missile Range then turns southeast through western Texas and enters Mexico just east of Big Bend National Park. Nowak (1995) speculates that individuals from the core geographic range of *C. l. baileyi* regularly dispersed into the range of populations to the north. He found that, following the large-scale extirpation of wolves in the southwestern U.S., the later occurrence of wolves in these areas was attributable to *C. l. baileyi* dispersing from Mexico (Nowak 1995).

In reality, the boundaries between ranges of adjacent gray wolf subspecies were wide zones of intergradation where genetic mixing between subspecies occurred, rather than distinct lines on a map (Mech 1970, Brewster and Fritts 1994). The width of these zones relates to the ability of wolves to disperse. They are capable of dispersing hundreds of miles, with the longest known dispersal exceeding 550 miles (Fritts 1983). Thus for gray wolves, these zones of subspecies intergradation were likely hundreds of miles wide.

In light of these considerations, the Mexican Wolf Recovery Team has determined that the probable historic range of the Mexican wolf included the core geographic range of *C. l. baileyi*, plus an approximately 200-mile extension to the north and northwest of that area (Fig. 1-1) (D. Parsons, USFWS, pers. comm.). This range delineation includes the core range of *C. l. baileyi* as described by Young and Goldman (1944), Hall and Kelson (1959), and Nowak (1995); includes much of the expanded range resulting from the consolidation of subspecies proposed by Bogan and Mehlhop (1980); accommodates the range expansion of *C. l. baileyi* following extermination of adjacent wolf populations described by Nowak (1995); and is consistent with the dispersal capability of gray wolves. Fig. 1-1 delineates the probable historic range of *C. l. baileyi* for purposes of reintroducing the subspecies into the wild with experimental status, 50 CFR 17.81(a). Chap. 3 on the Affected Environment summarizes the historical evidence of wolves for each of the recovery areas under consideration.

The last 100 years have seen the Mexican wolf’s range, which in the past may have sustained a population of many thousands, shrink very severely. Not all habitat types within the area in Fig. 1-1 were occupied by these wide-ranging predators, however. Historic reports refer to the Mexican wolf as primarily associated with forested mountainous terrain (Bednarz 1988). While it does not require particular vegetation, it reportedly most often occurred above 4,500 feet elevation in or near woodlands of pine (Brown 1983).}

---

5Appendix I provides a List of Scientific Names for all species mentioned.
Figure 1-1. Approximate historic range of the Mexican wolf.
**Reasons for Listing**

Many factors contributed to the Mexican wolf’s demise, but its reputation as a livestock killer, which led to concerted federal eradication efforts, was predominant (Brown 1983, McBride 1980). Other less important factors were: commercial and recreational hunting and trapping; killing of wolves by game managers on the theory that more game animals would be available for hunters (Leopold 1944); habitat alteration; and human safety concerns (although no documentation exists of Mexican wolf attacks on humans).

Fig. 1-2 illustrates the subspecies’ rapid decline in New Mexico and Arizona following initiation of federal eradication efforts in 1915. After about 15 years of trapping, shooting, and poisoning of adults, and “denning” of pups (digging them out of dens and killing them), very few Mexican wolves remained. The last killings by control agents occurred around 1960. A similar decline occurred in Texas (Scudder 1977). Eradication efforts were stimulated by bounties offered by federal, state, and local governments, as well as livestock associations and individual ranchers (Mex. Wolf Rec. Team 1982).

It is difficult now to assess the accuracy of reports regarding the Mexican wolf’s historic impact on livestock (see Appendix A, Livestock Depredation section). Some representative quotes from commentators illustrate the animal’s reputation as a livestock killer:

“In my opinion, the lobo is the cruelest, most wanton killer of all our Southwestern predators. Bears and lions do sometimes become stock killers, and both do sometimes kill wantonly, beyond the need for food. But such animals are the exceptions to the rule: whereas the opposite is true, in my opinion of the lobo.... A favorite method of killing large animals is to hamstring the animal, breaking him down and making him completely helpless.... A few incidents like this will teach anyone to hate wolves.... The Fish and Wildlife Service (formerly The Biological Survey) has rendered an invaluable service to the livestock and game interests of the Southwest by the determined warfare they have carried on against the lobo.” (Evans 1951).

“The gray wolf was abundant in northern Mexico (present day New Mexico), where ‘they sometimes make dreadful havoc among the cattle, frequently killing and devouring even mules and horses’” (Gregg, quoted in Young and Goldman 1994).

“Wolves’ hunting techniques changed when ranchers began to settle the West and bring in livestock. Deer, always difficult for canids to obtain, became increasingly scarce under the pressure of subsistence hunting by homesteaders, miners, and cowboys. More importantly, livestock were easy picking everywhere. Once set, this table was too easy to resist.... the adaptable wolves readily abandoned their natural prey and turned almost entirely to cattle.” (D.E. Brown 1983).

“The big wolves, the worst predatory enemy of cattle, have been brought under control.... We are concerned merely to the extent of preventing reinestation from Mexico.” (Ligon 1927).

The apparently high historical depredation rates are inconsistent with the situation now in other areas where gray wolves and cattle co-exist, such as the northern Rocky Mountains and northern Minnesota, where depredation is quite uncommon relative to livestock numbers available (range: 0.004% to 0.09% of available cattle killed by wolves annually; Mack et al. 1992). Gipson (quoted in McIntyre 1994) questions the validity of historic accounts of wolf depredation rates.

**Status**

The subspecies is now considered extirpated from the southwestern United States because no wild wolf has been confirmed to exist since 1970. Occasional sightings of “wolves” continue to be reported from U.S. locations but, to date, none have been confirmed through clear evidence, despite continuing investigation (Girmendonk 1994a, Whitaker et al. 1995, Wolok 1994).

Survival of the animal in the wild in Mexico also remains unconfirmed. Based on field surveys in 1977-1978, McBride (1980) estimated that “some 50 wolves may still inhabit Mexico.” Computer
The Mexican wolf was listed as an endangered subspecies in 1976 (41 FR 17736). In 1978, the gray wolf species in North America south of Canada was listed as endangered, except in Minnesota where it was listed as threatened (43 FR 9607). This listing of the species as a whole continued to recognize valid biological subspecies for purposes of research and conservation (43 FR 96 10). The Directors of the FWS and the Mexican Dirección General de la Fauna Silvestre approved the Mexican Wolf Recovery Plan in 1982 (Mex. Wolf Rec. Team 1982). The Plan recognizes that the subspecies’ recovery depends on re-establishment in suitable habitats within its historic range.

Two males and one pregnant female captured in the wild in Mexico from 1977 to 1980 and the uncaptured mate of the pregnant female founded the certified captive population of Mexican wolves. In 1995, the Mexican Wolf Recovery Team approved the addition of two other captive Mexican wolf lineages, representing four additional founders, into the certified population, based on state-of-the-art genetic analysis. One is known as the Ghost Ranch lineage, some of which were kept and bred at the Ghost Ranch Living Museum in northern New Mexico; the other is the Aragon lineage based at the
Aragon Zoo in Mexico City. As of March, 1996, the total certified captive population in the three lineages stood at 139 animals; 114 are held at 24 facilities, mostly zoos and wildlife sanctuaries, in the United States and 25 are held at five facilities in Mexico. The FWS also has a captive population management facility on the Sevilleta National Wildlife Refuge in central New Mexico to hold surplus wolves from the other facilities (USFWS 1994a). These surplus animals would be the potential release stock if the FWS undertakes the proposed reintroduction effort.

Environmental Impact Statement Scoping

Public Involvement

The FWS has involved the public, pursuant to 40 CFR sec. 150 17, in determining the significant questions that this EIS should address. At the time of the public scoping in 1991 and 1992, five candidate areas for releasing Mexican wolves were under consideration. These five areas had been identified by the FWS and the Arizona, New Mexico, and Texas state wildlife agencies as potentially suitable for wolf release (USFWS 1992). The areas were centered on: 1) the Blue Range, 2) the Chiricahua Mountains, 3) the Galiuro and Pinaleno Mountains, and 4) the Atascosa and Patagonia Mountains, all in Arizona; and 5) the White Sands Missile Range in New Mexico.

The FWS held four public meetings, two in Tucson, Arizona, one in Las Cruces, New Mexico, and one in Albuquerque, New Mexico. Written comment periods followed each meeting and followed publication of the FWS's Notice of Intent to Prepare an Environmental Impact Statement (USFWS 1992). Over 838 people attended the meetings and the FWS received a total of 1,324 written comments during the comment periods (Jenkins 1993). These consisted of individual letters, form letters, responses to opinion questionnaires sent out by private groups, and petitions. All comments were tabulated. The 65 oral comments made during the three recorded public meetings were transcribed and tabulated. Also, numerous other agencies and experts have been consulted (see Chapter 5 - Coordination and Consultation).

Alternatives and Impact Questions Raised in Scoping

The public raised approximately 112 definable questions in eight general categories (Jenkins 1993). Some questions related to the alternative actions to be considered; most related to the potential impacts of wolf releases. Table 14 identifies the most common questions and the alternatives or environmental impacts to which the questions relate.

The Mexican Wolf EIS Interdisciplinary Team, charged with overseeing the writing of this document, determined which of the questions raised in the public scoping process represented reasonable alternatives or potentially significant impacts merit- ing treatment in the FEIS, pursuant to 40 CFR sec. 150 1.7(a) (2). Table 1 - 1 indicates the Interdisciplinary Team’s determinations for the most common questions.

Alternatives and Impact Questions Addressed in this FEIS

Alternatives

The Notice of Intent to Prepare an Environmental Impact Statement (USFWS 1992) preliminarily identified three alternative actions under consideration for the candidate areas:

- reintroduction of captive-raised Mexican wolves classified as a nonessential experimental population,
- reintroduction under full protection of the

"The scoping process occurred prior to the issuance of President Clinton's 1994 Executive Order, No. 12898, entitled “Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations.” Environmental justice issues were not commonly raised in the scoping process. Based on the analysis in this FEIS, the proposed action is not expected to significantly impact minority or low-income populations.

* Members of the Interdisciplinary Team are identified in the List of Preparers in Chapter 5.
Table I-1. Most common questions raised during public scoping and their treatment in this final environmental impact statement.

Key: 1 = addressed in Chap. 1 on purpose, need, and Mexican wolf overview,
      2 = addressed in Chap. 2 on alternatives
      3 = addressed in Chap. 3 on affected environment
      4 = addressed in Chap. 4 on consequences
      A = addressed in Appendix A on Mexican wolf life history and ecology
      X = alternative or impact question not addressed directly in FEIS, see text for explanation

Treatment

Questions Related to Alternatives or Planning

X A: Should release sites in Mexico be considered?
X B: Should release sites in Texas be considered?
2 C: Should reintroduced Mexican wolves be designated as experimental and non-essential to the continued existence of the species?
2 D: Should reintroduced Mexican wolves retain full endangered species status and related protection?
2 E: Should additional areas be considered as release sites?
2 F: Should more than one initial release site be considered?
2 G: Should wolves that disperse off of target recovery areas be controlled?

Questions Related to Potential Impacts

1. Livestock Depredation Impacts

4 A: Will wolves prey on domestic livestock?
4 B: Will livestock depredation impacts be significant?
2, A C: Could changes in livestock management practices reduce the depredation impacts?

2. Economic Impacts

2 A: Should livestock owners be compensated for wolf-caused losses?
2, 4 B: Will compensation programs be effective?
4 C: Will hunting license sales be impacted by wolf reintroduction?
4 D: Should states be compensated for game losses?
4 E: Will wolf reintroduction adversely impact local economies in New Mexico and Arizona?
X F: Can costs of Mexican wolf recovery be justified?
Table 1-1. Continued.

3. Ecological/Biological Impacts

X   A: Does maintenance of ecosystem health require the presence of native predators and a balanced predator-prey relationship?
4,A  B: Will wolf predation adversely impact other wildlife populations?
3,A  C: Are prey populations in the potential recovery areas adequate to support wolf populations?
4,A  D: Do wolves perform an important evolutionary service to prey species by removing unfit animals from their populations?
3   E: Is White Sands Missile Range within the historic range of *Canis lupus baileyi*?
2   F: Has life in captivity caused Mexican wolves to lose their fear of humans?
2   G: Has life in captivity impacted the Mexican wolf’s ability to survive in the wild?
X   H: Are wolves an essential component of the ecosystem?

4. Population Viability Considerations

1,2  A: Does recovery and long-term survival of the Mexican wolf require its reintroduction to the wild?
2   B: Is inbreeding depression evident in the captive population?

5. Wildlife Management Impacts

A   A: Will wolves compete with human hunters for the same prey?
A   B: Do wolves pose a threat to human safety?
A   C: Will reintroduction of the Mexican wolf pose any significant disease-related impacts?

6. Philosophical/Ethical Considerations

X   A: Do wolves have a right to exist?
X   B: Do wolves have a right to exist in a natural environment/ecosystem?
X   C: Should wild lands be restored and conserved?

7. Other Impacts/Considerations

4   A: Will existing land uses or land use plans be impacted by wolf reintroduction?
A   B: Will wolves kill pets?
1,3  C: Do Mexican wolves still exist in the wild?
4   D: Will wolf reintroduction on White Sands Missile Range impact the operations there?
1   E: Is the wolf an endangered species?
X   F: If the wolf is released in Arizona, what will be the impact if it disperses into Mexico?
ESA, and

- no action, in which Mexican wolves are not reintroduced.

The second and third of these alternatives have not changed fundamentally in this FEIS (see Chapter 2 - Alternatives Including the Proposed Action, which describes the alternatives in detail). However, public input and further scoping by the Interdisciplinary Team led to dividing the first-listed alternative, above, into two alternatives, as follows:

- reintroduction of captive-raised Mexican wolves, classified as nonessential experimental, under management plans to allow dispersal from the primary recovery zones into secondary recovery zones (the Preferred Alternative), and

- reintroduction as nonessential experimental under management plans to prevent dispersal from the primary recovery zones.

This change reflects that a key distinction among the alternatives is the degree of control the FWS would exert over the movements of the population. The first alternative allows the released wolves and their progeny to establish territories well away from the release areas (or “primary recovery zones”), while the latter alternative calls for the FWS to prevent the wolves from dispersing beyond the primary recovery zones.

The alternatives scoping process also included the selection of two of the five candidate areas within the subspecies’ former range as the most suitable for releasing Mexican wolves. This involved comparing and ranking all the candidates based on key suitability attributes (see Chapter 2 - Selection of Potential Areas for Releasing Mexican Wolves). The two candidates selected were the Blue Range area in east-central Arizona and the White Sands Missile Range in south-central New Mexico. Largely in response to comments on the DEIS, the Interdisciplinary Team and the FWS have decided that the Preferred Alternative (Alt. A) should focus on the Blue Range area for the initial releases and treat the White Sands area as a back-up, to be used only if necessary and feasible. In summary, the wolf recovery areas selected—and the alternative actions for these areas considered in this FEIS—reflect agency, expert, and public input.

**Impacts**

This FEIS addresses most of the major impact questions raised by other agencies, outside experts, and the public. Those impacts judged to be potentially significant receive detailed, alternative-by-alternative, analysis in Chapter 4 - Environmental Consequences. The Interdisciplinary Team determined that alternative-by-alternative analysis was appropriate for six of the impacts most stressed by the public and for three additional potentially significant impacts that released wolves could cause. The three additional impact topics were impacts on: 1) predator control activities, especially of USDA’s Animal Damage Control division, 2) agency, tribal, and local government policies and plans, and 3) recreational uses in the areas involved. In sum, the nine potentially significant impact topics are:

- Impacts on wild prey of wolves
- Impacts on hunting
- Impacts on livestock
- Impacts on predator control programs
- Impacts on agency, tribal, and local government policies and plans
- Impacts on land use
- Impacts on military activities
- Impacts on recreation
- Impacts on regional economies

Chapter 4 describes the scope of these topics in detail.

**Alternatives and Impact Questions Not Addressed in this FEIS**

**Alternatives**

The following questions that relate to alternatives or planning were considered but dropped from detailed analysis in this EIS because they were determined not to raise reasonable alternatives meriting consideration (see Table I-1 regarding the treatment of all alternative or planning issues):
**Should release sites in Mexico be considered?** This is not addressed because the FWS lacks any authority over recovery actions in Mexico. Further, the FWS lacks information on potential impacts there. Obtaining this information for purposes of analyzing such an alternative would present major logistical and diplomatic difficulties. Mexican wildlife authorities may consider wolf reintroductions in the future.

**Should release sites in Texas be considered?** This is not addressed here because suitable areas to support a reintroduced wolf population have not been identified or designated in Texas. However, this FEIS does consider Big Bend National Park, Texas, as a potential natural recolonization area that could support a very small wolf population that would not be independently viable (see Chapter 2 - Alternative D). Release sites adjacent to the Mexican border are generally undesirable, absent further cooperation with Mexico, because of the likelihood that wolves would then disperse into Mexico beyond the protection of the ESA and beyond the control of U.S. agencies.

**Should wolves be captured in Mexico and released in the United States?** This is not addressed because no evidence of a viable wild population exists from which suitable release stock could be drawn. (However, the original breeding stock of the captive population proposed here for release was captured in Mexico.) Further, the FWS would lack any authority to undertake such actions in Mexico even if sufficient numbers of wolves were found and it is uncertain whether the Mexican government would approve such actions.

**Should captive-raised wolves be released as an essential experimental population, under section 10(j) of the ESA, 16 USC sec. 1539?** This is not addressed because the FWS determined that the nonessential experimental classification fits the Mexican wolf’s status. Only wolves surplus to the captive breeding program will be released. (See Appendix C - Proposed Mexican Wolf Experimental Population Rule, section on Findings Regarding Reintroduction, and Appendix D - Section 7 Consultation on Proposed Action, section on Effects on Mexican Gray Wolf, regarding definition of “surplus” wolves and significance of their removal from the captive population.) Their loss would not jeopardize the continued survival of the subspecies. The nonessential experimental classification allows for management flexibility deemed vital to successful wolf recovery (USFWS 1993a). The essential experimental classification in many ways could be similar to the alternative of releasing wolves classified as fully endangered, which this FEIS does address (Chap. 2 - Alternative C). Alternatively, if a very flexible experimental population rule was adopted, then the essential experimental classification could be similar to the nonessential experimental approach, analyzed here as Alternative A. Detailed analysis of the essential experimental classification would be redundant.

**Impacts**

The following questions relating to impacts were considered but dropped from detailed analysis because they were determined either to lie outside the reasonable scope of this EIS or not to raise potentially significant impacts (see Table I-4 regarding the treatment of all impact issues):

**Should any game losses to state governments be compensated?** This is a policy choice rather than an environmental impact. There is no objective answer. Nevertheless, Chap. 4 does estimate the hunting-related economic losses in Arizona and New Mexico.

**Can impacts to taxpayers because of costs of Mexican wolf recovery be justified?** This also is a policy choice without an objective answer. However, Chap. 2, Table 2-8, and Appendix B do provide cost estimates for the four alternatives.

**Impacts involving long-term evolutionary or philosophical concerns.** These include “are wolves an essential component of the ecosystem?”, “should wild lands be restored and conserved?”, and “do wolves have a right to exist?” These are policy questions involving value judgments rather than environmental impacts. Their consideration is either not required by the National Environmental Policy Act or would be beyond the reasonable coverage of this EIS.

**Are there possible impacts in Mexico if wolves were released in the United States?** This question is not addressed because the two areas considered for releasing wolves are well north of the border and the
proposal calls for retrieval of wolves that disperse out of the designated recovery areas. Impacts in Mexico, while remotely conceivable, are not likely. It should be noted that if wolves did naturally recolonize border areas from further south in Mexico under Alternative D—that is, without a release of captive-raised wolves—then associated impacts in Mexico would be anticipated. The probability of natural recolonization actually occurring is considered very low.

Permits and Clearances

The following regulatory approvals and cooperative arrangements may be necessary prior to releasing captive Mexican wolves:

a) NEPA required the FWS to submit a draft EIS, subject to an agency and public review period. The draft EIS was approved on June 8, 1995, and the comment period on the draft ended October 31 (see Chapter 5 for further information on the public input on the draft). The revision of the draft has lead to this FEIS, which is to be followed by a decision on which action to take, 42 USC sec. 4321 et seq. The Record of Decision will follow issuance of the FEIS by at least 30 days, 40 CFR sec.s 1505.2 and 1506.10. Also, before construction of the proposed release pens, the agencies involved would need to cooperatively decide on precise pen locations within the primary recovery zone or zones and then prepare one or more environmental assessments under NEPA of the potential site-specific impacts.

b) The FWS would need to promulgate an experimental population rule describing protection and management of the proposed nonessential experimental population, 16 USC sec. 1539(j). The provisions of the FWS’s Proposed Mexican Wolf Experimental Population Rule are summarized in Chapter 2 and provided in full in Appendix C. This version was officially published in the Federal Register on May 1, 1996, pages 19237-19248. Various changes have been made to the proposed action between the DEIS and this FEIS that are not reflected yet in the proposed experimental population rule re-printed in Appendix C. A decision to proceed with the proposed action, or any alternative that involves experimental reintroduction, would need to be followed by issuance of a final experimental population rule. Pursuant to 50 CFR sec. 17.81 (d), the rule is being developed in consultation with appropriate state fish and wildlife agencies, local governmental entities, affected agencies, landowners, and others. The EIS process has provided the opportunity for such consultations to occur (see Chap. 5 for additional information on consultation and coordination). In addition, a consultation and public hearing process specific to the proposed rule has been undertaken.

c) The FWS would need an internally-issued endangered species permit authorizing movement of captive wolves for purposes of release, 16 USC sec. 1539(a). Also, the FWS would need an internal Section 7 consultation regarding potential impacts of the proposal on federally-listed threatened and endangered species, 16 USC sec. 1536. This has been undertaken and no adverse effects are anticipated (Appendix D). A similar consultation has been provided by the New Mexico Game and Fish Department regarding state-listed species (Hubbard 1994), under New Mexico’s Wildlife Conservation Act, NMSA 17-2-37 to -46.

d) Action by the Arizona Game and Fish Department will follow its process for approving endangered species releases (AGFD 1987) (Appendix E). The Department has drafted a “Cooperative Reintroduction Plan for the Mexican Wolf in Arizona” that calls for a joint reintroduction effort with the FWS in the Blue Range area (Groebner et al. 1995). It sets forth minimum criteria to be considered in evaluating implementation of the plan.

e) Various agencies, tribes, and local governments have policies and plans that could be affected by the final decision. The FWS has
attempted to cooperate with these parties in the EIS process through meetings and sharing information. They may need to follow their own decision making procedures regarding their participation in future wolf recovery actions.

f) Other arrangements with federal, state, and tribal agencies covering such matters as access, trapping, research, radio-tracking, and airplane overflights would need to be formalized through one or more interagency cooperative management plans or agreements. These would follow the Record of Decision.
Chapter 2

Alternatives including the Proposed Action
CHAPTER 2
Alternatives Including the Proposed Action

Introduction

This chapter begins with an overview of the Mexican gray wolf recovery program and the “soft release” approach to wolf reintroduction, followed by an outline of the selection process for potential areas for releasing wolves in the Southwest. These background sections are important for understanding why, how, and where the alternative actions would occur.

The chapter then describes the Fish and Wildlife Service’s (FWS) Proposed Action (Alt. A), now designated as the “Preferred Alternative.” This incorporates a cooperative reintroduction plan proposed by the Arizona Game and Fish Department. The Preferred Alternative is followed by two other approaches to reintroducing the Mexican wolf (Alts B and C) and a “No Action” approach (Alt. D). Numbers of animals proposed for release, population growth scenarios, foreseeably affected areas, and impact mitigation measures are given for each alternative. The chapter concludes with summary tables comparing the features of the four alternatives and comparing their environmental consequences.

The Mexican Wolf Recovery Program

All Mexican wolves to be released will come from the captive population, which now numbers 114 animals maintained in 24 zoos and wildlife sanctuaries in the United States. The Mexican Wolf Species Survival Plan (SSP) Management Group, made up of representatives from those facilities, coordinates the population’s management. Cooperation also occurs with the managers of a smaller population in Mexican zoos. The wolves have exhibited no major genetic, physical, or behavioral problems affecting their fitness resulting from captivity (Siminski 1994a, see Appendix K - Fish and Wildlife Service Response to Dennis Parker’s Comment on the DEIS).

The SSP Management Group has paired the certified population for maximum breeding potential every breeding season since 1990 (Siminski 1994b). Also, the FWS has undertaken genetic analysis of two other captive lineages. In 1995, the Mexican Wolf Recovery Team found these other two lineages to be pure Mexican wolves and recommended that they be added to the certified Mexican wolf population, to enhance its genetic diversity as well as its size. The SSP Management Group’s goal of having at least 100 certified animals in the U.S. captive population prior to a reintroduction effort has been exceeded. The population is ready to support a reintroduction effort.

The FWS will move male/female pairs identified as candidates for possible release to its captive wolf management facility on the Sevilleta National Wildlife Refuge, north of Socorro, New Mexico. Native prey recognition, predatory skill trials, aversive conditioning to livestock and humans, and other measures to improve adaptation of the wolves to life in the wild may be initiated at this facility. In the event of a decision to proceed with reintroduction, the FWS would select from among the candidate pairs based on reproductive performance, behavioral compatibility, response to the adaptation process, and other factors. Only those individual wolves that are genetically well-represented in the remaining captive population would be used as release stock. The actual releases under each of the reintroduction alternatives described below (Alts A, B, and C) would be “soft releases.”

The Soft Release Approach

Experts developed the soft release approach to wolf reintroduction in order to reduce the likelihood of quick dispersal away from the release area (USFWS 1993a, Fritts 1992; see Appendix A - Wolf Movements section). This involves a holding period of up to several months in secure, temporary pens at the release sites, where exposure to humans is minimized. Following adaptation to local conditions the wolves-wearing standard telemetry collars-are allowed to leave the pens. Field managers may leave carcasses of native prey nearby until the wolves begin hunting on their own. Movements of initial groups of released wolves provide valuable information guiding future releases (Phillips 1992). Annual
releases are made this way until it appears that the recovery goals will be met through reproduction in the wild.

No soft release of captive-raised gray wolves has occurred previously; however, the FWS is currently undertaking a series of annual soft releases of wild-caught gray wolves from Canada into Yellowstone National Park (USFWS 1993a, see Appendix J - Update on Yellowstone and Central Idaho Gray Wolf Reintroductions).

Also, the reintroduction of the red wolf (Canis rufus) in eastern North Carolina was largely by soft releases of captive-raised animals (Phillips 1992). Both of these release programs, conducted under nonessential experimental population rules, have largely succeeded to date. The Mexican Wolf Recovery Program will apply knowledge gained from these experiences.

Selection of Potential Areas for Releasing Mexican Wolves

Identification of potential areas for releasing Mexican wolves began in 1986 when the FWS, pursuant to the 1982 Mexican Wolf Recovery Plan, solicited candidates from the wildlife management agencies of New Mexico, Arizona, and Texas. This led to evaluation of five areas for their relative suitability. These areas were centered on: 1) the Blue Range, 2) the Chiricahua Mountains, 3) the Galiuro and Pinaleno Mountains, and 4) the Atascosa and Patagonia Mountains, all in Arizona; and 5) the White Sands Missile Range (WSMR) in New Mexico (Fig. 2-1). Arizona’s Game and Fish Department analyzed the four Arizona candidates (Johnson et al. 1992). Bednarz (1989), under a contract with the FWS, analyzed the WSMR.

The FWS compared and ranked the five candidates based on the following attributes: area of vegetation associated with typical Mexican wolf habitat, wild ungulate density, water availability, livestock density, potential effects on other threatened or endangered species, human population density, and road density (USFWS 1993e) (Table 2-1). The ranking did not attempt to consider every possible facet of the long-term suitability of these areas for wolf recovery. Long-term suitability will to some extent depend on future ecological changes and management actions.

Overall, the WSMR ranked highest followed closely by the Blue Range area. However, the WSMR ranked lowest of all five candidates in total area of vegetation associated with typical Mexican wolf habitat. Bednarz (1989) estimated that 1,000 mi$^2$ of such vegetation (mostly pinon-juniper woodland) exists on and adjacent to WSMR. Bednarz predicted the entire WSMR area could support about 30 wolves. The FWS’s current estimate of the number of wolves the area could support, based largely on prey availability and computer modelling of deer population dynamics (Green-Hammond 1994), is less: only 20. Neither estimate—30 or 20—represents an independently viable population (Bednarz 1989, Shaffer 1987). Nevertheless, a population in this size range likely could be maintained through supplemental releases or, possibly, by natural immigration of wolves from other nearby populations if other populations were present.

The WSMR is unique among the five candidate areas in that it is closed to public access and livestock grazing, although livestock are grazed on adjacent lands. It is largely isolated, except to the northeast, by 25 to 40 mile-wide desert basins that could inhibit wolf movements. These features, particularly the low likelihood that wolves would prey on livestock, offer advantages as an area to conduct a relatively low-conflict, experimental reintroduction. However, the predicted wolf numbers the WSMR could support fall far short of the Mexican Wolf Recovery Plan’s objective of re-establishing at least 100 wolves in an area of 5,000 mi$^2$ (Mex. Wolf Rec. Team 1982). At least one additional area would be needed to achieve the objective. The WSMR could possibly serve as a “wolf nursery” from which recaptured wild wolves, rather than captive-raised wolves, might be used to stock another recovery area. The use of wild-raised wolves has been an important factor in the success of past reintroductions (Fritts 1992).

The Blue Range of east-central Arizona was the other high-ranking candidate release area (Table 2-1). It also received the highest ranking by the Arizona Game and Fish Department in its analysis of the four Arizona candidate areas (Johnson et al. 1992). This and contiguous parts of the Apache National Forest (ANF) lie adjacent to the larger Gila National Forest (GNF) in New Mexico, which provides similar, forested, mountainous habitat. Together the ANF and GNF comprise more than
Figure 2-1. Five candidate areas for releasing Mexican wolves.
Table 2-1. Suitability rankings of candidate areas for releasing Mexican wolves.

Key:
APM = Atascosa and Patagonia Mountains, Arizona
BR = Blue Range, Arizona
CM = Chiricahua Mountains, Arizona
GPM = Galiuro and Pinaleno Mountains, Arizona
WSMR = White Sands Missile Range, New Mexico

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<th>CM</th>
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<td><strong>17</strong></td>
<td><strong>15</strong></td>
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</table>

\(^{1}\)The highest rank is 5 and the lowest rank is 1. Areas that were substantially equivalent on an attribute received the same rank for that attribute.

\(^{2}\)“T&E Sp. Effects” refers to expected effects on other threatened and endangered species in the area.

**SOURCE:** USFWS (1993e)

7,000 \(\text{mi}^2\) of federal land, most of which is suitable for wolves. A wolf population reintroduced into the Blue Range area would likely eventually expand throughout much of the ANF and GNF unless managers prevented this from occurring.

Assuming an average pack territory size to be about 250 \(\text{mi}^2\) (see Mech 1970), and average pack size to be five wolves (Bednarz 1988), the ANF and GNF combined could support 100 or more wolves. This accords roughly with Bailey’s (1931) estimate that 100 wolves occupied the GNF area in 1906. Successful reintroduction into the ANF and GNF area would meet the Mexican Wolf Recovery Plan’s objective. However, unlike the WSMR, the ANF and GNF are open to public use and largely in cattle grazing allotments. The potential for conflicts with ranching and other uses is higher.

In addition, about 4,000 \(\text{mi}^2\) of similar, contiguous, largely forested, montane habitat lies to the west on the Fort Apache (or White Mountain Apache) and San Carlos Apache Reservations in Arizona. However, the FWS has no agreement with these tribes regarding their future involvement in wolf recovery and both have expressed opposition to wolves on their reservations. The reservations, therefore, have not been considered as potential release or recovery areas. Nevertheless, they could be affected if wolves are released in the Blue Range area and they are addressed as likely wolf dispersal areas.
under the full endangered status alternative (Alt. C) in this FEIS.

In sum, the Blue Range and WSMR areas each possess distinct positive and negative features for wolf recovery. This FEIS analyzes reintroduction in both areas. Since issuing the DEIS, the FWS has designated the BRWRA as the preferred reintroduction location, with the WSWRA as a back-up to be used only if necessary and feasible. This focusing of the Preferred Alternative on the BRWRA is fundamentally due to the Interdisciplinary Team and the FWS determining that a strong biological preference exists for the BRWRA. It provides a large, multiple-species, native prey base (white-tailed deer, mule deer, elk, javelina), abundant well-distributed water, and a large area for wolves to colonize following the initial release. It is also known to have been prime wolf habitat historically. Only it is projected to achieve the Mexican Wolf Recovery Plan goal of 100 wild wolves. While evidence exist of wolves having been on the WSWRA, it was probably not prime wolf habitat and could not now support an independently viable population.

**Alternatives**

**Alternative A (Preferred Alternative):**
The U.S. Fish and Wildlife Service proposes to reintroduce Mexican wolves, classified as nonessential experimental, into the Blue Range Wolf Recovery Area. Wolves will be released into the primary recovery zone and allowed to disperse into the secondary recovery zone. If feasible and necessary to achieve the recovery objective of 100 wolves, a subsequent reintroduction of wolves into the White Sands Wolf Recovery Area will be conducted.

**Actions Associated with Alternative**

In 1997, the FWS will begin to reintroduce family groups of captive-raised Mexican wolves into the primary recovery zone of the Blue Range Wolf Recovery Area (BRWRA) (Fig. 2-2; areas defined precisely in Box 2-1, Geographic Boundaries). The FWS will gradually release up to 15 family groups into the BRWRA (Table 2-2) and later, if necessary and feasible, up to five family groups into the back-up WSWRA (Fig. 2-3; Table 2-3). Reproduction in the wild would increase the populations to approximately the recovery area goals under each reintroduction alternative. Wolves will be released into the primary recovery zone and allowed to disperse into the secondary recovery zone. The recovery objective of the alternative is to re-establish 100 wild wolves distributed over more than 5,000 mi² by about the year 2005, consistent with the 1982 Mexican Wolf Recovery Plan. The FWS projects that the population will eventually fluctuate near this level as result of natural processes, such as intra-specific aggression and changes in prey abundance and vulnerability, and management actions, such as problem wolf control and translocation. The FWS and its cooperators will monitor, research, evaluate, and actively manage the wolves, including translocating or removing wolves that disperse outside the wolf recovery areas or that cause significant conflicts.

The FWS will designate the released wolves and their progeny as one “nonessential experimental” population under the Endangered Species Act (ESA), 16 USC sec. 1539(j). Reintroduction will be accomplished through “soft releases” (see the Soft Release Approach section, above). This will be done in cooperation with various agencies. The U.S. Forest Service (for the BRWRA) and the U.S. Army (if the WSWRA is used) will be the primary land managing agencies involved.

The Arizona Game and Fish Department has developed a Cooperative Reintroduction Plan that outlines the Department’s potential involvement as joint managers, with the FWS, of wolves on the Arizona side of the BRWRA (Groebner et al. 1995). The plan is consistent with the FWS’s Preferred Alternative, with some additional ideas that are highlighted herein. It will be considered as a subset of this alternative pertaining just to the Arizona side. (It should be noted that future FWS cooperation with the Arizona Game and Fish Department would not preclude similar cooperation with other state, federal, tribal, and local agencies in Arizona or New Mexico.)

Reintroduction will occur under management plans that allow dispersal by the new wolf populations from the immediate release areas (“primary recovery zones”) into designated adjacent areas.
Figure 2-2. Blue Range Wolf Recovery Area.

Alternatives Including the Proposed Action
Box 2-1 Geographic boundaries for Mexican wolf reintroduction.

Blue Range Wolf Recovery Area (BRWRA): all of the Apache National Forest and all of the Gila National Forest (Fig. 2-2).

BRWRA primary recovery zone: the area within the Apache National Forest 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) (Fig. 2-2).

BRWRA secondary recovery zone: the remainder of the BRWRA not in the primary recovery zone (Fig. 2-2).

White Sands Wolf Recovery Area (WSWRA): all of the White Sands Missile Range, the White Sands National Monument, and the San Andres National Wildlife Refuge, and the area adjacent and to the west of the Missile Range bounded on the south by the southerly boundary of the U.S. Department of Agriculture Jornada Experimental Range and the northern boundary of the New Mexico State University Animal Science Ranch; on the west by the New Mexico Principal Meridian; on the north by the Pedro Armendaris Grant boundary and the Sierra-Socorro County line; and on the east by the western boundary of the Missile Range (Fig. 2-3).

WSWRA primary recovery zone: the area within the White Sands Missile Range bounded on the north by the road from former Cain Ranch Headquarters co Range Road 16, Range Road 16 to its intersection with Range Road 13, Range Road 13 to its intersection with Range Road 7; on the east by Range Road 7; on the south by U.S. Highway 70; and on the west by the Missile Range boundary (Fig. 2-3).

WSWRA secondary recovery zone: the remainder of the WSWRA not within the primary recovery zone (Fig. 2-3).

Mexican wolf experimental population area: the portion of Arizona lying north of Interstate Highway 10 and south of Interstate Highway 40; the portion of New Mexico lying north of Interstate Highway 10 in the west, north of the New Mexico-Texas boundary in the east, and south of Interstate Highway 40; and that portion of Texas lying north of US Highway 62/180 and south of the Texas-New Mexico boundary (Fig. 2-4).
Table 2-2. Projected wolf population growth to recovery area goal after releases into the Blue Range Wolf Recovery Area under nonessential experimental classification (Alternative A).

Recovery area goal: 100 wolves occupying a total area of 5,000 mi$^2$; based on Mexican Wolf Recovery Team (1982).

<table>
<thead>
<tr>
<th>Year</th>
<th>1997</th>
<th>1998</th>
<th>1999</th>
<th>2000</th>
<th>2001</th>
<th>2002</th>
<th>2003</th>
<th>2004</th>
<th>2005</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. released successfully$^a$</td>
<td>10</td>
<td>10</td>
<td>10</td>
<td>10</td>
<td>4</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>No. surviving (from prev. year)</td>
<td>--</td>
<td>7</td>
<td>14</td>
<td>23</td>
<td>35</td>
<td>45</td>
<td>55</td>
<td>68</td>
<td>83</td>
</tr>
<tr>
<td>No. pups born$^b$</td>
<td>0</td>
<td>5</td>
<td>10</td>
<td>20</td>
<td>30</td>
<td>40</td>
<td>50</td>
<td>60</td>
<td>75</td>
</tr>
<tr>
<td>10% control loss</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>5</td>
<td>7</td>
<td>9</td>
<td>11</td>
<td>13</td>
<td>16</td>
</tr>
<tr>
<td>25% other losses$^c$</td>
<td>2</td>
<td>6</td>
<td>8</td>
<td>13</td>
<td>17</td>
<td>21</td>
<td>26</td>
<td>32</td>
<td>40</td>
</tr>
<tr>
<td>Total wolves (end of year)</td>
<td>7</td>
<td>14</td>
<td>23</td>
<td>35</td>
<td>45</td>
<td>55</td>
<td>68</td>
<td>83</td>
<td>102</td>
</tr>
<tr>
<td>No. packs$^d$</td>
<td>1</td>
<td>2</td>
<td>4</td>
<td>7</td>
<td>9</td>
<td>11</td>
<td>13</td>
<td>16</td>
<td>20</td>
</tr>
<tr>
<td>No. breeding pairs$^e$</td>
<td>1</td>
<td>2</td>
<td>4</td>
<td>6</td>
<td>8</td>
<td>10</td>
<td>12</td>
<td>15</td>
<td>18</td>
</tr>
<tr>
<td>Area occupied$^f$ (100 mi$^2$)</td>
<td>3</td>
<td>5</td>
<td>10</td>
<td>18</td>
<td>23</td>
<td>28</td>
<td>33</td>
<td>40</td>
<td>50</td>
</tr>
</tbody>
</table>

$^a$ Initially, about 15 captive-raised wolves annually will be released, but five of these are assumed to quickly die, disappear, disperse from the recovery area, or require recapturing for a variety of reasons, and not to contribute to population growth. Fewer wolves will be released in 2001 to minimize overshooting of the population goal.

$^b$ Average of five pups per litter based on McBride (1980).

$^c$ "Other losses" includes wolves that die, leave, disappear, or are removed from the recovery area for any reasons besides control; adapted from rates in Phillips (1992), USFWS (1993a), and Mech (1970).

$^d$ Average pack size of five based on Bednarz (1988).

$^e$ Most packs contain one breeding pair; assumed that 10% of packs do not have a successful breeding pair.

$^f$ Average pack territory size of 250 mi$^2$ based on Mexican Wolf Recovery Team (1982) and Mech (1970). Not all land within a territory is suitable year-round habitat.

**SOURCE:** Adapted from USFWS (1993a).
Figure 2-3. White Sands Wolf Recovery Area.
Table 2-3. Projected wolf population growth to recovery area goal after releases into the White Sands Wolf Recovery Area under nonessential experimental classification (Alternative A).

Recovery area goal: 20 wolves occupying the typical habitat area of approximately 1,000 mi², adapted from Bednarz (1989).

<table>
<thead>
<tr>
<th></th>
<th>1997</th>
<th>1998</th>
<th>1999</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. released successfully²</td>
<td>7</td>
<td>7</td>
<td>3</td>
</tr>
<tr>
<td>No. surviving (from prev. year)</td>
<td>--</td>
<td>6</td>
<td>13</td>
</tr>
<tr>
<td>No. pups born⁶</td>
<td>0</td>
<td>5</td>
<td>10</td>
</tr>
<tr>
<td>5% control loss</td>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>20% other losses³</td>
<td>1</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Total wolves (end of year)</td>
<td>6</td>
<td>13</td>
<td>20</td>
</tr>
<tr>
<td>No. packs⁵</td>
<td>1</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>No. breeding pairs⁶</td>
<td>1</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>Area occupied⁷ (100 mi²)</td>
<td>2.5</td>
<td>5.0</td>
<td>10.0</td>
</tr>
</tbody>
</table>

¹ Initially, about 10 captive-raised wolves annually will be released, but three of these are assumed to quickly die, disappear, disperse from the recovery area, or require recapturing for a variety of reasons, and not to contribute to population growth. Fewer wolves will be released in 1999 to minimize overshooting of the population goal.

² Average of five pups per litter based on McBride (1980).

³ “Other losses” includes wolves that die, leave, disappear, or are removed from the recovery area for any reasons besides control; adapted from rates in Phillips (1992), USFWS (1993a), and Mech (1970).

⁴ Average pack size of five based on Bednarz (1988).

⁵ Most packs contain one breeding pair; assumed that 10% of packs do not have a successful breeding pair.

⁶ Average pack territory size of 250 mi² based on Mexican Wolf Recovery Team (1982) and Mech (1970). Not all land within a territory is suitable year round habitat.

**SOURCE:** Adapted from USFWS (1993a).
(‘secondary recovery zones’) (Figs 2-2 and 2-3, above). However, the FWS and cooperating agencies will not allow the wolves to establish territories outside these wolf recovery area boundaries unless this occurs on private or tribal lands and the land manager does not object. The FWS would attempt to enter into cooperative management agreements with such landowners regarding control of the wolves. If the land manager objects to the presence of wolves on private or tribal lands, field personnel would recapture and relocate the wolves.

The FWS and the cooperating agencies will use a flexible “adaptive management” approach based on careful monitoring, research, and evaluation throughout the release phase. This will include adjusting the numbers actually released according to the needs and circumstances at the time. Initially, to reduce the likelihood of wolf dispersal onto the White Mountain Apache and San Carlos Apache reservations to the west, the wolf releases will occur on the eastern side of the BRWRA primary recovery zone, close to the Arizona/New Mexico border. The FWS will encourage and support the formation of a citizen advisory committee, or similar management oversight body, to assist the FWS and cooperating agencies in responding to local concerns.

Initial release stock will be “surplus” Mexican wolves designated by the SSP Management Group from the U.S. captive population. A surplus wolf is one whose loss or removal will not significantly adversely affect the genetic or demographic make-up of the population (Siminski 1994a). Thus, death of one or more surplus wolves would not jeopardize the continued existence of the subspecies. Use of surplus wolves will allow the FWS to designate the wild population as nonessential experimental. This provides greater management flexibility than if released wolves retain their endangered status and associated ESA protections.

Prior to any releases, the FWS will determine whether recolonization has occurred or appears likely to occur within the U.S. portion of the subspecies’ former range. Depending on its extent, natural recolonization could contribute to meeting the recovery objective and could, but would not necessarily, eliminate the need for releases of captive animals into one or both of the designated wolf recovery areas (see USFWS 1994c).

The following future circumstances will be considered in decision-making about using the WSWRA subsequent to initial releases in the BRWRA:

- whether using the WSWRA, in combination with the BRWRA, is necessary to achieve the recovery objective of re-establishing 100 wolves; that is, it would be used if it appears that the initial introduction in the BRWRA will not achieve a total population of 100 wolves,
- whether, based on future research, it appears that the WSWRA deer herd could support a wolf population that would contribute to meeting the recovery objective, and
- other future circumstances that could affect the feasibility of using the WSWRA, such as the FWS wolf program budget, management concerns, future military uses of the missile range, and so on.

If both areas are eventually used, wolves could be translocated between the two areas as needed to maintain overall population viability and to accomplish other management objectives. If feasible, recaptured wild wolves from one recovery area, rather than captive-raised wolves, could be used to stock the other area to increase the likelihood of success (Fritts 1992).

A key aspect of this proposal is the necessity of adequate funding for monitoring and research to study the impacts of the action and to determine whether the Mexican wolf can survive in the modern Southwest (see Appendix B - Projected Implementation Costs). Progress will be continuously evaluated. The FWS will prepare periodic progress reports, detailed annual reports, and full evaluations after three and five years. The full evaluations will include recommendations regarding continuation or termination of the reintroduction effort and whether, and how, to use the WSWRA. Decision-making criteria that the FWS and cooperating agencies will consider will include those recommended by the Arizona Game and Fish Department in its Cooperative Reintroduction Plan, which also calls for full evaluation of the initial “experimental” phase after three years (Groebner et al. 1995):
whether the wolves have successfully established home ranges within the designated wolf recovery area,

whether the reintroduced wolves reproduce successfully in the wild,

whether the numbers and vulnerability of prey are adequate to support wolves,

whether the livestock depredation control program is effective,

whether significant threats to human safety have occurred,

whether wolf mortality is substantially higher than expected, see Tables 2-2 and 2-3,

whether effective cooperation with other agencies and the public is occurring, and

whether combined agency funds and staff are adequate to carry out needed management, monitoring, and research.

Monitoring and research efforts will assist in determining the answers to these questions. The criteria may need to be updated in the light of changes in circumstances after the initial releases (Groebner et al. 1995). For example, concern has been expressed that current forest and woodland health and ecological trends in the BRWRA will result in decreased viability of prey populations needed to support recovery levels of wolves (Hayes 1995). If the initial releases fail, further releases would be inappropriate unless the cause of failure is identified and remedied.

Projected Population Growth-In the BRWRA, three family groups will be released in the first year. (Arizona’s Reintroduction Plan calls for releasing only two pairs annually in the BRWRA; the FWS proposes three pairs because dispersal into the New Mexico side of the BRWRA is anticipated.) Each pair is projected to have, on average, three pups surviving at the time of release (or following the first whelping season after release). Thus, the average family group size will be five and the initial releases would amount to an average of 15 individuals.

Supplemental releases of similar numbers of wolves will be conducted, if necessary, for the following four years; thereafter, only reproduction in the wild will drive the population’s growth.

Growth projections are set forth in Tables 2-2 and 2-3 (for the WSWRA, if used), above; these provide guidance but do not predict exact outcomes. The projections assume that about one-third of the wolves released each year quickly die, disappear, disperse from the recovery area, or otherwise require recapturing, and do not contribute to growth of the population (USFWS 1993a, Phillips 1992). Thus, the average number of wolves successfully released annually is initially projected to be ten for the BRWRA (seven for the WSWRA). Fewer wolves may be released in later years to avoid overshooting the recovery objective, depending on actual reproduction and mortality rates.

The Preferred Alternative will be completed when the population reaches the recovery objective of 100 wolves over 5,000 mi²; this is projected to take nine years (Table 2-2). Moderately high annual control losses and other losses-35% total—are expected. The depredation control and other losses are relatively high due to the presence of livestock and the public in the BRWRA.

The FWS or cooperating agencies will monitor the wolves continually. The schedule and numbers of wolves released will be adjusted in accordance with the actual population growth. Upon achievement of the recovery objective, the FWS will develop and implement detailed long-term plans for sustainable management of the re-established wolves. The recovery area goals approximate the expected number of wolves that these areas can reasonably support. The goals may need revision if field evidence shows they are not realistic. The FWS projects that the wolf populations will eventually fluctuate above and below these goals through a combination of natural processes and management actions. The FWS will actively manage against expansion of the population beyond the designated wolf recovery areas.

Geographic Boundaries.-The Preferred Alternative involves the following geographic designations: wolf recovery area, primary recovery zone, secondary recovery zone, and experimental population area (Fig. 2-4). Box 2-1 and Appendix C, the proposed Mexican Wolf Experimental Population Rule, give precise
Figure 2-4. Mexican Wolf Geographic Boundaries.
boundaries of these areas and zones. These designations carry no public or private land use restrictions, per se. Also, ESA critical habitat shall not be designated within the experimental population area under the FWS's proposed nonessential experimental classification, 16 USC sec. 1539(j)(2)(C)(ii).

Wolf recovery will be supported only in the designated wolf recovery areas (i.e., the BRWRA and possibly the WSWRA). Within these recovery areas, wolves will be released only in the primary recovery zones, but they will be allowed to disperse into the adjacent secondary recovery zones. The chief significance of the experimental population area is to distinguish the legal status of any wolves that might be found there; wolf recovery is not being proposed and will not be supported throughout the area. Any wolf in this large area will be considered to belong to the nonessential experimental population. The flexible management measures in the Mexican Wolf Experimental Population Rule will apply throughout this area. Wolves found within the experimental population area, but outside of a designated wolf recovery area, will be captured and returned for re-release or placement into the captive population. Wolves found outside the experimental population area will be presumed to be of wild origin with full endangered status under the ESA unless evidence such as a radio-collar or identification mark establishes that it is a member of the experimental population. In such a case the wolf would retain its experimental nonessential status pending recapture.

The southern boundary of the experimental area was established to the north of the most suitable areas for possible natural recolonization from Mexico. Thus, if wolves actually did recolonize from Mexico—a very speculative possibility—they would travel north into the experimental population area (see Alt. D).

Release Procedures.—The FWS will select release stock from its captive wolf management facility on the Sevilleta National Wildlife Refuge or other captive management facilities. In the winter of 1996-1997—or later if circumstances compel a delay—the FWS will place the selected pairs in separate pens constructed within the BRWRA primary recovery zone. These pens will be separated by several miles. Each pen will occupy less than one-half acre; field personnel will have temporary housing nearby. Land managers will restrict public access and “disturbance-causing land use activities” (defined in the Glossary, Appendix G, including some specific exemptions), up to a one mile radius around the release pens only while wolves are in the pens. Human contact will be further reduced and the wolves’ diet will be converted to natural prey items, such as road-killed deer, elk, javelina, jackrabbits, and cottontails. Wolves will remain in the pens for up to six months to acclimate to the area. Then, the field managers will open the pens and allow the wolves to leave and return at will. Managers will place carcasses (e.g., roadkills) of natural prey in the vicinity until they determine that the wolves have the predatory skill to obtain an adequate food supply on their own.

In the event that a wolf selected for release and placed in the acclimation pens becomes unsuitable or dies, it may be replaced by another animal from the captive population. In this case the wolf may be released later, after sufficient acclimation time has elapsed. Releases conducted during subsequent years will follow procedures similar to those described above with refinements based on previous release experiences. If wolves have established a territory in the vicinity of a release pen, then the pen will be moved to a location outside known wolf territories for releases in subsequent years. If the WSWRA is used, release procedures will be similar to those described above.

Monitoring and Research.—Prior to placement in release pens the adult wolves will receive permanent identification marks and radio collars. Pups will receive surgically implanted transmitters prior to release. Field managers will recapture them when they are large enough to be fitted with neck collars. Wild-born wolves will be captured, given a permanent identification mark, and radio-collared for at least the first five years of the project.

The FWS and cooperating agencies will monitor movements, behavior, population status, and well-

*The FWS and the Forest Service, for the BRWRA, and the U.S. Army, for the WSWRA if used, and other cooperating agencies, will jointly designate precise release pen sites within the primary recovery zones. The FWS and these agencies will prepare an environmental assessment under NEPA on potential site-specific impacts associated with these facilities.
being of released wolves through radio tracking (ground and aerial), field observations, obtaining sighting reports from the public, and other methods. Food habits, kill rates, pack size, litter size, territory size, and other aspects of wild Mexican wolf life will be studied. The FWS and cooperating agencies will bear the costs of this monitoring program at least through five years beyond the achievement of the recovery objective; cooperative research agreements with qualified institutions may be negotiated.

Management.—A federal regulation will designate the population to be released as experimental and nonessential to the continued existence of the subspecies. This Mexican Wolf Experimental Population Rule will delineate the precise geographic boundaries (see Box 2-1, above) and prescribe the protective measures and management authority that apply. No formal ESA Section 7 consultation would be required regarding potential impacts of land uses on nonessential experimental Mexican wolves. Any harm to wolves resulting solely from habitat modification caused by authorized uses of public lands, that is, not in violation of the closure provisions or other provisions regarding take or harassment, would be a legal take under the Proposed Rule. Any habitat modification occurring on private or tribal lands would not constitute illegal take. Based on evidence from other areas, the FWS does not believe that wolf recovery requires major changes to currently authorized land uses. The main management goals are to protect wolves from disturbance during vulnerable periods, minimize illegal take, and remove individuals from the wild population that depredate or otherwise cause significant problems.

The complete proposed experimental population rule, as published in the Federal Register on May 1, 1996, is in Appendix C. In summary, the Proposed Rule provides:

- No one will be in violation of the ESA for unavoidable and unintentional take of a wolf within the Mexican wolf experimental population area when the take is incidental to a legal activity, such as driving, trapping, and military testing or training activities, and is promptly reported. Anyone may take a wolf in defense of human life.

Alternatives Including the Proposed Action

No private or tribal land use restrictions will be imposed for wolf recovery without the concurrence of the private owner or tribal government. On public lands, public access and disturbance-causing land use activities (defined in Appendix G) may be temporarily restricted within a one-mile radius around release pens, and around active dens between March 1 and June 30 and around active wolf rendezvous sites (defined in Appendix G) between June 1 and September 30.

On public lands allotted for grazing, livestock owners and their designated agents: (1) may harass wolves for purposes of scaring them away from livestock provided the harassment is promptly reported, and (2) may be allowed to take wolves actually engaged in attacking livestock.

Permission for private parties to take wolves on public grazing lands must meet all of these conditions: 1) six or more breeding wolf pairs occur in the BRWRA, or three or more breeding wolf pairs occur in the WSWRA (if used); 2) previous livestock loss or injury by wolves has been documented by an authorized FWS, ADC, or state employee and efforts to control the offending wolves have been undertaken but have not succeeded; 3) physical evidence exists that an attack occurred at the time of the take; and 4) the take is promptly reported.

On private or tribally-owned land, regardless of location, property owners and livestock owners and their designated agents may harass wolves near livestock, people, buildings, facilities, pets, or other domestic animals at any time and may take wolves attacking livestock under more liberal conditions than those applicable to public grazing lands. That is, such take can occur regardless of the number of recovered wolf pairs in the area and no requirement exists for government agencies to have completed their efforts to take the depredating wolves. However, physical evidence that an attack occurred at the time of the take must be
present and the take must be promptly reported.

Any FWS-authorized person may capture and remove or translocate reintroduced wolves consistent with a FWS-approved management plan or special management measure. These may include wolves that: (1) prey on livestock, (2) attack domestic animals other than livestock on private land, (3) impact game populations in ways which may inhibit further wolf recovery (impact defined in Appendix G), (4) prey on state-endangered desert bighorn sheep on the White Sands Missile Range (if used), (5) are considered problem wolves (defined in Appendix G), are a nuisance, or endanger themselves by their presence in a military impact area, or (6) are necessary for research.

The FWS does not intend to change the “nonessential experimental” designation to “essential experimental” or “endangered” and the FWS does not intend to designate critical habitat for the Mexican wolf.

Any taking of a wolf contrary to the experimental population rule may be referred to the appropriate authorities for prosecution.

The release process involves many uncertainties. Wolves may die, surviving mates may need to be recaptured and paired with another mate or returned to the captive population, or wolves may disperse out of the recovery areas and need to be retrieved (Phillips 1992). Post-release management to address these uncertainties will follow an interagency cooperative management plan. This will include working with the Arizona Game and Fish Department to meet the requirements of its Cooperative Reintroduction Plan and working with the New Mexico Department of Game and Fish. A wolf management team representing the FWS, the Game and Fish agencies, and other cooperating agencies will determine whether particular actions are necessary. The interagency management plan will cover issues such as release pen siting, veterinary management, depredation control, capture and relocation, research, radio tracking, aerial overflights, prey monitoring, and prey habitat management. Field staff will conduct monitoring and research, trapping, depredation investigation, mortality investigation, control, and other on-the-ground actions. A citizen advisory committee, or similar body, could also participate in management decisions.

Mitigation Measures

Control of Problem Wolves—. The experimental population rule provisions, summarized above, are largely measures to mitigate the potential impacts of the proposal by providing the greatest degree of management flexibility and the least impact on private activity consistent with wolf recovery. One mitigation measure is the allowance of non-injurious harassment of wolves and, in limited situations, killing them if they are observed attacking livestock, although the actual number of observed attacks is expected to be small. The FWS or other authorized agencies will respond to all incidents of wolf-caused depredation with concerted efforts to prevent additional depredation. Captured problem or nuisance wolves will be returned to captivity or to a distant location in the wolf recovery area, pursuant to the cooperative management plan. If both recovery areas are in use, wolves from the BRWRA could be translocated to the WSWRA, and vice versa.

The FWS will permanently remove from the wild or, as a last resort, euthanize any wolves exhibiting a consistent pattern of livestock depredation (three or more confirmed kills within one year in primary wolf recovery zones and two or more in other areas). A wolf would be euthanized only after a determination by the FWS that it had no further value to the recovery program; euthanasia would be done in accordance with the guidelines of the American Veterinary Medical Association (AVMA 1993), when feasible. Resolving depredation problems through changes in livestock husbandry will be explored with ranchers.

On private property, after two confirmed incidents within one year of nuisance behavior or the killing or injuring of pets or other domestic animals by wolves, efforts will be undertaken to deter this behavior. The FWS will move captured offending wolves to a distant location. The FWS will permanently remove from the wild or euthanize any wolves exhibiting a consistent pattern of nuisance behavior (three or more incidents per year). This model of active, professional, management of
Depredation has proven feasible in Minnesota and in the northern Rockies; it has demonstrably served in both areas to expeditiously resolve wolf/livestock conflicts (Niemeyer et al. 1994; Paul 1995). Active management in conjunction with public education and information improves local tolerance of wolves.

The FWS will attempt to recapture and relocate members of the experimental population that go outside the designated wolf recovery areas. However, the FWS will not routinely recapture and return pack members that make occasional forays outside recovery areas nor will it attempt to do so for reported but unconfirmed lone wolves, except when livestock depredation occurs. Packs that establish territories on public land outside the designated wolf recovery areas will be captured and returned to a recovery area or to captivity. If wolves move onto private or tribal lands outside the recovery areas the FWS will attempt to develop management actions in cooperation with the land manager, including recapture and return if requested by the land owner or tribal government. Field staff will not work on private or tribal land without permission.

**Other Mitigation.**—As indicated, the FWS will condition the captive wolves prior to release. This will emphasize orienting them to native prey and habitat and may include aversive conditioning to both humans and livestock. The actual releases will occur in remote portions of the recovery areas where the fewest potential conflicts with human uses will occur.

A private depredation compensation fund exists to cover the costs of livestock losses. The Defenders of Wildlife, a national membership non-profit corporation, has over $112,000 in a fund to be applied to wolf depredation in both the northern Rocky Mountains and the Southwest (Schlickeisen 1993; Defenders of Wildlife 1994). The fund pays 100% of the market value of livestock lost to confirmed wolf kills as determined by a responsible wolf management official. It also pays 50% for unconfirmed losses of livestock when wolves are in the area and evidence exists that a depredation occurred. From 1987 through 1994, a total of about $15,000—around $2,000 per year—was paid out of this fund to 17 ranchers in Montana. During this period the wolf population there averaged 44 animals. The FWS does not guarantee the future existence of this private mitigation fund, but recognizes it has been a very valuable aid to wolf recovery.

The FWS will undertake a cooperative effort to improve public understanding of the biology, ecology, history, management, and status of Mexican wolves. In particular, residents of the primary and secondary recovery zones will receive briefings and regular updates. Participation of a citizen advisory committee will be encouraged and supported. The FWS and cooperating agencies will work with ranchers to assess actual depredation impacts and to develop methods to mitigate potential impacts through changes in livestock husbandry. These could include: use of horned cattle, regular checks of herds, bull management so that calves are born at about the same time, calving in confined pastures, herd concentration methods, herd protection methods, and removal or burial of livestock carcasses (Bjorge and Gunson 1985). Some of the suggested methods likely would be impractical for open range situations. In small pastures, the use of livestock guarding dogs or other guard animals may deter wolf attacks (Coppinger and Coppinger, in press).

The proposed Mexican Wolf Experimental Population Rule also provides for controlling wolves to prevent unacceptable impacts on ungulate herds that might inhibit wolf recovery and to avoid impacts on New Mexico’s state-endangered desert bighorn sheep population on the WSWRA (if used). This herd merits special protection due to low population growth caused by long-standing disease problems, although wolves likely will not take many of these steep-terrain animals (Bednarz 1989). Unacceptable impacts on ungulate herds are defined in the Glossary (Appendix G) under “Impact on game populations in ways which may inhibit further wolf recovery.”

**Summary of Alternative A**

In conclusion, the following actions are called for to implement Alternative A:

- expand the captive Mexican wolf population,
- select and acclimate wolves for release,
- adopt the final rule designating the population as experimental nonessential and designating the experimental population area,
- conduct public information and education efforts and support a citizen advisory
committee,

- develop an interagency cooperative management plan,
- set up release pens in the BRWRA and place wolves in them,
- implement field management, monitoring, research, and problem wolf control,
- conduct annual releases of adequate numbers of family groups of wolves to lead to achievement of the recovery objective of 100 wolves,
- recapture and return wolves that disperse beyond the BRWRA boundary,
- consider the necessity and feasibility of using the WSWRA, and
- at three and five years, fully evaluate whether the reintroduction effort should continue or terminate.

**Alternative B: Reintroduction of Mexican wolves, classified as nonessential experimental, into both the Blue Range Wolf Recovery Area and the White Sands Wolf Recovery Area primary recovery zones.** Wolves dispersing from the primary recovery zones will be captured and returned to the primary zones or captivity.

**Actions Associated With Alternative**

In 1997, the FWS will begin to reintroduce family groups of captive-raised Mexican wolves into both the BRWRA and the WSWRA primary recovery zones and actively prevent the populations from expanding beyond these zones (Figs 2-2 and 2-3, above). In the BRWRA primary recovery zone the FWS will release about eight family groups over four years with the goal of reaching a population of 20 wild wolves by 2001 (Table 2-4). In the WSWRA primary recovery zone the FWS will release about four family groups over two years with the goal of reaching a population of 14 wild wolves by 1999 (Table 2-5). The total recovery objective will be 34 wolves. The BRWRA primary recovery zone represents only about one-fifth of the area wolves would occupy in the whole BRWRA under Alt. A. The WSWRA primary recovery zone represents about two-thirds of the area wolves would occupy in the whole WSWRA under Alt. A.

The FWS will designate the population as nonessential experimental under the ESA. The FWS will adopt basically the same Mexican Wolf Experimental Population Rule as under Alt. A (Appendix C), but it would apply to the smaller areas. The FWS and its cooperators will follow the same release, monitoring, and management procedures as under Alt. A, but on a smaller scale due to the smaller areas involved. Control will be accomplished through a combination of aggressive monitoring and management methods to promptly recapture wolves that leave the primary recovery zones. Wolves could be translocated between the two areas as needed.

In the BRWRA primary recovery zone, because of the smaller area involved (1,000 mi²), the FWS will release only two family groups annually, totaling approximately ten wolves (Table 2-4), rather than three family groups released annually under Alt. A. High annual control mortality and other losses of wolves are expected due to the intensive management required to prevent dispersal. Alternative B in the BRWRA will be completed when 20 wolves occupy the 1,000 mi² primary recovery zone. The population and area goals likely would be met after five years, in 2001.

In the WSWRA primary recovery zone, annual mortality and other losses of wolves are expected to be somewhat higher than under Alt. A due to the intensive management required to prevent dispersal. Alternative B in the WSWRA will be completed when 14 wolves occupy the roughly 720 mi² of suitable Mexican wolf habitat in the primary recovery zone (Bednarz 1989). The population and area goals likely would be met after three years, in 1999.

These population projections provide guidance but do not predict exact outcomes. Neither subpopulation would be considered independently viable and neither would alone, nor combined, meet the Mexican Wolf Recovery Plan objective.
Table 2-4. Projected wolf population growth to recovery area goal after releases into the Blue Range Wolf Recovery Area under nonessential experimental classification with restricted dispersal (Alt. B).

Recovery area goal: 20 wolves occupying the primary recovery zone, area of approximately 1,000 mi^2; adapted from Mexican Wolf Recovery Team (1982).

<table>
<thead>
<tr>
<th>Year</th>
<th>No. released successfully</th>
<th>No. surviving (from prev. year)</th>
<th>No. pups born^b</th>
<th>10% control loss</th>
<th>30% other losses^c</th>
<th>Total wolves (end of year)</th>
<th>No. packs^d</th>
<th>No. breeding pairs^e</th>
<th>Area occupied^f (100 mi^2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1997</td>
<td>7</td>
<td>--</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>4</td>
<td>--</td>
<td>--</td>
<td>3</td>
</tr>
<tr>
<td>1998</td>
<td>7</td>
<td>4</td>
<td>0</td>
<td>1</td>
<td>3</td>
<td>7</td>
<td>--</td>
<td>--</td>
<td>5</td>
</tr>
<tr>
<td>1999</td>
<td>7</td>
<td>7</td>
<td>5</td>
<td>2</td>
<td>3</td>
<td>11</td>
<td>--</td>
<td>--</td>
<td>8</td>
</tr>
<tr>
<td>2000</td>
<td>7</td>
<td>11</td>
<td>10</td>
<td>3</td>
<td>3</td>
<td>17</td>
<td>--</td>
<td>--</td>
<td>10</td>
</tr>
<tr>
<td>2001</td>
<td>0</td>
<td>17</td>
<td>15</td>
<td>9</td>
<td>9</td>
<td>20</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
</tbody>
</table>

^a Initially, about ten captive-raised wolves annually will be released, but three of these are assumed to quickly die, disappear, disperse from the recovery area, or require recapturing for a variety of reasons, and not to contribute to population growth.

^b Average of five pups per litter based on McBride (1980)

^c "Other losses" includes wolves that die, leave, disappear, or are removed from the recovery area for any reasons besides control; adapted from rates in Phillips (1992), USFWS (1993a), and Mech (1970)

^d Average pack size of five based on Bednarz (1788)

^e Most packs contain one breeding pair; assumed that 10% of packs do not have a successful breeding pair.

^f Average pack territory size of 250 mi^2 based on Mexican Wolf Recovery Team (1782) and Mech (1770). Not all land within a territory is suitable year round habitat.

**Source:** Adapted from USFWS (1993a).
Table 2-5. Projected wolf population growth to recovery area goal after releases into the White Sands Wolf Recovery Area under nonessential experimental classification with restricted dispersal (Alt. B).

Recovery area goal: 14 wolves occupying the primary recovery zone area of approximately 720 mi²; adapted from Bednarz (1989).

<table>
<thead>
<tr>
<th></th>
<th>1997</th>
<th>1998</th>
<th>1999</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. released successfully&quot;</td>
<td>7</td>
<td>7</td>
<td>0</td>
</tr>
<tr>
<td>No. surviving (from prev. year)</td>
<td>--</td>
<td>5</td>
<td>12</td>
</tr>
<tr>
<td>No. pups born b</td>
<td>0</td>
<td>5</td>
<td>10</td>
</tr>
<tr>
<td>5% control loss</td>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>25% other losses c</td>
<td>2</td>
<td>4</td>
<td>6</td>
</tr>
<tr>
<td>Total wolves (end of year)</td>
<td>5</td>
<td>12</td>
<td>15</td>
</tr>
<tr>
<td>No. packs d</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>No. breeding pairs e</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Area occupied f (100 mi²)</td>
<td>2.5</td>
<td>5.0</td>
<td>7.5</td>
</tr>
</tbody>
</table>

"Initially, about ten captive-raised wolves annually will be released, but three of these are assumed to quickly die, disappear, disperse from the recovery area, or require recapturing for a variety of reasons, and not to contribute to population growth.

bAverage of five pups per litter based on McBride (1980).

c“Other losses” Includes wolves that die, leave, disappear, or are removed from the recovery area for any reasons besides control; adapted from rates in Phillips (1992), USFWS (1993a) and Mech (1970).

dAverage pack size of five based on Bednarz (1988).

eMost packs contain one breeding pair; assumed that 10% of packs do not have a successful breeding pair.

fAverage pack territory size of 250 mi² based on Mexican Wolf Recovery Team (1982) and Mech (1970). Not all land within a territory is suitable year-round habitat.

Source: Adapted from USFWS (1993a).
Mitigation Measures

Mitigation will be the same as under Alt. A. The scale of the mitigation efforts will be reduced due to the smaller areas involved. However, a high intensity of management will be needed to prevent wolves from dispersing beyond the primary recovery zones into adjacent suitable habitat.

Summary of Alternative B

In conclusion, the following actions are called for to implement Alternative B:

- expand the captive Mexican wolf population,
- select and acclimate wolves for release,
- adopt the final rule designating the population as experimental nonessential and designating the experimental population area,
- conduct public information and education efforts and support a citizen advisory committee,
- develop an interagency cooperative wolf management plan,
- designate release areas within the BRWRA and WSWRA primary recovery zones, set up release pens, and place wolves in them,
- conduct annual releases in both areas of adequate numbers of family groups to lead to achievement of the total recovery objective, that is, 34 wolves,
- implement intensive field management, monitoring, research, and problem wolf control,
- recapture and return wolves that disperse beyond designated primary recovery zones, and after three and five years, fully evaluate whether the reintroduction effort should continue or terminate.

Alternative C: Reintroduction of Mexican wolves, classified as endangered, into the Blue Range Wolf Recovery Area only. Wolves will be released into the primary recovery zone and unlimited dispersal will be allowed.

Wolves will receive full protection under the Endangered Species Act.

Actions Association with Alternative

In 1997, the FWS will begin to reintroduce family groups of captive-raised Mexican wolves under their current full-endangered status into the primary recovery zone of the BRWRA in east-central Arizona, following the same release procedures as under Alts. A and B. The FWS will gradually release up to 15 family groups into the BRWRA. No releases will occur in the WSWRA. The recovery objective of the alternative is to re-establish 100 wild wolves distributed over more than 5,000 mi² by about the year 2002, consistent with the Mexican Wolf Recovery Plan (Table 2-6). The FWS and its cooperators will monitor and conduct research on the wolves, but they will not actively manage them.

The full-endangered status allows unrestricted dispersal; that is, the FWS will neither restrict the population to the designated BRWRA, as under Alt. A, nor to the smaller primary recovery zone, as under Alt. B. No attempts will be made to recapture or return wolves with the possible exception of individual depredators.

The wolves will have the full protection against “take” by humans provided by the ESA. Anyone who would “harass, harm, pursue, shoot, wound, kill, trap, capture, or collect, or attempt to engage in any such conduct” against a Mexican wolf will be violating the ESA, 16 USC sec. 1532(19) and 1538. The only exceptions will be takings to protect human life or by special permit “for scientific purposes or to enhance the propagation or survival of the affected species,” 16 USC sec. 1539(a)(1)(A). This is the same “endangered” status that wild Mexican wolves would have if they were to somehow naturally recolonize into the United States from Mexico under Alt. D.

The overall rates of mortality and other losses are projected to be lower than under Alt. A in the BRWRA, at 25% (Table 2-6, above). As a result, the population and area goals will be met after six years, three years sooner than under Alt. A. These popula-
Table 2-6. Projected wolf population growth to recovery area goal after releases into the Blue Range Wolf Recovery Area with full Endangered Species Act protection (Alternative C).

Recovery area goal: 100 wolves occupying a total area of 5,000 mi$^2$; based on Mexican Wolf Recovery Team (1382).

<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>No. released successfully$^a$</td>
<td>10</td>
<td>10</td>
<td>10</td>
<td>10</td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td>No. surviving (from prev. year)</td>
<td>--</td>
<td>8</td>
<td>17</td>
<td>31</td>
<td>49</td>
<td>70</td>
</tr>
<tr>
<td>No. pups born$^b$</td>
<td>0</td>
<td>5</td>
<td>15</td>
<td>25</td>
<td>40</td>
<td>65</td>
</tr>
<tr>
<td>25% all losses$^c$</td>
<td>2</td>
<td>6</td>
<td>11</td>
<td>17</td>
<td>23</td>
<td>34</td>
</tr>
<tr>
<td>Total wolves (end of year)</td>
<td>8</td>
<td>17</td>
<td>31</td>
<td>43</td>
<td>70</td>
<td>101</td>
</tr>
<tr>
<td>No. packs$^d$</td>
<td>1</td>
<td>3</td>
<td>6</td>
<td>9</td>
<td>14</td>
<td>20</td>
</tr>
<tr>
<td>No. breeding pairs$^e$</td>
<td>1</td>
<td>3</td>
<td>5</td>
<td>8</td>
<td>13</td>
<td>18</td>
</tr>
<tr>
<td>Area occupied$^f$ (100 mi$^2$)</td>
<td>3</td>
<td>8</td>
<td>15</td>
<td>23</td>
<td>33</td>
<td>50</td>
</tr>
</tbody>
</table>

$^a$ Initially, about 15 captive-raised wolves annually will be released, but five of these are assumed to quickly die, disappear, disperse from the recovery area, or require recapturing for a variety of reasons, and not to contribute to population growth. Fewer wolves will be released in 2001 to minimize overshooting of the population goal.

$^b$ Average of five pups per litter based on McBride (1980)

$^c$ "Other losses" includes wolves that die, leave, disappear, or are removed from the recovery area for any reasons besides control; adapted from rates in Phillips (1932), USFWS (1993a), and Mech (1970).

$^d$ Average pack size of five based on Bednarz (1988)

$^e$ Most packs contain one breeding pair; assumed that 10% of packs do not have a successful breeding pair

$^f$ Average pack territory size of 250 mi$^2$ based on Mexican Wolf Recovery Team (1982) and Mech (1970). Not all land within a territory is suitable year-round habitat

**Source:** Adapted from USFWS (1993a).
tion projections provide guidance but do not predict exact outcomes.

It is more likely under Alternative C than under Alt.s A, B, or D that the wolf population could eventually grow to far exceed the projections in the scenarios. The precise numbers and areas where wolves could occur cannot be predicted with confidence, but they most likely would be forested, montane habitats near the BRWRA. Chap. 3 describes the areas into which reintroduced wolves foreseeably would disperse under this alternative. They are the San Carlos Apache and Fort Apache reservations, the Lakeside Ranger District of the Sitgreaves National Forest, and the San Mateo Mountains unit of the Cibola National Forest.

The impacts will be less predictable than under the nonessential experimental classification alternatives (A and B) because the impacts would occur over a broader region when the wolves disperse outside the BRWRA, as they probably eventually would. A greater likelihood of land use restrictions will exist under this alternative. Depending on where the wolves occur, these could include limiting predator control methods that might kill or injure wolves, closing roads, modifying livestock grazing allotments, and imposing other protections to avoid jeopardizing the population’s survival. Federal agencies will be required to pursue their ESA Section 7 responsibilities to conserve, and not to harm, the endangered population. This legal mandate could take precedence over other, more discretionary, activities of these land managers. This could include managing lands specifically to maintain and create high-quality habitat for wolf prey. Such management could include extensive vegetation manipulation to favor ungulates, e.g., through timber harvesting, clearing, and prescribed burning if this is determined to be necessary to fully support wolf recovery.

**Mitigation Measures**

Individual depredating wolves could be controlled only pursuant to a permit so long as the action enhanced the subspecies’ survival, 16 USC sec. 1539(a)(1)(A). Management for this fully-protected population will be less flexible than under the experimental population rules for Alt.s A and B. There will be no experimental population rule, no boundaries on the wolf recovery area, no provisions to control wolves that are impacting ungulate herds, and it will be illegal to harm or harass the wolves anywhere except under very narrow circumstances authorized by an ESA permit. Taking by private individuals of wolves that attack livestock will be illegal. Taking wolves in defense of human life will still be allowed, 16 USC sec.s 1540(a)(3) and 1540(b)(3).

The FWS will implement the other mitigation measures listed under Alt. A. As indicated, the FWS will condition the captive wolves prior to release. Conditioning will emphasize orienting the wolves to native prey and habitat and may include aversive conditioning to both humans and livestock. The private depredation compensation fund sponsored by the Defenders of Wildlife would apply. Again, the FWS does not guarantee the future existence of this private mitigation fund, but recognizes it has been a valuable aid to wolf recovery in the northern Rockies since 1987.

The FWS will undertake a cooperative effort to improve public understanding of the biology, ecology, history, management, and the full-endangered status of the wolves under this alternative. In particular, residents of all areas where the reintroduced wolves occur will receive briefings and regular updates. The FWS and cooperating agencies will work with ranchers to assess actual depredation impacts and to develop methods to mitigate potential impacts through changes in livestock husbandry (Bjorge and Gunson 1985; Coppinger and Coppinger, in press).

An interagency management plan will be entered into with cooperating state, federal, and tribal agencies. This will cover issues such as release pen siting, veterinary management, depredation control, research, radio tracking, aerial overflights, land use restrictions, wolf and ungulate habitat enhancement, and prey monitoring and management. Mitigation will be necessary over a broader area when the population expands beyond the BRWRA. Even if the reintroduction was going badly it is unlikely that the project could be terminated and all the wolves recaptured consistent with the ESA, as could occur under the nonessential experimental reintroduction alternatives.
Summary of Alternative C

In conclusion, the following actions are called for to implement Alternative C:

- expand the captive Mexican wolf population,
- select and acclimate wolves for release,
- conduct public information and education efforts in the BRWRA and likely dispersal areas,
- develop an interagency cooperative wolf management plan,
- designate release areas in the BRWRA primary recovery zone, set up release pens, and place wolves in them,
- conduct annual releases of adequate numbers of family groups of wolves to lead to achievement of recovery objective of 100 wolves,
- implement field management, monitoring, research, and limited permitted problem wolf control, and
- after three and five years, fully evaluate whether the reintroduction effort should continue.

Alternative D: No Action

Actions Associated with Alternative

Under the No Action alternative, the FWS will take no action other than continuing its present course. It will neither release wolves nor take any other steps to directly ensure Mexican wolf recovery. The FWS will neither adopt an experimental population rule nor designate any wolf recovery areas. The agency will continue to support the captive population objectives established in the SSP Master Plan (Siminski 1994b), but the agency will not support breeding for maximum growth.

Based on its current ESA obligations, the FWS would still encourage protection and expansion of wild wolf populations under this alternative, if any were discovered. Natural recolonization of gray wolves has occurred in recent years in some areas along the northern U.S. border, such as northwestern Montana, northern Wisconsin, and northern Michigan, which are close to Canada or Minnesota where large sources of dispersing wolves exist (Laufer and Jenkins 1989, Ream et al. 1991, Thiel 1988). No evidence exists to indicate a likelihood of natural recolonization in U.S. portions of the historic Mexican wolf range (Girmendonk 1994a, Whitaker et al. 1995. Wolok 1994), but the FWS will support continued research on this possibility.

Natural recolonization is considered extremely speculative. Based on historical wolf abundance, recent sighting reports alleged to be wolves, proximity to Mexico, and other factors, the most suitable areas for potential natural recolonization by wild wolves probably would be the mountainous parts of southeastern Arizona and southwestern New Mexico (Fig. 2-5), and Big Bend National Park in southern Texas (Fig. 2-6). This alternative analyzes these three areas. No confirmed sighting reports have come from these areas or from Mexico in recent years.

The WSWRA and BRWRA—the most suitable candidate areas for releases of captive-raised wolves—are farther north and less likely to be naturally recolonized from Mexico (see Fig. 2-4, above). They are not analyzed under this alternative. However, if natural recolonization were somehow to occur in the BRWRA and WSWRA, the impacts likely would be comparable to those analyzed under the reintroduction alternatives.

Any wolves that did naturally recolonize would be fully protected as an endangered species in the United States. It would be illegal to harm or harass them except under very narrow circumstances authorized by an ESA permit. Nevertheless, 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 1993a).

Assuming for analytical purposes that source populations exist in Mexico, natural recolonization might take on the order of 30 years, if it occurred at all (see USFWS 1993a). Under this time frame, and assuming a 250 mi² average territory size (Mech 1970) for the five-member average pack (Bednarz 1988), speculative population scenarios for the three potential natural recolonization areas analyzed are:

Southeastern Arizona: 30 wolves might recolonize by the year 2023 over approximately 1,500 mi², consisting of the Coronado National Forest units south of Interstate 10, together with the Chiricahua National Monument, the Coronado National
Figure 2-5. Mexican wolf potential natural recolonization areas in southeastern Arizona and southwestern New Mexico.

NOTE: Areas in southeastern Arizona consist of all the Coronado National Forest units south of Interstate 10, together with the separately labelled areas.
Figure 2-6. Mexican wolf potential natural recolonization area, Big Bend National Park, Texas.
Memorial, and the Fort Huachuca Military Reservation west of State Route 90 (Fig. 2-5, above).

**Southwestern New Mexico:** 20 wolves might recolonize by the year 2023 over approximately 1,000 mi², consisting of the mountainous areas of Hidalgo County south of State Route 9 (Fig. 2-5, above).

**Big Bend National Park:** five wolves might recolonize by the year 2023 over approximately 250 mi², consisting of the Chisos Mountains and surrounding land (Fig. 2-6, above).

These speculative scenarios provide guidance but do not predict outcomes. Because of the great uncertainty involved, year-by-year population growth is not projected under this alternative as it is for **Alt.s A, B, and C.** Even if wolf recovery were somehow to occur in these three areas it might take several decades and the most optimistic total population of 55 animals inhabiting 2,750 mi² would not meet the Mexican Wolf Recovery Plan goal.

None of the potential natural recolonization areas alone, nor all of them combined, would meet the objective of the Mexican Wolf Recovery Plan of at least 100 animals distributed over a 5,000 mi² area, unless they were linked with larger source populations in northern Mexico (Mex. Wolf Rec. Team 1982). Due to uncertainties about location and timing, the impacts of natural recolonization, if it occurs, will be less predictable than in the case of reintroduction of captive-raised animals.

Land use restrictions could be imposed under this alternative depending on if, and where, wolves occurred. Restrictions could include limiting the use of predator control methods that might kill or injure wolves, closing roads, modifying livestock grazing, and imposing other protections to limit any jeopardy resulting from human activities. Other federal agencies would be expected to pursue their responsibilities under the ESA to conserve, and not harm, a recolonizing population. This would include managing to maintain and create high quality wolf and ungulate habitat.

### Mitigation Measures

Under a natural recolonization scenario the FWS would control only individual depredating wolves so long as the action enhanced the subspecies’ survival and a permit to do so was issued, 16 USC sec. 1539(a)(1)(A). Management of a small, fully-protected endangered population would be less flexible than under the experimental population rule in **Alt.s A and B.** Management would be similar to **Alt. C**, the reintroduction of full-endangered wolves.

The other mitigation options under **Alt. A** would be implemented if natural recolonization occurs, including providing public information and developing an interagency cooperative management plan. It is not certain that the current private depredation compensation fund would exist decades into the future to cover possible losses from a speculative natural recolonization.

### Summary of Alternative D

In conclusion, the following are called for under Alternative D:

- maintain the captive Mexican wolf population, but take no action toward reintroduction,
- in the event wolves were to recolonize, develop an interagency cooperative wolf management plan,
- in the event wolves were to recolonize, conduct research and public information and education efforts in the recolonization areas, and
- in the event wolves were to recolonize, implement field management, monitoring, and limited problem wolf control.

### Comparison of the Alternatives

Table 2-7 summarizes the features of the four alternatives. Appendix B provides projected cost estimates to complete each alternative. Table 2-8 outlines the projected environmental consequences. See Chapter 4 - Environmental Consequences for the detailed analysis that Table 2-8 summarizes.
### Table 2-7. Summary of Mexican wolf re-establishment alternatives.

Kev: BR = Blue Range Wolf Recovery Area; WS = White Sands Wolf Recovery Area.

<table>
<thead>
<tr>
<th>Alternative</th>
<th>Description</th>
<th>Areas Analyzed</th>
<th>Definite Boundaries Around Recovery Areas?</th>
<th>Endangered Species Act Protection Status</th>
<th>Area Wolf Population Goal</th>
<th>Estimated Area to be Occupied by Wolves (square miles)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>A</strong> (Preferred Alternative)</td>
<td>Nonessential experimental releases allowing dispersal into secondary recovery zones; BR first, WS back-up</td>
<td>BR and WS primary and secondary recovery zones</td>
<td>Yes</td>
<td>Per experimental population rule</td>
<td>BR and WS (if used): Total - 100</td>
<td>BR and WS (if used): Total - 5,000</td>
</tr>
<tr>
<td><strong>B</strong></td>
<td>Nonessential experimental releases preventing dispersal from primary zones</td>
<td>BR and WS primary recovery zones only</td>
<td>Yes</td>
<td>Per experimental population rule</td>
<td>WS - 14 RR - 20 Total - 34</td>
<td>WS - 720 BR - 1,000 Total - 1,720</td>
</tr>
<tr>
<td><strong>C</strong></td>
<td>Releases under full ESA protection</td>
<td>RR only plus likely dispersal areas</td>
<td>No</td>
<td>Endangered (speculative)</td>
<td>BR - 100</td>
<td>BR - &gt;5,000</td>
</tr>
<tr>
<td><strong>D</strong></td>
<td>No releases; research and support possible natural recolonization</td>
<td>Southeastern Arizona, Southwestern New Mexico, and Big Bend National Park, Texas</td>
<td>No</td>
<td>Endangered (speculative)</td>
<td>SE Ariz. - 30 SW NM - 20 Big Bend NP - 5 Total - 55</td>
<td>SE Ariz. - 1,500 SW NM - 1,000 Big Bend N P - 250 Total - 2,750</td>
</tr>
</tbody>
</table>

(continued below)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>A</strong> (Preferred Alternative)</td>
<td>BR - Yes W S - No Together - Yes</td>
<td>BR - 9 W S - 3</td>
<td>BR - 35% WS - 25% None Medium</td>
<td>$7,247,000 (over 14 years)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>B</strong></td>
<td>W S - No B R - N o Together - No</td>
<td>W S - 3 B R - 5</td>
<td>WS - 30% BR - 40% None High</td>
<td>$5,890,000 (over 10 years)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>C</strong></td>
<td>BR - Yes</td>
<td>B R - 6</td>
<td>BR - 25% Some possible Low</td>
<td>$5,692,000 (over 10 years)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>D</strong></td>
<td>SE Ariz. - No S W N M - N o Big Bend NP - No Together - No</td>
<td>Decades (speculative)</td>
<td>No estimates Some possible Low</td>
<td>$150,000 (period indeterminate)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1 In addition, about one-third of the captive-raised wolves that are released annually are expected to quickly die, disappear, disperse from the recovery area, or to require recapturing for a variety of reasons, and not to become part of the established population.

2 See Appendix B for cost accounting.
Table 2-8. Summary of key projected impacts under each alternative.

Votes: Chap. 4 provides background for all information summarized here. All impacts in the back-up White Sands Wolf Recovery Area under Alt. A depend on whether the area is used. This table emphasizes quantifiable adverse impacts and is not a cost-benefit summary. Monetary losses are in 1993 dollars.

Key: BR = Blue Range Wolf Recovery Area; WS = White Sands Wolf Recovery Area.

<table>
<thead>
<tr>
<th>Alternative</th>
<th>Net impact of wolf recovery on wild prey populations (low to high range)</th>
<th>Impact on annual hunter take in area (low to high range)</th>
<th>Annual lost value of hunting (low to high range)</th>
<th>Annual lost hunter expenditures in region (low to high range)</th>
<th>Number of cattle killed annually (low to high range)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A (Preferred Alt.)</td>
<td>BR: 4,800-10,000 fewer deer; 1,200-1,900 fewer elk</td>
<td>BR: 300-560 fewer deer; 120-200 fewer elk</td>
<td>BR: $716,800-$1,336,600</td>
<td>HR: $579,100-$1,079,100</td>
<td>BR: 1-34</td>
</tr>
<tr>
<td></td>
<td>WS: 1,200-3,000 fewer deer</td>
<td>WS: 10-24 fewer deer</td>
<td>WS: $3,000-$7,100</td>
<td>WS: $2,900-$7,000</td>
<td>WS: 0.01-0.3</td>
</tr>
<tr>
<td>B</td>
<td>HR: 970-1,900 fewer deer; 230-350 fewer elk</td>
<td>BR: 57-110 fewer deer; 24-33 fewer elk</td>
<td>BR: $123,100-$214,800</td>
<td>RR: $58,200-$101,500</td>
<td>BR: 0.03-1</td>
</tr>
<tr>
<td></td>
<td>WS: 760-2,000 fewer deer</td>
<td>WS: 5-11 fewer deer</td>
<td>WS: $1,500-$3,300</td>
<td>WS: $1,500-$3,200</td>
<td>WS: 0</td>
</tr>
<tr>
<td>C</td>
<td>BR: 3,700-8,800 fewer deer; 870-1,700 fewer elk</td>
<td>BR: 240-480 fewer deer; 90-150 fewer elk</td>
<td>RR: $582,800-$1,119,200</td>
<td>BR: $470,700-$902,700</td>
<td>BR: 1-3</td>
</tr>
<tr>
<td>D</td>
<td>not modelled (none in Big Bend NP)</td>
<td>not modelled (none in Big Bend NP)</td>
<td>not modelled (none in Big Bend NP)</td>
<td>not modelled (none in Big Bend NP)</td>
<td>not estimated (none in Big Bend NP)</td>
</tr>
</tbody>
</table>

1 Figures given compare prey populations under the wolf reintroduction scenario, at a point in time five years after the wolf population goal for the area is achieved, to what the prey populations are projected to be if wolves are not reintroduced.

2 These figures likely overstate the actual losses. Hunters may not actually hunt less overall because of fewer deer and elk in the wolf recovery areas, but instead turn their attention to substitute areas or species. Further, deer and elk hunting in Arizona and New Mexico are dominated by resident hunters. Most of the money not spent by residents as hunter expenditures in the region probably will be spent in some other sector of the state economy.

3 All projected impacts in the potential natural recolonization areas are speculative.
<table>
<thead>
<tr>
<th>Alternative</th>
<th>Value of cattle killed annually (low to high range)</th>
<th>Economic benefits</th>
<th>Impacts on ADC activities</th>
<th>Impacts on government policies and plans</th>
<th>Impacts on land use and military activities</th>
<th>Impacts on recreation</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>A</strong> (Preferred Alt.)</td>
<td>HR: $640-$21,600</td>
<td>BR: increased recreational use value and expenditures</td>
<td>BR: M-44 and neck snare restrictions; limits on other tools</td>
<td>BR: conflict with local ordinance</td>
<td>BR: minor access restrictions near pens, dens, and rendezvous sites</td>
<td>BR: increased visitation</td>
</tr>
<tr>
<td></td>
<td>WS: $10-$200</td>
<td>WS: little impact</td>
<td>WS: limited conflict with local ordinance</td>
<td>WS: very limited access restrictions; inconvenience for security administration</td>
<td>WS: little impact</td>
<td></td>
</tr>
<tr>
<td><strong>B</strong></td>
<td>RR: $20-$600</td>
<td>BR: limited increased recreational use value and expenditures</td>
<td>BR: limited M-44 and neck snare restrictions; limits on other tools</td>
<td>HR: no conflict</td>
<td>BR: minor access restrictions near pens, dens, and rendezvous sites</td>
<td>BR: limited increased visitation</td>
</tr>
<tr>
<td></td>
<td>WS: $0</td>
<td>WS: no impact</td>
<td>WS: no conflict</td>
<td>WS: very limited access restrictions; inconvenience for security administration</td>
<td>WS: no impact</td>
<td></td>
</tr>
<tr>
<td><strong>C</strong></td>
<td>BR: $640-$21,600</td>
<td>BR: increased recreational use value and expenditures</td>
<td>BR: M-44 and neck snare restrictions; limits on other tools</td>
<td>BR: conflict with local ordinances; potential conflict with San Carlos and White Mountain Apaches' tribal sovereignty</td>
<td>BR: access restrictions near pens, dens, and rendezvous sites; restrictions on grazing and other activities</td>
<td>BR: increased visitation</td>
</tr>
<tr>
<td><strong>D</strong></td>
<td>not estimated (none in Big Bend NP)</td>
<td>All 3 areas: increased recreational use value and expenditures</td>
<td>All 3 areas: M-44 and neck snare restrictions; limits on other tools</td>
<td>All 3 areas: no conflict</td>
<td>All 3 areas: access restrictions near pens, dens, and rendezvous sites; restrictions on grazing and other activities</td>
<td>All 3 areas: increased visitation</td>
</tr>
</tbody>
</table>

---

4 Livestock losses may be compensated by a private depredation compensation fund.
Chapter 3

Affected Environments
CHAPTER 3
Affected Environments

Introduction

Chapter 2 designated the areas in the Southwest in which the four alternative actions would take place. Chapter 3 will describe these areas geographically, biologically, and socially. This description will provide the framework for analyzing the potential impacts of each of the alternatives in Chapter 4.

Alternatives A, B and C are the alternatives under which the Fish and Wildlife Service (FWS) would actively reintroduce captive-raised Mexican wolves into the wild. The areas that would foreseeably be affected by these alternatives overlap.

The affected areas under Alternative A could include the entire Blue Range Wolf Recovery Area (BRWRA) and the White Sands Wolf Recovery Area (WSWRA) (Figs 3-1 and 3-2); however, the use of the WSWRA as a back-up area is conditional. The affected areas under Alternative B are just the primary recovery zones within both the BRWRA and WSWRA. Under both Alternatives A and B, the FWS would attempt to recapture and remove any wolves that established territories outside the designated boundaries. Pending recapture, areas outside these boundaries could also be affected, but to a relatively minor degree.

Alternative C is limited initially to reintroduction in the BRWRA (reintroduction into the WSWRA has been dropped since the DEIS). Nevertheless, this alternative potentially affects the largest area of any alternative. Impacts are not limited to the BRWRA. Impacts also may occur wherever the wolves disperse. Dispersal areas under Alternative C cannot be predicted with confidence; however, this chapter provides general descriptions of the most likely, or foreseeable, dispersal areas.

The areas most likely affected if natural wolf recolonization occurred at some point in the future under Alternative D, the “No Action” alternative, are distinct from the areas affected by Alternatives A, B, and C. These “potential natural recolonization areas” are described at the end of this chapter.

Blue Range Wolf Recovery Area (BRWRA)

Geography

The BRWRA includes all of the Apache and Gila National Forests (NF) in east-central Arizona and west-central New Mexico, encompassing 4,386,245 acres, or 6,854 mi² (Fig. 3-3). The BRWRA is located within southern Apache and northern Greenlee counties in Arizona, and southern Catron, northern Grant, and western Sierra Counties in New Mexico. Elevations range from under 4,000 feet in the semi-desert lowlands along the San Francisco River to 11,000 feet on Mount Baldy, Escudilla Mountain, and the Mogollon Mountains. Lower elevations are characterized by rolling hills with moderately steep canyons and sandy washes. Major drainages, such as the Gila and San Francisco Rivers, have carved steep-walled canyons through the lower areas. Higher elevations are characterized by rugged slopes, deep canyons, elevated mesas, and rock cliffs.

Climate

The BRWRA has relatively mild weather with cool summers and moderate to cold winters over most of the higher elevations, and warm year-round temperatures in the lower elevations. Extremes range from -32°F to 101°F (Johnson et al. 1992). At Alpine, Arizona (elevation 8,050 feet), the average minimum temperature is 27.9°F and the average maximum is 58.7°F. At Clifton, Arizona (elevation 3,470 feet), the average minimum temperature is 51.5°F and the average maximum is 79.0°F. Annual precipitation varies from seven to 12 inches in the southern woodlands to 30 to 37 inches in the mixed conifer forests and averages almost 21 inches in the area. Most precipitation falls during thunderstorms between mid-July and September. Snow falls in the higher elevations from December through March (Allen 1993).
Figure 3-2. Affected areas under Alternatives A and B in the White Sands Wolf Recovery Area Region.
Figure 3-3. Blue Range Wolf Recovery Area.
Water

Natural springs and streams supplemented with sources constructed for livestock and wildlife are widely dispersed (Allen 1993). The BRWRA contains several major drainages, including the Little Colorado, Gila, San Francisco, Blue, and Black Rivers, Eagle Creek, and the North and San Agustin Plains. A total of almost 1,465 miles of permanent streams and about 4,244 acres of lake surface area are present. The Blue Range Primitive Area, in the southern Apache NF, has 22 perennial water sources and 730 developed sources. The Gila NF contains about 2,800 developed water sources for livestock. These are less common in the ungrazed portions of the wilderness areas within the Gila NF (Johnson et al. 1992; SW Region USFS 1987a).

Vegetation

The most prevalent biotic communities in the BRWRA are: petran montane and great basin conifer forests, plains and great basin grasslands, Madrean evergreen woodland, and semidesert grasslands. Petran montane conifer forests, occurring generally from 6,650 feet to 8,050 feet elevation, are characterized by ponderosa pine often interspersed with aspen or fir stands. Great basin conifer forests, at 4,900 feet to 7,550 feet, are dominated by juniper and piñon. Plains and great basin grasslands occur between 4,900 feet and 7,550 feet and are comprised of a variety of grasses; however, fire suppression and overgrazing have altered some of this landscape so that mesquite, juniper, and forbs now are widespread within the BRWRA. In Madrean evergreen woodlands, at 3,950 feet to 7,200 feet, evergreen oaks, juniper and piñon dominate. Occurring at 3,600 feet to 5,600 feet, semidesert grasslands consist of a variety of grass and scrub vegetation (Brown 1982).

Vegetation at the higher elevations of the BRWRA is dominated by mixed conifer stands (437,720 acres). As the terrain slopes toward the Black River, in the upper Blue River watershed, and throughout the Gila NF, ponderosa and white pine forests occur interspersed with understories of oak, piñon, juniper, douglas and white fir, mountain mahogany, and ceanothus (totalling approximately 1,941,230 acres in the BRWRA). Lower elevations support piñon-juniper woodlands and Madrean evergreen woodlands (2,352,430 acres).

Grasslands are interspersed throughout all vegetation types (484,480 acres). The northern portion of the Apache NF includes an extensive high altitude grassland near the summit of the White Mountains. Some areas such as Four Bar Mesa in the southern Apache NF have had extensive control of woody vegetation to preserve the scarce grasslands. Most streams support riparian plant communities, encompassing 46,780 acres in the BRWRA. Fremont cottonwood, sycamore, walnut, boxelder, ash, and hackberry are common at lower elevations; and narrowleaf cottonwood, willows, alders, maples, red osier, and berry bushes are common along higher elevation streams (Allen 1993; SW Region USFS 1987a; SW Region USFS 1986a).

Historically, vegetation in the Apache NF was typified by open-canopied forests and grassland areas interspersed with forested areas. The trend has been and is predicted to continue to be toward expansion of coniferous and woodland vegetation, resulting primarily from decades of fire suppression and secondarily from reduced timber harvesting. The trend in all forest types below the Mogollon Rim follows that experienced above the Rim, especially in the pifion-juniper woodland type, where the shift is from open-canopy stands dominated by mature juniper trees, sparsely scattered pifion, and grey oak to a much denser woodland dominated by pifion (Hayes 1995a). Federally endangered, threatened, proposed, and candidate plant; are listed in Appendix D.

Animals

History of Wolves

Mexican wolves formerly ranged throughout central and southeastern Arizona and southern New Mexico, including the Mogollon Rim, White Mountains, Black Range, and the Blue and Black River region (Brown 1983; Young and Goldman 1944). Bailey (1931) estimated that 100 wolves occupied the Gila NF area in 1906. Through the 1940s occasional reports of wolves continued from the White Mountain Apache (or Fort Apache) Reservation and the San Carlos Apache Reservation west of the Apache NE. In 1960 the last confirmed wolf in east central Arizona was trapped on the Fort Apache Reservation. No wolves have been confirmed to exist in or near the proposed BRWRA since (Brown 1983, Whitaker et al. 1995). However, six unconfirmed reports alleged to
be “wolves” have come from the BRWRA since 1983 (Girmendonk 1994a; Wolok 1994).

Species of Special Concern

Endangered species listed by the FWS as presently, or historically, occurring in the BRWRA include the Gila trout, Gila topminnow, American peregrine falcon, whooping crane, northern aplomado falcon, bald eagle, southwestern willow flycatcher, and black-footed ferret. Federally threatened species include the Chihuahua chub, beautiful shiner, spikedace, loach minnow, Apache trout, little Colorado spinedace, and Mexican spotted owl (USFWS 1994a and 1993b). The proposed and candidate species for federal listing also are found in Appendix D. The FWS is investigating the possibility of releasing a population of federally endangered California condors in the Black Range of New Mexico (R. Marshall, USFWS, pers. comm.). The FWS also is proposing to extend protection of the endangered jaguar throughout its range, including the southwestern U.S.

At present, approved critical habitat is associated only with the federally threatened Little Colorado spinedace, in the northern extreme of the Apache NF for approximately five miles along Nutrioso Creek (52 Fed. Reg. 35034, Sept. 16, 1987). Critical habitat has also been designated for the spikedace, loach minnow, and Mexican spotted owl by the FWS, but is in an uncertain legal status.

In addition, the State of Arizona has designated the water shrew and meadow jumping mouse as species of special concern in the BRWRA (AGFD, In prep.), and New Mexico lists as endangered the Gila spring snail, New Mexico topsnail, chlorella oreohelix, roundtail chub, lowland leopard frog, Gila monster, green rat snake, narrowhead garter snake, Gila woodpecker, Bell’s vireo, gray vireo, common black-hawk, southwestern willow flycatcher, spotted bat, Arizona montane vole, and desert bighorn sheep (NM Natural Heritage Program 1994).

Potential Wild Prey of Wolves

Large ungulates include white-tailed and mule deer, elk, and, to lesser extents, javelina, pronghorn, and Rocky Mountain bighorn sheep (Allen 1993). Annual ungulate survivorship and reproduction in the Southwest vary with precipitation levels, grazing quantity and quality, and management practices (Johnson et al. 1992). White-tailed deer in the BRWRA generally inhabit steep-sloped woodlands featuring oak, juniper, and piñon. They also are found in ponderosa pine forests, desert scrub, deciduous forests, and occasionally spruce-fir communities. Mule deer are found usually between 4,000 feet and 7,000 feet elevation in coniferous forests from piñon-juniper to spruce-fir, but they can inhabit chaparral, desert areas, and higher elevations. Mule deer and white-tailed deer ranges frequently overlap. Elk are found in relatively high mountain areas in meadows and coniferous forests. They may move to lower elevations, living in piñon-juniper woodlands, mixed conifer forests, plains grassland, and occasionally in desert scrub. Elk cows, calves, and yearling males often winter in large groups in different areas than adult males. Around the Blue Range Wilderness Area in the Gila NF some elk are becoming year-round residents (E. Holloway, Gila NF, pers. comm.).

Javelina generally inhabit ponderosa pine woodlands, piñon-juniper and oak woodlands interspersed with grasslands, desert scrub, desert grasslands, and chaparral. They also occur on desert mountain ranges and in thickets along creeks and washes. Pronghorn inhabit shortgrass plains and meadows ranging from desert areas to high plateaus. Bighorn sheep are found in mountains, preferring precipitous ranges with broken rock and steep gullies, along washes or creek beds, or near natural water sources. Rocky Mountain bighorn sheep move between higher summer and lower winter ranges in the Apache NF, but remain year-long residents at about 4,000 feet elevation in the Gila NE (Desert bighorn sheep prefer areas between 3,000 and 4,000 feet elevation in jojoba communities where galleta is the dominant grass between shrubs) (AGFD 1994a; Hoffman 1986; E. Holloway, Gila NF, pers. comm.).

The BRWRA as a whole contains an estimated 57,170 deer of both species (average density 8.3/mi²). The deer population in the Gila NF generally appears stable (Gonzales 1993), although deer in the Glenwood Ranger District appear to be declining (Baldwin 1995; E. Holloway, Gila NF, pers. comm.). The Apache NF is experiencing a decline in deer likely related to low fawn crops and declining habitat quality resulting from unfavorable vegetation succession largely due to decades of fire suppression. Approximately 15,800 elk (2.3/mi²) are found in the BRWRA (AGFD 1994a; Girmendonk 1994b; Gonzales 1993). This population has increased during recent years
AffectEd Environments

In the Arizona portion of the BRWRA hunting seasons for deer occur from late August to mid-September and from October through January, and include general firearm, muzzleloader, and archery seasons (Girmendonk 1994b). Archery, general firearm, and muzzleloader seasons are held for elk hunting. Elk seasons are open during September, October, November, and early December. General firearm and archery seasons for javelina run at various times from January to early March. Pronghorn hunting seasons are concentrated around August and September, and include general firearm, muzzleloader, and archery. For Rocky Mountain and desert bighorn sheep, October and December permits are issued to take any ram by firearm or bow. The black bear hunting season is from August through September and March through April, during which time hunters can take one animal per calendar year. Mountain lion hunters may take one animal per calendar year.

In the New Mexico portion of the BRWRA hunting occurs primarily in the fall and mid-winter. Two archery deer seasons usually are scheduled in September and January, during which one fork-antlered deer can be harvested. Three rifle deer seasons occur in November, allowing one fork-antlered deer to be taken. One archery elk season is scheduled in September. One elk of either sex can be taken. Several limited entry elk hunts are scheduled in September and October, and one limited entry javelina hunt is scheduled in February. One limited entry, mature buck pronghorn season usually is scheduled for two days in late September or early October. Two Rocky Mountain bighorn sheep hunts are scheduled in January (Gonzales 1993). The black bear hunting season occurs September 1 through October 30 and is limited to one bear. Mountain lion hunting can occur from December 1 through March 31 with a bag limit of one lion. Dogs can be used to take bears and lions, but bear baiting is prohibited in New Mexico. About 3% or less of resident New Mexican deer hunters use hunting guides, whereas 12% of deer hunters who come from outside the state use guides (Zia Res. Assoc. 1990).

Hunting

Arizona and New Mexico’s Departments of Game and Fish manage public hunting in their respective portions of the BRWRA. In 1992 in the BRWRA, 19,453 hunters harvested 4,426 deer (22.8% success) and 7,250 hunters took 2,767 elk (38.2% success). Seventy-five hunters took 32 pronghorn (42.7% success). Also in 1992, about 335 hunters harvested 108 javelina (32.1% success), and six hunters took four Rocky Mountain bighorn sheep (66% success) (Girmendonk 1994b; Gonzales 1993). Hunting trends from 1988 through 1992 are presented in Table 3-1. Deer harvests since 1983 have fluctuated slightly. Since 1983, the trend has been toward steadily increasing elk harvests.

In the Arizona portion of the BRWRA hunting seasons for deer occur from late August to mid-September and from October through January, and include general firearm, muzzleloader, and archery seasons (Girmendonk 1994b). Archery, general firearm, and muzzleloader seasons are held for elk hunting. Elk seasons are open during September, October, November, and early December. General firearm and archery seasons for javelina run at various times from January to early March. Pronghorn hunting seasons are concentrated around August and September, and include general firearm, muzzleloader, and archery. For Rocky Mountain and desert bighorn sheep, October and December permits are issued to take any ram by firearm or bow. The black bear hunting season is from August through September and March through April, during which time hunters can take one animal per calendar year. Mountain lion hunters may take one animal per calendar year.

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Existing Livestock Predators

The primary livestock predators are the coyote, lion, and bear (Phillips 1993). Coyotes are common residents of the BRWRA. Black bears are fairly com-
Table 3-1. Average harvests, numbers of hunters, and success rates in the general BRWRA area, 1988-1992.

<table>
<thead>
<tr>
<th></th>
<th>Average Harvest</th>
<th>Average # Hunters</th>
<th>% Hunter Success</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>AZ</td>
<td>NM</td>
<td>AZ</td>
</tr>
<tr>
<td>Deer</td>
<td>1,322</td>
<td>2,8741</td>
<td>6,237</td>
</tr>
<tr>
<td>Elk</td>
<td>788</td>
<td>1,236</td>
<td>1,676</td>
</tr>
<tr>
<td>Javelina</td>
<td>106</td>
<td>71</td>
<td>331</td>
</tr>
<tr>
<td>Pronghorn</td>
<td>30</td>
<td>2.5</td>
<td>44</td>
</tr>
<tr>
<td>Bighorn sheep</td>
<td>4</td>
<td>6</td>
<td>4</td>
</tr>
</tbody>
</table>

1Pronghorn were not hunted in NM until 1991
2Figure is for 1989-92

SOURCES: ADGF 1994a; Girmendonk 1994b; NM DGF 1994; Gonzales 1393.

mon (SW Region USFS 1992a). Predator numbers and densities for the Apache NF are depicted in Table 3-2. For the Gila NF, predator numbers are not available (J. Gonzales, NMDGF, pers. comm.).

From 1987 through 1991, total estimated livestock losses (all cattle) from existing predators averaged about 1% of permitted livestock on the Apache NF (Myers and Baxter 1993). Comparable depredation rates probably occurred on the Gila NF (S. Libby, Gila NF, pers. comm.). The U.S. Department of Agriculture, Animal Damage Control Division (ADC) has depredation control agreements with 53 ranches that graze 170,819 acres in the BRWRA, although no ADC control has occurred in the Gila NF in recent years (A. May, NM ADC, pers. comm.). From 1987 through 1991, permittees on the Apache NF reported that 628 head of livestock were killed by predators, averaging approximately 126 head reported killed each year. Each year the number of depredations confirmed by ADC is much less than the number reported (Phillips 1993). Of the 132 grazing permittees on the Gila NF, 48 responded to a 1993 survey conducted by the New Mexico office of ADC (May 1993). Thirty-seven (77%) reported livestock depredation in 1993, involving 109 cattle and 234 calves. Forty-one permittees believed that coyotes were responsible, 33 said that mountain lions were responsible, and 25 reported that bears were involved. The highest rate of depredation occurs from March through May.

Land Ownership and Management

The U.S. Forest Service manages most of the land within the BRWRA boundaries; on the Arizona side about 94% is National Forest while on the New Mexico side about 96% is National Forest. The remaining land is primarily private or under state or BLM management. Each National Forest has developed its own land and resource management plan. The Apache and Gila National Forest Management Plans guide federal goals and objectives in the BRWRA. The management emphasis for forested lands in the Apache NF is “a combination of multiple uses including a sustained yield of timber and firewood production, wildlife habitat, livestock grazing, watershed, and dispersed recreation” (SW Region USFS 1987b). For woodland areas in the Apache NF, management emphasizes fuelwood production, wildlife habitat, watershed condition, livestock grazing, and indicator species such as mule deer and elk. The mission of the Gila NF is “to provide multiple use and sustained yield of goods and services in a way that maximizes long-term net public benefits consistent with resource integration, environmental quality, and management considerations” (SW Region USFS 1986b). Emphasis is placed on maintaining or increasing herbaceous forage for wildlife and managing coniferous woodlands to provide high quality habitats.

The Forest Service manages just over one million acres of designated wilderness in the BRWRA. The goals of wilderness management are to minimize human development, to maintain natural biological and physical features, and to provide quality recreation. The areas are the Blue Range Primitive Area (187,410 acres), and the Bear Wallow (11,080 acres), Escudilla (5,200 acres), Mount Baldy (7,097 acres), Gila (558,065 acres), Aldo Leopold (202,016 acres), and Blue Range (29,304 acres) Wilderness Areas. Two Wilderness Study Areas in the Gila NF total another
Table 3-2. Approximate predator densities¹, 1995-94, and total predators taken by ADC², 1987-91, in Arizona portion of Apache National Forest.

<table>
<thead>
<tr>
<th>Predators present (animals/mi²)</th>
<th>Predators taken by ADC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coyote³ 1,950 (1.03)</td>
<td>68</td>
</tr>
<tr>
<td>Black bear 824-1,283 (0.44-0.68)</td>
<td>13</td>
</tr>
<tr>
<td>Mountain lion 40-103 (0.02-0.05)</td>
<td>11</td>
</tr>
</tbody>
</table>

¹Assumes an even distribution of populations.
²All ADC activities were conducted in the Alpine and Clifton Ranger Districts.
³Numbers reflect an approximation of spring 1994 breeding population only.

Sources: USFWS 1993c; AGFD 1994b.

27,660 acres (SW Region USFS 1986b). The only National Park Service unit in the BRWRA is the 533-acre Gila Cliff Dwellings National Monument located within the Gila NF. The monument preserves the homes of Native Americans who lived within this canyon area from the 1280s through the early 1300s.

Agency and Local Government Plans and Policies

U.S. Forest Service

Management in the BRWRA has focused on several human-induced problems such as the loss of habitat diversity and disproportionate levels of key successional habitat stages, resulting from the control of natural disturbance regimes (fire, insects, and disease) and the effects of past timber and livestock grazing practices. Current directions for wildlife management include coordination of wildlife needs with other resource uses, direct habitat improvement work, protection of threatened and endangered species, and cooperative efforts with the Arizona and New Mexico Departments of Game and Fish and the U.S. Fish and Wildlife Service (Hayes 1995b; SW Region USFS 1987a; SW Region USFS 1986a).

The National Forest Plan 1993 amendments for the Southwestern Region call for management of federally threatened and endangered species habitat “to achieve declassifying in a manner consistent with the goals established by the U.S. Fish and Wildlife Service” and by the Arizona and New Mexico Game and Fish Departments (SW Region USFS 1993b). Also, the guidelines and standards for management of Mexican spotted owls and northern goshawks (a candidate for federal listing) emphasize three activities: surveying to identify the extent and location of populations of the birds; protecting key habitat areas; and managing for long-term maintenance of suitable habitat (SW Region USFS 1993b).

In addition, key elements of the Forest Service reinvention plan are to promote sustainable ecosystems and to provide public service (USDA Forest Service 1994). The Southwestern Region of the Forest Service will continue implementing integrated resource management to guide ecology-based multiple use management (SW Region USFS 1993a). The Forest Plans for both the Apache and Gila NF establish guidelines for integrated management and provide standards to manage for habitat diversity, riparian and stream values, and forest and rangeland health. Under the Forest Plans, old-growth areas will be retained, and moving timber management away from even-aged to uneven-aged management is being emphasized (Hayes 1995b; SW Region USFS 1987b, 1986b).

In addition, the application of prescribed natural fire is expanding over much of the BRWRA. Most of the Gila NF is under revised prescribed fire plans that provide for the use of natural fire both within and outside wilderness areas. Similar plans are in place in the Apache NF within the BRWRA outside of wilderness, but are limited in extent. Analysis is underway to expand the use of prescribed natural fire for the Blue Range and 200,000 acres of the Clifton Ranger District, both in the Apache NF (Hayes 1995b).

The range management emphases on the Apache NF are on high quality forage and improvements. These emphases are shifting through consideration for the following, in order of priority: allotments that have threatened and endangered species; coldwater
fisheries; allotments with no management plans; allotments with management plans that do not comply with the overall Forest Plan; allotments with management plans that have not been implemented; allotments where plan implementation is progressing; and allotments that have reached the objectives of the Forest Plan (SW Region USFS 1987b).

In the Gila NF the emphasis is on increasing grazing capacity to meet current and planned permitted use through intensive management. The range goals of the Gila NF Plan are to provide forage to livestock, cooperate with other agencies and landowners to reduce impacts of grazing, and to manage for threatened and endangered species (SW Region USFS 1986b).

State of Arizona

Arizona does not have a statute specifically protecting endangered species. However, the state legislature granted the Game and Fish Commission broad authority to regulate wildlife (ARS sec. 17-23 L). In response, the Commission created Policy J. 10, amended in 1991 as Policy A2. 11. The policy states that the Department shall administer a nongame and endangered wildlife program, develop lists of state-threatened species, and implement a re-establishment program with the goal of recovering listed species (see Appendix E, Twelve-Step Procedure for Reestablishment of Non-game and Endangered Species (AGFD 1987)). The Department has drafted a “Cooperative Reintroduction Plan for the Mexican Wolf in Arizona” that calls for a reintroduction effort in the Blue Range Area in cooperation with the Fish and Wildlife Service (Groebner et al. 1995).

In 1994 Arizona voters adopted an anti-trapping initiative (amending ARS sec. 17-30 L), which makes the use of several wildlife capture devices illegal, including leghold traps. However, the law does not prohibit “the use of snares, traps not designed to kill, or nets to take wildlife for scientific research projects, falconry, or for relocation of the wildlife as may be defined or regulated by the Arizona Game and Fish Commission and or the Government of the United States.”

State of New Mexico

The New Mexico Wildlife Conservation Act (NMSA sec.s 17-2-37 to -46) and regulations (NM State Game Commission Reg. No. 682) list the Mexican wolf as a state-endangered species. The statute prohibits its taking, possessing, transporting, exporting, processing, selling, or shipping a state-listed species, and authorizes the New Mexico Department of Game and Fish to establish management programs. State-listed species may, however, be taken to “alleviate or prevent damage to property or to protect human health” (NMSA sec. 17-2-42D).

Counties

Most of the National Forest land in the BRWRA falls in Greenlee and Catron Counties, with smaller portions in southern Apache, northern Grant, and western Sierra Counties (Fig. 3-3). About 2/3rds of both Greenlee and Catron Counties are in the BRWRA.

Sierra and Catron Counties have land use ordinances establishing the counties’ environmental planning and review process. The ordinances seek to identify federal agency legal obligations regarding decisions affecting the environment (Sierra County Ord. No. 92-012; Catron County Ord. No. 002-93). These ordinances assert that federal decisions within these counties are subject to a local approval process. They also call for coordinated analyses that address numerous impact areas of local interest. Also, in 1995, Apache and Greenlee Counties adopted land use and resource policies with some goals similar to the ordinances described above, although Greenlee County’s does not appear to assert authority as such (Apache Co. Bd. of Sup. Res. No. 95-28; Greenlee Co Bd. of Sup. Res. of June 6, 1995). Catron and Sierra Counties also have passed ordinances prohibiting release into the wild of any animal of the genus Canis (Catron County Ord. No. 002-92; Sierra County Ord. No. 94-00 1).

Land Development

Although there are many proposals in the BRWRA, there are no major land developments in the construction phase or with definite plans to proceed. The Forest Service and other agencies will continue present management, including limited timber harvesting.
grazing improvements, fire management, flood control, and recreational improvements. No ski areas exist in the BRWRA; however, the potential for downhill ski facilities exists at sites in the northern portion of the Apache NF near Alpine (SW Region USFS 1987a), and possibly in the Mogollon Range in the Gila NE Geothermal potential exists on National Forest land near Nutrioso. The Phelps-Dodge copper mines at Morenci in Greenlee County likely will continue to slowly expand in size, as will the other smaller mines around the BRWRA in Grant and Sierra Counties.

Vacation and retirement development in and around the BRWRA is expected to continue at a brisk rate in some areas, particularly in the Silver City area, where construction has been increasing at 5% annually (L.K. Jones, Grant Co. Econ. Dev. Office, pers. comm.), and in the Lakeside-Pine Top area in the southeastern portion of the Sitgreaves NE. Additional possible recreational developments include a proposed dude ranch in the Beaverhead area of the Apache NF and expansion of camping and fishing facilities at Joy’s Fish Hatchery near Blue on the Blue River (L. Ruger, Greenlee Co. Econ. Dev. Office, pers. comm.).

Livestock Grazing

Before addressing livestock grazing in the BRWRA specifically it is useful to understand the industry in the Southwest. Box 3-1 provides a general description. It should be noted that the numbers below are based on a 1993 compilation and that some reductions in allowable livestock numbers, and changes in grazing period for particular allotments, were required by the Forest Service in 1995. Many, but not all, of these reductions are under appeal, so their ultimate effect on the total number of livestock permitted remains unclear (M. Rising, Apache-Sitgreaves NF, pers. comm.).

Domestic livestock graze on 3,047,960 acres (69%) of the BRWRA. Large areas closed to or deferred from grazing include the 63,620-acre Sandrock Allotment, located in the Apache NF in the southern portion of the primary recovery zone, approximately 394,000 acres of the Gila Wilderness Area surrounding the Mogollon Mountains, and 43,000 acres in the Black Range within the Aldo Leopold Wilderness Area. The Sandrock Allotment, over half of which is located within the Blue Range Primitive Area, has been closed since 1983 to improve range and watershed conditions. The Forest Service is going through a planning process to determine whether and how future livestock grazing may occur there.

Approximately 82,600 cattle total are permitted to graze in the BRWRA. (This is the cumulative number of permitted bulls, cows, and calves; not all allottees actually graze their full permitted numbers; also, the number should not be confused with AUMs, or Animal Unit Months). There are 208 allotments, averaging 397 cattle per allotment. Roughly 50% of the cattle are on year-round allotments while the rest are seasonal. Numerous grazing allotments have had major reductions in allowable cattle in recent years, largely for range improvement reasons. One flock of 7,000 sheep grazes on one allotment near the northern periphery of the Apache NE. Scattered grazing of ranch horses also occurs throughout the area (Allen 1993).

Within just the BRWRA primary recovery zone, 10,494 cattle are permitted to graze. There are 35 allotments, averaging 300 cattle per allotment. Again, 50% of the cattle are on year-round allotments and the rest are seasonal. One dude ranch in the primary recovery zone is authorized to graze 47 horses.

Most of the cattle graze in remote, mountainous areas and are infrequently seen by their owners. Roughly 60% of the calves are born on the open range, away from the ranch headquarters. Because the cattle are neither concentrated nor closely monitored by their owners these calves may be more susceptible to predation than calves of different cattle operations (Allen 1993).

Forestry

Timber harvesting and related activities such as planting and thinning are planned by the Forest Service to sustain forest health, forest products, threatened and endangered species habitats, other wildlife habitat needs, biological diversity, rural community stability, and social values. Approximately 15,000 acres per year are required to sustain an annual harvest of approximately 30 million board feet to regional sawmills. Forest products include sawtimber, pulpwood, salvage material, and fuelwood. The majority of timber lands in the BRWRA are managed for even-aged stands. Future harvests will be from smaller diameter trees to improve forest diversity through creation of small openings in large monotypic...
Box 3-1. General description of southwestern cattle ranching.

Most of the ranches in the areas addressed in this EIS are cow/calf operations, which means the rancher has a base breeding herd of mother cows and bulls. A typical size operation has about 170 mother cows. While the timing of calving varies with the rancher’s bull management, most calves are born in late winter and early spring. This is the most critical period for exposure to predation. The rancher sells the annual calf crop for income at about ten months of age. Marketing can occur throughout the year but is concentrated in the fall. A small number of yearling operations are present in which young cattle are held on a ranch for a period of growth until all are sold at about 18 months of age. Yearlings tend to be less susceptible to predation than calves.

Most of the ranchers in the areas considered here rely on public land grazing allotments (the exception being the southwestern New Mexico potential natural recolonization area with its very large private ranches). Ten-year permits are issued to the owners of private tracts known as “base properties” within the allotments. Grazing seasons can range from year-long to as short as one month. Each allotment has a management plan specifying the number of animals allowed and other measures, such as rest and rotation, to prevent overgrazing and other damage. Public land grazing fees, which vary according to a formula that accounts for beef prices and other factors, are important in this cyclical business of marginal profitability. Fees are subject to an ongoing federal reform process that may lead to future increases. Another important factor in profitability is the rate of predator losses. Indeed, predator loss trends are one of the factors considered in calculating the grazing fee formula.

Economic returns from ranch sales vary with the market for beef, which has been depressed for several years. Typical livestock receipts on a large ranch in Arizona and New Mexico total about $130,000. A typical year for a large ranch yields a return on total assets of 1.8% to 2.0%. Median net ranch income is around $17,000 annually. The average rancher spends close to $50,000 per year locally for goods, services, and employee wages.

Ranch returns may be negative, especially for smaller operations. In other words, many small ranchers exist on depreciation. Many rely on other jobs to supplement their incomes. Because the rates of return do not attract capital into the industry, few young people are attracted to it. Thus, the ranching population averages 55 years of age. Typical ranchers in Arizona and New Mexico have been on the same ranch for a long time, i.e., about 31 years. The employment outlook for ranch foremen and cowboys is negative, with employment losses for New Mexico projected at about 8% between levels in 1988 and the year 2000.


stands (Allen 1993; SW Region USFS 1987a; SW Region USFS 1986a).

Of the total National Forest acreage in the BRWRA, 1,242,890 acres (28.3%) are suitable for timber harvesting. Another 958,688 acres (21.9%) are classified as incapable of producing commercial timber; these primarily consist of mixed ponderosa pine-Juniper stands at low elevations. An additional 258,912 acres (5.9%) are physically unsuitable for timber harvesting. Finally, 1,202,019 (27.4%) acres of piñon and juniper are currently classified as unsuitable by the Forest Service because it has inadequate information to determine suitability (SW Region USFS 1987a; SW Region USFS 1986a).

Most future harvesting will use existing roads. Reconstruction of existing roads will be primarily of low standard roads, averaging 30 miles per year. Much of this reconstruction will involve moving roads away from environmentally sensitive areas such as meadows and riparian areas (Allen 1993). The Forest Service collected $9,351,449 in timber fees for the BRWRA in 1993 (S. Lee, Apache NF, pers. comm.; M. Boyles, Gila NF, pers. comm.). This amount has decreased substantially due to logging restrictions.

Mining and Other Natural Resources Extraction

Several large open-pit copper mines are worked to the south of the BRWRA, including the South Dodge Tyrone mines southwest of Silver City and the Santa Rita/Chino mine east of Bayard in Grant County. Morenci, in Greenlee County, is the site of a 1.8-mile long open-pit copper mine immediately south of the
primary recovery zone. Phelps Dodge owns the mine and nearby smelter. About 450 million pounds of copper are produced each year, making it the nation’s largest copper mine. On the Clifton Ranger District in the Apache NF one active mine has produced small amounts of gold (SW Region USFS 1987a).

Public Access and Recreation

Most of the BRWRA is adequately roaded for management activities, recreational access, transport of forest products, and livestock grazing (Allen 1993). Recreation is the fastest growing use of southwestern National Forests. The Forest Service constructs and upgrades campgrounds and other recreational facilities to meet the growing demand. Common activities include hiking, backpacking, horseback riding, hunting, fishing, snowmobiling, and driving for pleasure. The BRWRA contains 52 developed campgrounds and seven picnic areas. Several lakes offer fishing and boating. There are 2,320 miles of trails (Allen 1993).

Use is measured in Recreation Visitor Days (RVDs). Estimated use for 1992 in the BRWRA was 2,190,580 RVDs, including 1,068,620 RVDs for camping, 234,200 RVDs for hunting, 324,560 RVDs for hiking/horseback riding, 229,440 RVDs for fishing, and 336,760 RVDs for nature study (Allen 1993). Approximately 67 guides and outfitters provide service in the BRWRA (SW Center for Res. Analysis 1994), mostly for hunting. Average fees charged range from $75 for photography to $2,720 for an elk hunt.

Regional Economy, Employment and Population

The highest median household income in the region, $28,570, is found around Silver City in Grant County, New Mexico. The lowest, $18,460, is in Catron County, New Mexico, which also has the BRWRA’s highest unemployment rate at 12.9% and the highest poverty rate at 25.6%. The central economic activities in the mostly rural BRWRA region are logging, ranching, mining, tourism/recreation, and farming (Catron County Commission 1992; 1990 U.S. Census).

Apache County

Coal-fired energy plants near St. Johns provide much of the economic base in addition to timber, tourism, government, and agriculture. Southern Apache County has relied heavily on economic activity associated with timber, with some recreational and retirement development “spilling over” from the Lakeside-Pinetop area to the west. Cattle ranching has declined in importance.

A small sawmill operates in Nutrioso, north of Alpine, a larger mill operates in Eager, and other wood processing facilities exist. Apache County recently opened an economic development office and is seeking to attract various businesses, including additional forest products manufacturing and microwave relays. Slow to moderate economic growth is projected (Ariz. Dept. Econ. Sec. 1993).

Greenlee County

Phelps Dodge’s Morenci mine employs 2,100 people, about 80% of the county work force. Mine employment is projected to climb slowly (Ariz. Dept. Econ. Sec. 1993). Unlike Apache County to the north, tourism and recreation have not contributed much to the regional economy; however, they represent opportunities for future economic development (Ariz. Dept. of Commerce, n.d.). Timber production has declined in economic importance. Irrigated crop agriculture is important in the southern portion of Greenlee County. About 2/3rds of the cattle grazing in the county occurs in the northern portion in the Apache NF (M. Schneider, Greenlee Co. Agric. Ext. Office, pers. comm.).

Catron County

Ranching is the most important business in Catron County, with 175 mostly small- to medium-sized cattle ranches and 420 employees. Ranching is relatively more important to Catron County than to any other county in the BRWRA; the county cattle industry had more than $20 million in sales in 1992. Crop agriculture plays a minor role. Government is a large employer, particularly with the county’s preponderance of National Forest land.

The timber industry in the county has declined markedly. Reserve, the Catron County seat, formerly relied heavily on a Stone Container Corporation
sawmill for employment, which closed in 1992. The mill closure eliminated 140 to 160 jobs and also had a major negative secondary impact on employment in other businesses in the area (Catron Co. Comm’n 1992). The county has about 35 retail business establishments and no wholesalers (A. Thal, Western NM Univ., pers. comm.). Guiding and outfitting contribute more to Catron County’s economy than to the economies of any other county in the BRWRA (SW Center for Res. Analysis 1994).

Grant County

Copper production represents the most important economic sector, followed by livestock. The Phelps Dodge mines at Tyrone and Santa Rita and the smelter in Hurley provide over 1,600 jobs.

More beef cows graze in Grant County than in any other New Mexico county (R. Lamb, Grant Co. Agric. Ext. Office, pers. comm.). Tourism, construction, light industry, and Western New Mexico University are other important economic contributors. Timber has decreased substantially in economic importance, reflected in the closing of area sawmills.

Sierra County

Retail trade (including recreation and tourism) and ranching are the top economic contributors (Sierra Co. Comm’n 1993). Most ranches are small, with fewer than 100 cows. However, two large ranches east of the BRWRA (the Ladder Ranch and the Pedro Armendariz Ranch), now in a single ownership, encompass about 800,000 acres. The owners have removed most cattle from these ranches and replaced them with a smaller number of bison to the economic detriment of the county due to reduced taxes (Sierra Co. Comm’n 1993).

Both the BRWRA as a whole and the primary recovery zone within the BRWRA have low population densities, averaging about one person per mi² (Tables 3-3 and 3-4). Silver City is the largest population center near the BRWRA, at about 11,000. The smaller population centers of Springerville/Eager (population 6,100), Clifton/Morenci (population 4,640), and Central/Bayard (population 4,400) lie just outside the borders of the BRWRA. The latter two population centers are associated with large copper mining operations. Few towns occur within the BRWRA boundaries; the largest are Alpine (population 600) in Apache County and Reserve (population 310) in Catron County. Alpine is oriented toward tourism and recreation, while Reserve is the center of commercial and government activity in Catron County. A few small, isolated ranching communities exist in the BRWRA. Two within the primary recovery zone are Eagle Creek and Blue. Both communities consist of a dozen or so families, with their own schoolhouse but no commercial establishments within an hour’s drive.

Population growth through the year 2000 is projected to be fairly high in the Springerville/Eager area in southern Apache County but low or negative in northern Greenlee County (Johnson et al. 1992). The population of Catron County is projected to be stable or to decrease through the year 2000, Grant County’s population is projected to increase by about 4% above 1990 levels, and Sierra County’s population is projected to increase about 8% above 1990 levels (Bur. of Bus. and Econ. Res. 1991).

Likely Dispersal Areas Associated with the Blue Range Wolf Recovery Area

The following areas adjacent to the BRWRA are foreseeably affected under Alternative C, which gives full Endangered Species Act protection to the reintroduced wolves (Fig. 3-1, above). The Service would not attempt to prevent the dispersal of the wolves out of the BRWRA under this alternative. The areas discussed are, in order: the San Carlos and White Mountain Apache reservations, the Lakeside Ranger District of the Sitgreaves NF, and the San Mateo Mountains unit of the Cibola NE. The largest areas are the two Indian reservations to the west of the BRWRA; these are addressed in the greatest detail.

San Carlos and White Mountain Apache Reservations

History of Wolves

Mexican wolves historically ranged across both reservations. Wolves were sporadically reported or caught on the reservations until 1960. In 1930, a pack of wolves was reported in the San Carlos Apache Reservation along the Black River. A wolf was taken in
**Table 3-3. Summary of regional U.S. Census data for Blue Range wolf recovery area.**

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Total population</td>
<td>10,782</td>
</tr>
<tr>
<td>Population density</td>
<td>0.8/mi$^2$</td>
</tr>
<tr>
<td>Number in labor force</td>
<td>4,514</td>
</tr>
<tr>
<td>Percent of civilian labor force unemployed</td>
<td>8.3%</td>
</tr>
<tr>
<td>Percent of civilian labor force employed in agriculture, forestry or fisheries</td>
<td>16.3%</td>
</tr>
<tr>
<td>Median household income</td>
<td>$21,612</td>
</tr>
<tr>
<td>Percent of population below poverty level</td>
<td>17.6%</td>
</tr>
</tbody>
</table>

$^1$Region covered by census tracts does not correspond exactly with recovery area boundaries; generally, census tracts include some adjacent rural areas around the recovery areas.

**SOURCES:** 1990 U.S. Census for following census tracts in Arizona: Apache County 390 1 and Greenlee County 9704. In New Mexico: all of Catron Country; Grant County 9841, 9842, and 9849; and Sierra County 7824.

**Table 3-4. Summary of regional U.S. Census data for Blue Range wolf recovery area, primary recovery zone only.**

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Total population</td>
<td>1,371</td>
</tr>
<tr>
<td>Population density</td>
<td>1.1/mi$^2$</td>
</tr>
<tr>
<td>Number in labor force</td>
<td>519</td>
</tr>
<tr>
<td><strong>Percent of civilian</strong> labor force unemployed</td>
<td>8.3%</td>
</tr>
<tr>
<td>Percent of civilian labor force employed in agriculture, forestry or fisheries</td>
<td>10.1%</td>
</tr>
<tr>
<td>Median household income</td>
<td>$23,355</td>
</tr>
<tr>
<td>Percent of population below poverty level</td>
<td>17.2%</td>
</tr>
</tbody>
</table>

$^1$Region covered by census tracts does not correspond exactly with primary recovery zone boundaries; census tract includes a small adjacent rural area to the southeast of the recovery zone.

**SOURCES:** 1990 U.S. Census for Greenlee County census tract 9901.
the same area in 1938 and again in 1945. Uncon-
firmed wolf reports continued to surface on the
reservations from 1945 through **1947. Two wolves**
were caught on each the White Mountain and San
Carlos Apache Reservations in **1946. The last con-
firmed wolf kill in Arizona came in **1960 in the**
Grasshopper District of the White Mountain Apache
Reservation (Brown 1983). An unconfirmed “wolf”
sighting was reported on the San Carlos Reservation
in 1087 and another was reported in the Apache NF
just east of the northeast corner of that reservation in
1992 (Girmendonk 1994a). There continue to be
reports of sightings on the White Mountain Apache
Reservation. However, none of the sightings have been
confirmed (White Mountain Apache Tribe 1995).

**San Carlos Apache Reservation**

**Geography**

The 1.8 million-acre San Carlos Apache Reservation
occupies a range of elevations and habitats in east-
central Arizona. San Carlos Reservation lands form
the western boundary of the BRWRA (Fig. 3-l). The
southern portion is mostly high desert, with the
exception of 8,000-foot Mount Turnbull. To the
north, high ridges and plateaus occur with several
large prairies interspersed. The northeastern section
consists of steep, densely forested terrain. The reserva-
tion is bordered to the east and west by National
Forests, to the south by state, private, and BLM lands,
and to the north by the White Mountain Apache
Reservation.

**Climate**

At the town of San Carlos average low temperatures
range from 32°F in January to 63°F in July. Average
highs range from 55°F in January to 95°F in July.
Annual average precipitation is 15.8 inches with 4.4
inches of snowfall. Moving north and east on the
reservation and higher in elevation, average tempera-
tures decrease and precipitation and snowfall increase.

**Water**

The perennial streams are portions of the Gila, San
Carlos, Blue, Black, and Salt Rivers and Willow,
Boni Ta, Bear Wallow, and Eagle Creeks, totalling 2 15
miles. There are five main reservoirs, including Talkalai
Lake, San Carlos Lake (the largest lake on the reserva-
tion), Seneca Lake, Point of Pines Lake, and Dry
Lake, totalling 20,800 acres. Three hundred and sixty-
two stock tanks have been built on the reservation,
but many are in disrepair and have gone dry or are at
low levels.

**Vegetation**

Vegetation types occurring on the reservation 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 condi-
tion of the woodlands has never been classified.
Overgrazing is causing soil erosion in many areas.

**Animals**

Species of Special Concern.-The Gila topminnow,
razorback sucker, bald eagle, southwestern willow
flycatcher, and American peregrine falcon are federally
endangered species, and the federally threatened loach
minnow, Mexican spotted owl, and spikedace may be
found. Nongame wildlife species are poorly docu-
mented.

A portion of the critical habitat for the endan-
ergized razorback sucker is on the reservation. Activities
which may adversely affect the critical habitat include
construction and operation of hydroelectric facilities,
irrigation, flood control, bank stabilization, oil and
gas drilling, mining, grazing, introduction of nonna-
tive fish, and resort facilities (59 Fed. Reg. 13374, 
Mar. 21, 1994).

Potential Wild Prey of Wolves.-Coues white-tailed
deer, mule deer, elk, javelina, pronghorn, bighorn
sheep, turkeys, Aberc's squirrels, ground squirrels,
cottontails, jackrabbits, and wood rats occur on the
reservation. The deer occur in relatively low density,
with an estimated 2,4 10 mule deer and 850 Coues
white-tailed deer occupying approximately the eastern
one-fifth of the reservation. Migration of mule deer
from the Apache-Sitgreaves NF is believed to occur,
while the white-tailed deer are believed to be resident
and nonmigratory.

The elk herds are dense. The resident Dry Lake
herd consists of about 700 elk. The northeastern part
of the reservation east of the Black River holds a
resident elk herd of 100 to 150 animals and 500 to
1,500 elk that migrate onto the reservation from the north and east during the winter months. 

**Javelina** are common in the southern portion. Pronghorn, possibly the Chihuahuan subspecies, historically have occurred in the Big Prairie area, and they currently number about 120. Pronghorn from Montana recently were introduced to Ash Flats and now number about 160. A population of Rocky Mountain bighorn sheep occupies an area south of the Natanes Mountains. Table 3-5 depicts potential wolf prey numbers and densities. These density figures were calculated over the entire reservation, although much of it is not suitable habitat.

**Hunting.—** The San Carlos Recreation and Wildlife Department, under the direction of the San Carlos Game and Fish Commission, is responsible for wildlife management. The tribal council is ultimately responsible for wildlife policy decisions. Big game permit fees are paid by non-tribal members. Bag limits for big game species usually are one animal per year, and small game season limits follow the Arizona state regulations. Bear permits are limited to keep hunter success high. Mountain lion harvest has been limited but is now being encouraged. Small game permits are unlimited.

Table 3-6 depicts hunter revenue and harvest for 1993. On the northeastern portion of the San Carlos Apache Reservation an average of 150 deer, 225 elk, and 2 pronghorn are harvested by an average of 450 (33.3% success), 435 (5 1.7% success), and 2 (100% success) hunters annually, respectively.

Trophy elk hunting by non-members has produced several record animals and non-member hunting represents a major tribal revenue source providing about $500,000 in hunting revenues annually. Excluding mountain lion and turkey hunt revenues, the total fee income from non-member big game hunting was $442,075 in 1993. During the 1994-1995 elk season, 18 non-member hunting permits for the Malay Gap herd alone were sold for a total of $45,000. The tribe charges additional trophy fees of $1,000 to $3,000 for each elk that exceeds a certain trophy quality, which amounts to roughly $5,000 annually. An additional $25,000-30,000 is brought in annually from small game permits and another $7,000 from trapping permits. About 35 licensed guides, mostly tribal members, receive varying amounts of revenue from guiding.

About 50% of the tribal member deer hunters hunt in the eastern one-fifth of the reservation. The mountains in the northeastern portion provide the bulk of elk hunting by tribal members, which adds significant protein to their diets.

**Existing Livestock** Predators.—Coyote numbers range locally between low to very high densities. Black bears number about 475, occurring most densely in the eastern one-fifth of the reservation. Mountain lions total approximately 200. Coyotes are controlled through aerial gunning, traps, and call-and-shoot. A part-time federal ADC employee works on the reservation. Between May and July 1993, the ADC trapped 90 to 100 coyotes in or near the pronghorn range in the eastern portion of the reservation. The tribe has a policy against the use of poisons. Lion control is encouraged to reduce livestock depredation, including a $500 bounty offered by one livestock association.

**Tribal Policies and Plans**

The San Carlos Overall Economic Development Plan is being updated. The need for a comprehensive zoning plan has been identified. The primary document governing forest management policy is the tribe’s 1982-1991 Forest Management Plan. Multiple use of the forests is a tribal objective, and management practices favor harvesting younger and smaller trees. Other forestry management concerns are the negative impact on pine regeneration caused by cattle concentrations and the deterioration of range conditions due to poor cattle management.

In 1995, the Tribal Council adopted a resolution opposing wolf recovery in the BRWRA. The tribe does not have a comprehensive policy for managing recreational areas or threatened and endangered species. Bear Wallow (2,620 acres) is the only designated primitive area on the reservation. It was established to enhance wilderness recreation, to maintain biological diversity, and to protect threatened and endangered species. Logging is prohibited there.

**Land Development**

Little industry or business occurs on the reservation. Highway 70 is the major commercial development corridor. A small amount of agricultural land is irrigated. Some high elevation lands are suited for dry land farming but are not used. There are five major
Table 3-5. Game densities on San Carlos Apache Reservation, 1993-94 estimate.

<table>
<thead>
<tr>
<th>Animal</th>
<th>Number</th>
<th>Density (animal/mi²)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coues white-tail deer</td>
<td>2,350</td>
<td>0.8</td>
</tr>
<tr>
<td>Mule deer</td>
<td>3,700</td>
<td>1.3</td>
</tr>
<tr>
<td>Elk</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Resident + migratory</td>
<td>1,500±</td>
<td>0.5</td>
</tr>
<tr>
<td>Resident</td>
<td>700+</td>
<td>0.3</td>
</tr>
<tr>
<td>Javelina</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>3,950</td>
<td>1.4</td>
</tr>
<tr>
<td>Pronghorn (historic and introduced)</td>
<td>280</td>
<td>0.1</td>
</tr>
<tr>
<td>Desert bighorn sheep</td>
<td>15</td>
<td>0.0</td>
</tr>
<tr>
<td>Rocky Mountain bighorn sheep</td>
<td>30</td>
<td>0.0</td>
</tr>
</tbody>
</table>

Table 3-6. San Carlos game permits, harvest, and hunter success, for tribal members and non-members, and fee revenue for non-member permit sales, 1993-94 hunt year.

<table>
<thead>
<tr>
<th>Animal</th>
<th>Member</th>
<th>Non-member</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Animals Taken</td>
<td>Estimated Hunters (% success)</td>
</tr>
<tr>
<td>Mule deer</td>
<td>260</td>
<td>875 (37)</td>
</tr>
<tr>
<td><strong>Coues</strong> deer</td>
<td>65</td>
<td>*</td>
</tr>
<tr>
<td>Elk</td>
<td>250</td>
<td>485 (52)</td>
</tr>
<tr>
<td><strong>Javelina</strong></td>
<td>80</td>
<td>200 (40)</td>
</tr>
<tr>
<td>Pronghorn</td>
<td>2</td>
<td>2 (100)</td>
</tr>
<tr>
<td>Black bear</td>
<td>10</td>
<td>20 (50)</td>
</tr>
<tr>
<td>Turkey</td>
<td>265</td>
<td>375 (70)</td>
</tr>
</tbody>
</table>

*Member deer tags are not species-specific, but mule deer are preferred.
road projects scheduled, two of which are underway. Approximately 35 miles of roads will be upgraded and over twelve miles will be graded and drained.

**Livestock Grazing**

Multiple-family and tribal cattle operations exist. The reservation is divided into seven range units (totalling 1,832,040 acres), with grazing controlled under a Bureau of Indian Affairs system. In five of the units grazing permits are issued to privately owned and operated cattle associations; two ranches are tribally owned and operated. Four of the seven grazing areas are in poor range condition, two in fair condition, and one in good condition. Grazing now takes place in the southern portion of the reservation known as the Mineral Strip. The area was previously ungrazed for about 25 years, but the tribe is establishing ranches there.

The five cattle associations, consisting exclusively of tribal members, are managed by boards of directors elected from the association membership. For all the associations and ranches a total of 18,500 animal units (cow and calf) are allotted, but actual numbers are likely higher. Cows and bulls range freely with little active management. Cattle with different family ownership brands mix freely and many cattle are not branded.

Six of the seven livestock operations employ year-round grazing with round-ups occurring largely through trapping in scattered corrals. Cattle carcasses resulting from winter kill are common in the higher country. Moving herds toward calving pastures, limiting the amount of time that cows spend with bulls (to synchronize calving), and rotating cattle to less vulnerable pastures might reduce predation but are currently beyond the means of the cattle associations.

**Forestry**

Approximately 55,000 acres (3 1%) of the pine forests are suitable for timber harvesting. The annual allowable cut is 2.87 million board feet. One sawmill at Cutter has operated since 1990. Sustained yield principles are followed.

**Mining and Other Natural Resource Extraction**

Sand and gravel are mined commercially. Gypsum has been mined for many years in the southwest corner of the reservation from a patented mining claim. Mineralized uranium also has been located in a one-half square mile area, and two basins have potential for lithium mining. A 1990 U.S. Geological Survey study found low oil, natural gas, and coal potential on the reservation. Six kinds of decorative stone are mined, collected, or planned for mining including peridot, agate, garnet, calcite, and sapphires.

**Public Access and Recreation**

The reservation contains 465 miles of roads. Outdoor recreational opportunities for the public and tribal members include fishing, boating, camping, hunting, hiking, and wilderness experiences. Use fees are paid by non-members. Fishing, camping, and water sports contributed $700,000 to $800,000 in non-member fees to the tribe in fiscal year 1993. Several water-based recreational facilities exist. They include Seneca, San Carlos, Point of Pines, and Talkalai Lakes and the Black/Salt River area. The Black/Salt River recreation area is jointly managed by the San Carlos and White Mountain Apache Tribes.

**Regional Economy, Employment and Population**

The major economic contributors are timber, cattle, and recreation revenues. Over 7,000 people live on the reservation. Unemployment on the reservation is high. The reservation has one of the lowest median household incomes and highest percentage of people living below the poverty level in the Southwest (Table 3-7). Most residents live in or near the communities of San Carlos, Peridot, or Bylas.

**White Mountain Apache Reservation**

**Geography**

The 1.63-million acre White Mountain Apache (or Fort Apache) Reservation is located immediately west of the BRWRA in the transition between the Colora-
Table 3-7. Summary of regional U.S. Census data for the San Carlos Apache Reservation.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total population</td>
<td>7,294</td>
</tr>
<tr>
<td>Population density</td>
<td>2.7/mi²</td>
</tr>
<tr>
<td>Number in civilian labor force</td>
<td>3,188</td>
</tr>
<tr>
<td>Percent of civilian labor force unemployed</td>
<td>30.0%</td>
</tr>
<tr>
<td>Percent of civilian labor force employed in agriculture, forestry or fisheries</td>
<td>6.6%</td>
</tr>
<tr>
<td>Median household income</td>
<td>$8,743</td>
</tr>
<tr>
<td>Percent of population below poverty level</td>
<td>62.0%</td>
</tr>
</tbody>
</table>

**Source:** 1990 U.S. Census for the San Carlos Apache reservation.

Do Plateau and the Basin and Range physiographic provinces (Fig. 3-1). Erosion by streams has carved deep canyons into strata underlying the area. The Mogollon Rim runs through the southwestern margin of the Plateau Province on the reservation. Elevations range from 2,600 feet on the extreme western end to the 11,403-foot crest of Mount Baldy in the east. The reservation is bordered on the east and north by the Apache-Sierragreaves NF, on the west by the Tonto NF, and on the south by the San Carlos Apache Reservation.

**Vegetation**

Over 72,100 acres, or 44%, 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, juniper-piñon 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).

**Animals**

Species of Special Concern.—The tribe has a cultural tradition of care and respect for all species of wildlife. There are, however, several species that the tribe or the FWS has identified as endangered or threatened. Federally endangered wildlife which the FWS has identified as occurring on the reservation are the razorback sucker, bald eagle, peregrine falcon, and southwestern willow flycatcher. Federally threatened species that the FWS lists as occurring are the Apache trout, loach minnow, Little Colorado spinedace, spikedace, Mexican spotted owl, and possibly a re-established, nonessential experimental population of Colorado squawfish. (Activities which may adversely modify critical habitat for the razorback sucker on the reservation are described in the San Carlos Apache Reservation section, above.)

**Climate**

Temperature extremes range from a high in the summer of about 110°F at the low elevations of the far western end to about -45°F on Baldy Peak in mid-winter. The average low temperature is 7.4°F in January and the average high is 90.8°F in July. Average annual precipitation ranges from 15 inches in the desert regions on the western end to over 35 inches in the Mount Baldy area.

**Water**

There are over 300 miles of perennial streams on the reservation. Among the major streams are Canyon, Cibecue, Carrizo, Ord, Big and Little Bonito, Reservation, Tonto, and Pacheta Creeks, and the North Fork and East Fork of the Whiteriver. Numerous springs exist, particularly below the Mogollon Rim. Over 30 artificial trout lakes and 60 stock tanks are located throughout the reservation.
Prey of Wolves.—Coues white-tailed deer, mule deer, elk, javelina, pronghorn, Rocky Mountain bighorn sheep, and desert bighorn sheep are found on the reservation. Table 3-8 shows the estimated population sizes, densities, and habitat areas of these species. Bands of feral horses also occur here. White-tailed deer inhabit oak-pine woodlands, while mule deer are common in the montane conifer forests, interior chaparral, mountain grasslands, and Sonoran desert scrub. Elk were introduced into the White Mountains between 1913 and 1934 and have spread throughout the forested areas. The highest concentration of elk is in the eastern portion of the reservation. These elk move to and from the southeastern part of the reservation, the San Carlos Apache Reservation, and the BRWRA. Introduced pronghorn inhabit the plains and desert grasslands of the Bonito Prairie.

The deer population is low but stable. Elk herds are slowly increasing. However, recent changes in elk hunting regulations both on and off the reservation may slow or stop this increase. Desert and Rocky Mountain bighorn sheep each have a resident herd size of up to 10 animals. Small mammals include Arizona gray squirrels, Abert’s squirrels, golden-mantled ground squirrels, cliff chipmunks, ringtails, raccoons, and cottontails.

Table 3-8. Population estimates, densities, and estimated habitat areas of potential wolf prey species on the White Mountain Apache Reservation.'

<table>
<thead>
<tr>
<th>Species</th>
<th>Estimated Population</th>
<th>Density (animal/mi²)</th>
<th>Estimated Habitat (mi²)</th>
</tr>
</thead>
<tbody>
<tr>
<td>White-tailed deer</td>
<td>1,700</td>
<td>0.97</td>
<td>1,500</td>
</tr>
<tr>
<td>Mule deer</td>
<td>2,300</td>
<td>1.15</td>
<td>2,000</td>
</tr>
<tr>
<td>Elk</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Winter</td>
<td>6,000</td>
<td>13.33</td>
<td>450</td>
</tr>
<tr>
<td>Summer</td>
<td>11,500</td>
<td>10.95</td>
<td>1,050</td>
</tr>
<tr>
<td>Pronghorn</td>
<td>275</td>
<td>2.60</td>
<td>105</td>
</tr>
<tr>
<td>Desert bighorn</td>
<td>5</td>
<td>0.13</td>
<td>75</td>
</tr>
<tr>
<td>Rocky Mountain bighorn</td>
<td>8</td>
<td>0.16</td>
<td>50</td>
</tr>
</tbody>
</table>

'Numbers for javelina are not known.

Table 3-9. White Mountain Apache Reservation non-member hunting revenues for 1994.

<table>
<thead>
<tr>
<th>Species</th>
<th>Number Permits</th>
<th>Issued</th>
<th>Total Revenues</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bull elk</td>
<td>75</td>
<td></td>
<td>$ 940,000</td>
</tr>
<tr>
<td>Cow elk</td>
<td>100</td>
<td></td>
<td>30,000</td>
</tr>
<tr>
<td>Pronghorn</td>
<td>3</td>
<td></td>
<td>10,500</td>
</tr>
<tr>
<td>Mountain lion</td>
<td>20</td>
<td></td>
<td>3,000</td>
</tr>
<tr>
<td>Black bear (spring and fall)</td>
<td>58 (approx)</td>
<td></td>
<td>5,800</td>
</tr>
</tbody>
</table>


helping to capture bears in campgrounds and populated areas. Over the past three years, ADC has taken an annual average of 47 coyotes, 35 feral dogs, 1.3 lion, and 3.7 bears (Table 3-10). Control tools include leghold traps, M-44s, and calling and shooting for coyotes and feral dogs, and foot snares and hunting with dogs for lions and bears (Phillips 1994).

Tribal Policies and Plans

The tribal economy is guided by the Overall Economic Plan (White Mountain Apache Tribe 1993). Tribal plans include upgrading and expanding timber-related activities such as increasing timber processing capabilities, broadening the tourist base to include passive activities such as the opening of a walk-through historic park, and the development of retail and service businesses. The trend is toward internalizing control over these economic and development ventures (White Mountain Apache Tribe 1993).

The Tribal Council adopted a resolution in 1995 opposing Mexican wolf recovery in the BRWRA (White Mountain Apache Tribe Res. No. 12-95-371). In 1994, the Council adopted a resolution prohibiting most access to the reservation by federal and state agencies for scientific research or data collection without the tribe’s express written consent (Res. No. 02-94-060).

Livestock Grazing

All areas within the reservation except the populated areas and the wildlife area are grazed by livestock. There are nine multiple-family livestock associations and one tribal herd. The allocated animal units (cow and calf) total 15,230. The reservation is understocked due to low precipitation and few association funds. Grazing is yearlong. Previously, the associations held an annual fall sale of calves; however, because of low calf numbers, a regular sale has not been held for several years. Table 3-10 depicts the reported livestock losses for 1990-92. Approximately 3,500 head of horses also occur on the reservation.

Livestock ownership and grazing is not a major economic base on the reservation. Individuals within the associations own varying numbers of animals, from one cow to over 200 animals. Livestock ownership was established and largely continues to be for subsistence. Cattle are used for ceremonies, wakes, family consumption, etc.

Forestry

Forest management is governed by lo-year harvest plans. Commercial forestry occurs in the montane conifer forest, mostly in the northeast section of the reservation. Up to 721,000 acres are active timber harvesting areas, with annual harvests of 75 to 80 million board feet. Two sawmills exist, one at Cibecue and one at Whiteriver, for a total capacity of about 80 million board feet of lumber.

Mining and Other Natural Resource Extraction

No mineral extraction is occurring on the reservation. Mineral deposits ranging from non-metalliferous building materials to precious metals occur on the
Table 3-10. White Mountain Apache Reservation livestock losses reported to APHIS-ADC, 1990-92.

<table>
<thead>
<tr>
<th></th>
<th>Cows</th>
<th>Calves</th>
<th>Horses</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1990:</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bear</td>
<td>80</td>
<td>64</td>
<td></td>
</tr>
<tr>
<td>Feral dog</td>
<td>57</td>
<td>57</td>
<td></td>
</tr>
<tr>
<td>Lion</td>
<td>41</td>
<td>30</td>
<td></td>
</tr>
<tr>
<td>Coyote</td>
<td>71</td>
<td>97</td>
<td></td>
</tr>
<tr>
<td><strong>Subtotal</strong></td>
<td>249</td>
<td>248</td>
<td>2</td>
</tr>
<tr>
<td><strong>1991:</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bear</td>
<td>9</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>Feral dog</td>
<td>8</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>Lion</td>
<td>12</td>
<td>10</td>
<td>2</td>
</tr>
<tr>
<td>Coyote</td>
<td>3</td>
<td>20</td>
<td></td>
</tr>
<tr>
<td><strong>Subtotal</strong></td>
<td>32</td>
<td>46</td>
<td>2</td>
</tr>
<tr>
<td><strong>1992:</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bear</td>
<td>38</td>
<td>35</td>
<td>1</td>
</tr>
<tr>
<td>Feral dog</td>
<td>18</td>
<td>18</td>
<td></td>
</tr>
<tr>
<td>Lion</td>
<td>11</td>
<td>9</td>
<td>6</td>
</tr>
<tr>
<td>Coyote</td>
<td>15</td>
<td>69</td>
<td></td>
</tr>
<tr>
<td><strong>Subtotal</strong></td>
<td>82</td>
<td>131</td>
<td>7</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>363</td>
<td>425</td>
<td>11</td>
</tr>
</tbody>
</table>


reservation; however, potential for development is low. Large quantities of gypsum and limestone and small amounts of low-quality coal have been located but nor extensively developed.

Public Access and Recreation

About 760 miles of roads exist on the reservation, of which 128 miles are paved. The tribe requires all non-members to purchase outdoor recreation permits for activities on the reservation. The tribe offers hiking, backpacking, fishing, hunting, camping, whitewater rafting, boating, skiing, and gaming. The Sunrise Park Ski Resort near Mount Baldy offers downhill skiing and related activities. The revenues from fishing, camping, rafting, and picnicking were expected to total nearly $1.2 million in 1995. Skiing will add nearly $2 million and gaming nearly $5 million to tribal revenue. The northeast corner near Mount Baldy is closed to non-tribal members, and special use permits are required for the areas bordering the southern boundary as well as the entire area west of Highway 60.
Regional Economy, Employment and Population

The reservation is economically diverse, particularly near Whiteriver, with an active sawmill, thriving commercial development, and many construction projects underway. Industrial and farming pursuits are limited, although some irrigated farming occurs in the river valleys. The economy is centered on natural resources and recreation (BIA 1978). Five firms within the public administration, service, and manufacturing sectors account for 73.7% of employment. Tourism is a major employer, directly contributing more than 14% of reservation employment. The Sunrise Park Ski Resort and the Fort Apache Timber Company (employing about 220 tribal members) are the largest employers (White Mountain Apache Tribe 1993).

According to the U.S. Census, the civilian labor force was 5,820 individuals in 1990 and the unemployment rate was 32.8% (although the U.S. BIA reported a 6 1% unemployment rate for 1990 (Waters 1991)).

The median household income is $13,020 and 50.8% of the people live below the poverty level (Table 3-11). The reservation is sparsely populated, with approximately 10,390 residents according to the U.S. Census. The BIA estimated the resident population at 11,000 tribal members and about 2,500 non-tribal residents (Waters 1991). The residents are primarily clustered around Whiteriver, McNary, and Cibeque. The population has been growing steadily by almost three percent annually since 1980 (White Mountain Apache Tribe 1993).

Lakeside Ranger District, Sitgreaves National Forest

The Lakeside Ranger District, which lies immediately to the north of the White Mountain Apache Reservation and to the northwest of the BRWRA, comprises relatively gentle terrain sloping upward from northwest to southeast. The elevation ranges from 6,500 feet to 8,800 feet. Volcanic cones, generally in the eastern portion, rise 500 to 1,000 feet above the base topography. The ranger district has several wetlands, streams, lakes, and artificial impoundments.

A mixture of piñon-juniper, ponderosa pine, mixed conifer, and aspen forest types occur here. The northwest portion is predominantly piñon-juniper and dry rangeland. Plant cover is low, primarily due to low rainfall and low elevations. Mixed conifer and aspen occur mostly in the eastern portion and are associated with the volcanic cones. Approximately half of the district consists of ponderosa pine.

The district is managed under the Apache-Sitgreaves National Forest Plan (SW Region USFS 1987b). In the short term, management for consumptive uses (which includes recreation such as hunting and fishing) will be emphasized (E.H. Klein, Sitgreaves NF, pers. comm.). However, as the area becomes more urban, the demand for non-consumptive uses increases, and a greater emphasis may be placed on developing nonconsumptive recreational opportunities in the future.

The ranger district permits a total of 2,460 livestock. The entire district is open to grazing,

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**Table 3-11. Summary of regional U.S. Census data for the White Mountain Apache Reservation.**

<table>
<thead>
<tr>
<th>Total population</th>
<th>10,394</th>
</tr>
</thead>
<tbody>
<tr>
<td>Population density</td>
<td>4.2/mi²</td>
</tr>
<tr>
<td>Number in civilian labor force</td>
<td>5,820</td>
</tr>
<tr>
<td>Percent of civilian labor force unemployed</td>
<td>32.8%</td>
</tr>
<tr>
<td>Percent of civilian labor force employed in agriculture, forestry or fisheries</td>
<td>5.7%</td>
</tr>
<tr>
<td>Median household income</td>
<td>513,020</td>
</tr>
<tr>
<td>Percent of population below poverty level</td>
<td>50.8%</td>
</tr>
</tbody>
</table>

**Source:** 1990 U.S. Census for the Fort Apache reservation.
although some areas have not been grazed recently. Grazing occurs in the majority of allotments from June to October; a few are year-round.

Recreation includes camping, picnicking, hiking, sight-seeing, cross country skiing, hunting, fishing, and birdwatching, for an average of 409,000 RVDs yearly. The district has three developed campgrounds, three primitive campgrounds, a large number of undeveloped camp sites, and approximately 200 miles of trails used by horses, mountain bikes, and hikers. Most recreational activities occur in the southern and eastern parts of the district where pine vegetation predominates.

Traditionally, this portion of Arizona has been a recreation and vacation area. Forty-thousand acres of private land occur within the district boundaries consisting mostly of unincorporated developments. Two communities, Pinetop-Lakeside and Show Low, are located within the boundaries of the district with a combined population ranging from about 10,000 in the winter to over 50,000 in the summer. The trend is toward more growth as a retirement and second home area, leading to an increase in demand for conversion of National Forest lands to both private lands and areas for dispersed recreation (E.H. Klein, Sitgreaves NF, pers. comm.).

**San Mateo Mountains**

**Unit of Cibola National Forest**

The San Mateo Mountains encompass approximately 395,000 acres primarily in the southwestern portion of Socorro County northeast of the Black Range in New Mexico. The San Mateos are situated in the Magdalena Ranger District of Cibola NF, to the northeast of the Gila NF portion of the BRWRA. No permanent water sources are found in the San Mateos; only seasonal springs and wildlife watering tanks are located here. Vegetation ranges from spruce-fir woodland at about 10,000 feet elevation to mixed conifer, ponderosa pine and piñon-juniper woodlands, mountain shrub, plains grassland, and Chihuahuan desert at about 6,000 feet elevation on the south end of the mountains. About 66 percent of the land is forested. Less than 4,000 mule deer inhabit this part of the Cibola NF Approximately 400 elk also occur (B. Stephenson, Cibola NF, pers. comm.).

Most of the mountain range is covered by a management plan; however, about 52,800 acres in the southern half of the range is not under any current plan. Unit plans covering a ten-year period will be prepared beginning in fiscal year 1996 (B. Stephenson, Cibola NF, pers. comm.).

There are approximately 4,000 head of permitted cattle using the mountain range. Grazing seasons vary from a few months to year-round. The only ungrazed land is in the upper elevations of the Apache Kid and Withington Wilderness Areas. No timber sale program exists on the Magdalena Ranger District with the exception of fuelwood harvesting. No new campgrounds, roads, or major hiking trails are planned. Management emphasis for the mountain range will continue to be grazing, dispersed recreation, and wilderness management.

The primary recreation use is hunting, predominantly for mule deer and elk. During the warmer months, developed camp sites receive steady use. Hiking and sight-seeing by automobile are other important seasonal uses. The San Mateo Mountains account for about 75,000 RVDs.

**White Sands Wolf Recovery Area (WSWRA)**

**Geography**

The WSWRA encompasses 2,578,026 acres, or 4,028 mi², in south-central New Mexico (Fig. 3-4). This area includes all of White Sands Missle Range and Holloman Air Force Base (2,087,264 acres), White Sands National Monument (142,639 acres), the San Andres National Wildlife Refuge (57,215 acres contained within the missile range boundary), and lands adjoining the western boundary of the missile range (348,123 acres), including the Jornada Experimental Range and San Andres National Wildlife Refuge. The WSWRA encompasses two entire mountain ranges (the San Andres and the Oscura Mountains), portions of two major drainage basins (the Tularosa Basin to the east of the mountains and the Jornada del Muerto to the west of the mountains), two lava flows, and the largest gypsum deposit in the world.

The WSWRA primary recovery zone consists of the San Andres Mountains in the western part of the missile range. (The primary recovery zone and other precise boundaries are delineated in Box 2-1.)
Figure 3-4. White Sands Wolf Recovery Area.
affected environments

the secondary recovery zone on the west side is the narrow strip of foothills and plains, about 70 miles long and about eight miles wide, lying adjacent to the missile range boundary (fig. 3-4). the secondary recovery zone makes up 14% of the wswra and consists mostly of blm lands, private lands, and the jornada experimental range (see separate section below). the remainder of the wswra secondary recovery zone lies within the white sands missile range boundary, consisting of all lands outside the san andres mountains.

the wswra includes portions of five new mexico counties: dona ana, sierra, socorro, lincoln, and otero. highway 70 traverses the southern portion between las cruces and alamogordo forming the southern boundary of the primary recovery zone. the 1,119,771-acre fort bliss, an army artillery and air defense training range, lies to the south of the wswra. the army has evacuation agreements with land owners over four extension areas to the north and west of the missile range that are evacuated periodically for safety reasons during missile tests and other military activities (fig. 3-5).

white sands missile range is approximately 100 miles long and 37 miles wide. the majority of the range is situated in the tularosa basin, which consists mostly of cenozoic deposits of gypsum and quartz (bednarz 1389). the basin is notable for its shifting gypsum dunes and extensive alkali flats. the northern part of the basin is covered by a basalt flow called the carrizo malpais. the san andres mountains form the western boundary of the tularosa basin for approximately 85 miles and are from six to 17 miles wide. the range rises to about 9,000 feet elevation at salinas peak. the san andres are fault-block mountains with tilted sedimentary rock beds dipping westward toward the jornada del muerto. the foothills and bajadas in the secondary recovery zone to the west of the san andres grade into gravelly and sandy plains toward the rio grande.

the oscura mountains occupy the northeastern section of the wswra. these extend 25 miles from north to south in a roughly triangular shape with a maximum width of about 13 miles. the oscuras are comprised of primarily eastward dipping blocks of permian sedimentary and paleozoic rocks (meinzer and hare 19 15). the western margin is a steep escarpment and the eastern slope descends gradually.

climate

the climate in the wswra is typical of the southwestern deserts, characterized by aridity throughout the year, hot summers, mild winters, low relative humidity, and scant precipitation (table 3-12). average high temperatures can be over 100°f in june, and the average low is 21°f in january. annual precipitation varies from 7 to 11 inches in the lower areas, averaging 10 inches. high mountain locations in the san andres can receive from 12 to 20 inches, averaging 18 inches. most precipitation occurs during thunderstorms from june through september. precipitation from 1993-1995 in the lower tularosa basin has been 38% below the 1995-1994 ten year average (morrow 1996).

water

surface water in the wswra is almost nonexistent except for the highly gypsiferous and saline water in lake lucero, salt creek, malpais springs, and lost river. malpais springs is the most significant source of surface water, discharging several cubic feet per second. about 130 small springs, of variable reliability, exist in both the san andres and oscura mountains. approximately 50 percent of these are perennial (bednarz 1989). discharge from most sites usually is less than one gallon per minute (usfws 1985). as a result of a 1993-1995 drought all natural springs in the san andres mountains either dried up or were at their lowest levels in ten years (logan 1994a). in addition, white sands missile range has more than 50 watering facilities (e.g. windmills and rainwater catchments) that are occasionally serviced for game, wildlife, and feral horses (d. taylor, wsmr, pers. comm.).

the secondary recovery zone to the west of the missile range has numerous dirt tanks and livestock troughs, many supplied by pipeline systems. a water source occurs roughly every one to two miles (howard 1993).
Figure 3-5. White Sands Missile Range Extension Areas.
Table 3-12. Average annual temperatures for White Sands Missile Range, New Mexico.

<table>
<thead>
<tr>
<th>Region</th>
<th>Elevation (feet)</th>
<th>Temperature (°F)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basins</td>
<td>3,900-4,900</td>
<td>77 61 46</td>
</tr>
<tr>
<td>Mountains</td>
<td>5,000-9,060</td>
<td>74 53 31</td>
</tr>
</tbody>
</table>


Vegetation

The WSWRA supports a mixture of Chihuahuan desert, upper Sonoran desert, and southern Rocky Mountain flora. The major vegetation classes include p&on-juniper woodland, semi-desert shrubs, desert grasslands, gypsum grasslands and dunes, and desert mountains (NMNHP 1992).

A ponderosa pine community occurs at the highest elevations of the San Andres Mountains at Salinas Peak, covering about 7 mi². The coniferous woodlands are found between 6,300 and 8,500 feet elevation and are dominated by piñon and juniper. These woodlands total about 237 mi². Savannas occurring between about 6,000 and 7,000 feet elevation have open juniper canopies with predominately grassy cover. Savannas cover approximately 321 mi² of the missile range.

Scrublands are extensive, covering over 2,000 mi². Scrub types occur from about 4,100 to 8,500 feet elevation. Montane scrub usually occurs in the same elevation zone as woodlands and savannas, but in either more extreme environments or on sites that have been subjected to high frequency disturbance such as repeated fire. The vegetation is dominated by mountain mahogany, oaks, and hardy grasses. Plains-mesa scrub is typified by sand sage, occurring along the edge of the upper Jornada basin. Chihuahuan desert scrub occupies large areas of lower mountain slopes, bajadas, and basin bottoms, and is dominated by drought-resistant shrubs.

Grasslands on the missile range total about 761 mi² and are dominated by plains-mesa and desert grasslands. Plains-mesa grasslands lie between the higher elevation woodlands, savannas, or montane scrub, and the lower elevation desert grasslands or desert scrub. Desert grasslands are characterized by species like black grama. Desert grasslands range in elevation from 4,000 to 6,000 feet (NMNHP 1992).

The federally listed plants occurring in the WSWRA are listed in Appendix D.

Animals

History of Wolves

The WSWRA lies within the probable historic range of the Mexican wolf subspecies. Historic documentation of wolves is sparse, consisting of a few verbal accounts from turn-of-the-century residents (Halloran 1946a, 1944a, and 1944b; Forsling 1919). Also, Bertram (1992) examined canid bones excavated from the northeastern foot of the Organ Mountains within the WSWRA, which he identified as Canis lupus. However, he could not determine whether the bones were of local origin or came to the site through trade from elsewhere.

Bailey (1907 and 1931) mentioned reports of wolves in the San Andres and documented their common occurrence in the early twentieth century in neighboring areas such as the Sacramento and Capitan Mountains. Nunley (1977) and Young and Goldman (1944) reported wolves being captured west of the WSWRA near Hatch, New Mexico. No confirmed wolf reports have come from the area in recent years (Wolok 1994). However, one alleged sighting of a lone “wolf” occurred in 1988 at the southern White Sands Missile Range boundary in Otero County (Wolok 1994).

Species of Special Concern

The federally endangered species which the FWS lists as occurring on the missile range include the bald eagle, American peregrine falcon, northern aplomado falcon, southwestern willow flycatcher, whooping crane, and black-footed ferret. Federally-threatened Mexican spotted owls are listed by the FWS as
occurring. Peregrine falcons and bald eagles have been documented only as transients. The other animal species are seasonal residents or breeding species.

The potential wolf prey species of special concern is the New Mexico-endangered desert bighorn sheep, which occurs in the San Andres Mountains. The population numbers about 30 individuals (S. Berendzen, San Andres National Wildlife Refuge, pers. comm.) and primarily inhabits steep, rocky areas. The population has had persistent, devastating scabies infections that sharply reduced its numbers in the late 1970s from a high of about 200 animals (Sandoval 1979).

Critical habitat for the federally endangered Todsen’s pennyroyal occurs within a 2-km² area of White Sands Missile Range. Activities by the Army which would result in increased trampling or disturbance of the critical habitat may be restricted (46 Fed. Reg. 5730, Jan. 19, 1981).

Potential Wild Prey of Wolves

Mule deer are the most abundant ungulates followed by oryx, pronghorn, and feral horses. Table 3-13 provides population estimates for these potential prey (except horses) on the missile range portion of the WSWRA. Small mammals and ungulates such as javelina, elk, and desert bighorn sheep occur in limited numbers.

Mule deer occupy most habitat types except for the lowest elevations in the Tularosa Basin where vegetation and fresh water are sparse or nonexistent. Approximately 70% (5,300) of the total mule deer population on the missile range can be found in the primary recovery zone in the San Andres Mountains (NMDGF 1993a, 1993b, and 1992). Densities vary widely, from less than one animal per mi² to 10-12 per mi² within the mid-elevations of the mountains and along the footslope areas. Pockets of high densities exist at lower elevations as well. About 10% of the total deer population dwells in the lower basins (P. Morrow, WSMR, pers. comm.).

A drought from 1993-1995 has caused a decline in mule deer numbers in the San Andres Mountains (Morrow 1996). Fawns and reproducing does experienced the greatest reduction. It is anticipated that the mule deer population in the San Andres will recover with the return of normal to above normal precipitation (Logan 1994a).

Approximately 80% of the pronghorn live in the Jornada Basin and the rest occur in the northern and western portions of the Tularosa Basin below,000 feet elevation (U.S. Army 1994). Pronghorn move seasonally between the missile range and adjacent private and federal lands, apparently in response to water and forage availability. Overall, pronghorn on the missile range are increasing. The Jornada Basin pronghorn population appears to be stable-to-increasing and the Tularosa Basin population appears to be increasing (P. Morrow, WSMR, pers. comm.).

Non-native oryx are well-distributed below 6,000 feet elevation. Generally, oryx occupy the basin desert shrub and grassland habitats, but they can be found throughout the WSWRA, including most canyons within the San Andres. Single oryx and groups of less than three individuals are frequently observed in piñon-juniper habitats (P. Morrow, WSMR, pers. comm.). The population on the WSWRA is about 1,700 animals. It is increasing at an average annual rate of about 17% (Table 3-14). In the WSWRA, the species has no significant predators other than humans. They have sharp, formidable horns, and they defend their young. Coyotes, mountain lions, and bobcats may take a few, primarily young, oryx. It is

<table>
<thead>
<tr>
<th>Species</th>
<th>Mule Deer</th>
<th>Pronghorn</th>
<th>Oryx</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary recovery zone</td>
<td>5,300</td>
<td>70</td>
<td>700</td>
</tr>
<tr>
<td>Secondary recovery zone</td>
<td>2,200</td>
<td>280</td>
<td>1,000</td>
</tr>
<tr>
<td>Total primary + secondary</td>
<td>7,500</td>
<td>350</td>
<td>1,700</td>
</tr>
</tbody>
</table>

Table 3-14. Oryx population estimates for the WSWRA.

<table>
<thead>
<tr>
<th>Area</th>
<th>Year 1993</th>
<th>1994</th>
<th>1995</th>
<th>1996</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary recovery zone</td>
<td>700</td>
<td>700</td>
<td>950</td>
<td>1,100</td>
</tr>
<tr>
<td>Secondary recovery zone within the missile range</td>
<td>650</td>
<td>825</td>
<td>900</td>
<td>1,070</td>
</tr>
<tr>
<td>Secondary recovery zone outside the missile range</td>
<td>150</td>
<td>175</td>
<td>200</td>
<td>230</td>
</tr>
<tr>
<td>Total WSWRA</td>
<td>1,500</td>
<td>1,700</td>
<td>2,050</td>
<td>2,400</td>
</tr>
</tbody>
</table>


not known whether wolves will prey on oryx, or whether oryx will harm the wolves through defensive actions. African wild dog packs do not attack oryx in their native Africa (J. Ginsberg, Zoological Society of London, pers. comm.). No evidence exists of disease resulting in significant mortality in the oryx population (D. Taylor, WSMR, pers. comm.).

The oryx population continues to expand beyond original introduction expectations (Saiz 1978). Concern over the impacts of this expansion is increasing. White Sands National Monument personnel are undertaking a roughly half-million dollar project to fence out oryx (D. Ditmanson, White Sands Natl. Mon., pers. comm.). Managers are implementing strategies to reduce the population, particularly within the mountains where the potential to compete with native species may increase and through which oryx may disperse off the missile range (Morrow 1996).

A population of feral horses exists on the missile range entirely within the northern Tularosa Basin. The horses likely represent the progeny of domestic ranch stock left behind after the Army established exclusive military use of the missile range in 1950 (U.S. Army 1991). They are not protected under the Wild and Free-roaming Horses and Burro Act, 16 USC § 1334, because the Act does not apply to federal military lands. Feral horse movements and distribution are directly related to water availability (U.S. Army 1991). During dry periods horse distribution becomes compressed. Following rains horses again disperse (Morrow 1993).

In 1994, the horse population was estimated at 1,200 to 1,400 animals. However, several die-offs had occurred as a result of extreme dry conditions which limited forage and water availability. Over 120 horses died in the 1994 drought. Severe degradation is evident throughout horse habitat, especially along riparian areas (D. Holdermann, NM Coop. Res. Unit, pers. comm.). Pursuant to a study and Environmental Assessment (EA), the missile range initiated horse reduction activities (capture and removal) in late 1995; the current population is 250-350 animals (Morrow 1996). Current management objectives call for continued reductions in the population in 1996 to achieve the EA recommendation of half the Maximum Target Population of about 375, that is, reducing the population to about 180.

Small prey species include jackrabbits, cottontails, skunks, porcupines, ground squirrels, chipmunks, rats, and other small mammals (Bednarz 1989; Findley 1975).

Hunting

All big game hunts on the missile range are by special permit with limited entry. Permit levels and hunt areas are established cooperatively by White Sands Missile Range and the New Mexico Department of Game and Fish. In recent years, there have been two deer, one pronghorn, and six oryx hunts annually. Deer hunts are conducted annually in either the Salinas Peak or Oscura Mountain Hunt Area on an alternating basis. One male deer with at least one forked antler is the legal limit. Pronghorn are hunted concurrently with oryx in the Stallion Range Center area each fall. The legal harvests are one male pronghorn and either a
male or female oryx. Hunters are limited to one trophy oryx permit for life. Most hunts take place for two days over a weekend. Both rifle and primitive weapons hunts (muzzle-loader and archery) are conducted annually. No hunting is permitted on Holloman Air Force Base except for occasional oryx control hunts.

Table 3-15 summarizes the average mule deer harvest over the past five years. The average annual permit level for deer hunts is 140, and hunter participation averages 123 (88%). Hunter success rates average 51% for all deer hunts combined. Bow hunter success averages 11%, while rifle hunter success averages 69%. The success rate for primitive weapon hunts averages 38%. Harvest strategies for the 1996-97 season on WSMR will include the reduction of permit levels by about 50% from the previous year to an expected harvest of 40-55 legal bucks in the northern San Andres and Oscuras.

Pronghorn and oryx harvest statistics for the period 1986 though 1993 are presented in Table 3-16. From 1992-1994, permit levels increased by an annual average of 10%, while the oryx population is estimated to have increased 17% annually. Approximately 200 oryx permits were available in 1994 (U.S. Army 1994; R Morrow, WSMR, pers. comm.). Permit levels for the 1995-96 season were increased by 50% to 300 permits. Depredation hunts held on and off WSMR were increased by over 100% to approximately 150 permits.

**Existing Livestock Predators**

Coyotes are present in the mountainous areas in low densities and are more numerous in the secondary recovery zone in the Jornada del Muerto (K. Havstad, Jornada Experimental Range, pers. comm.).

White Sands Missile Range and the New Mexico Department of Game and Fish have initiated an informal agreement that allows nuisance black bears live-trapped from the Cloudcroft and Ruidoso areas to be released into suitable habitat within the Oscura Mountains on the missile range (NMDGF 1993b). Eight bears have been relocated under this agreement. Relocated bears were not believed to have killed livestock or to have been aggressive toward humans.

The total mountain lion population in the San Andres Mountains is estimated at 75 to 80. Density is approximately one lion per nine mi². This density is among the highest documented in North America (Logan 1994b). An experiment was initiated in 1990 in which two-thirds of the lion population of the southern San Andres were translocated to northern New Mexico. By mid-1993, most of this loss had been replaced by immigration and reproduction, and the population in this portion of the San Andres stood at 26 to 28 animals. Researchers continue to regularly monitor their movements. Despite the high lion density, cases of depredations on livestock on the west side of the missile range have been very rare (K. Logan, Hornocker Wildlife Research Inst., pers. comm.).

No predator control occurs within the missile range boundary. The New Mexico ADC office has control agreements with six ranches in the WSWRA secondary recovery zone. Target animals are coyotes and bobcats, and a full range of control methods are used. Verified losses in 1992 consisted of one calf.

**Table 3-15. Average annual mule deer harvest, White Sands Missile Range, 1989-1993.**

<table>
<thead>
<tr>
<th>Area</th>
<th>Weapon</th>
<th># Permits</th>
<th># Hunters</th>
<th>Harvest</th>
<th>% Hunter Success</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oscura</td>
<td>Bow</td>
<td>50</td>
<td>43</td>
<td>4</td>
<td>8</td>
</tr>
<tr>
<td>Salinas</td>
<td>Bow</td>
<td>50</td>
<td>36</td>
<td>5</td>
<td>14</td>
</tr>
<tr>
<td>Oscura</td>
<td>Rifle</td>
<td>93</td>
<td>84</td>
<td>42</td>
<td>49</td>
</tr>
<tr>
<td>Salinas</td>
<td>Rifle</td>
<td>75</td>
<td>71</td>
<td>60</td>
<td>88</td>
</tr>
</tbody>
</table>

**Source:** Morrow 1994.
Table 3-16. Average annual pronghorn and oryx harvest, White Sands Missile Range, 1986-1993.

<table>
<thead>
<tr>
<th></th>
<th># Permits</th>
<th># Hunters</th>
<th>Harvest</th>
<th>% Hunter Success</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pronghorn</td>
<td>27</td>
<td>26</td>
<td>25</td>
<td>97</td>
</tr>
<tr>
<td>Oryx</td>
<td>148</td>
<td>147</td>
<td>140</td>
<td>96</td>
</tr>
</tbody>
</table>


Land Ownership and Management

The Department of the Army exerts principal control and land management authority over White Sands Missile Range. The Army manages it to support missile and weapons development and test programs for the Army, Navy, Air Force, National Aeronautics and Space Administration (NASA), several other agencies, and non-government agencies. The missile range consists of a complex overlay of federal lands co-used by the Army and various land administrators, particularly in the southern one-third of the installation. Air space over the entire WSWRA is controlled by the military.

The National Park Service administers the 88-mi² White Sands National Monument. The monument is located entirely within the boundaries of White Sands Missile Range (see separate section below on the Monument). The FWS manages the 90-mi² San Andres National Wildlife Refuge that also lies entirely within the missile range. The principal purpose of the refuge is to conserve and develop its wildlife resources. The focus of refuge activities has been on protecting and restoring the remnant population of desert bighorn sheep.

The U.S.D.A. Agriculture Research Service, administers the 293-mi² Jornada Experimental Range located on the western San Andres Mountain piedmont and on the eastern portion of the Jornada Valley (see separate section below on the JER). About half of the JER is located within the missile range, and activities of both the Agriculture Research Service and the Army are subject to a co-use agreement.

NASA manages its White Sands Test Facility on a 88 mi² portion of the missile range to test spacecraft components. The Army has access to the NASA site and may construct roads, power lines, communication lines, and instrumentation sites, as well as conduct missile and Air Force tests at altitudes above 10,000 feet.

A 64-mi² area in the southeastern portion of the missile range is managed by Holloman Air Force Base.

The New Mexico Department of Game and Fish has ultimate management responsibility for most of the wildlife in the area. An interagency cooperative agreement sets forth the specific responsibilities of the Department of Game and Fish, U.S. Fish and Wildlife Service, and the Army.

Military use of all co-use lands takes precedence over other activities. Public access generally is prohibited on all co-use lands except on White Sands National Monument (WSMR 1993). The secondary recovery zone to the west of the missile range boundary consists mostly of BLM and private land. About a dozen ranches operate there.

Land Development

Within the missile range are one post headquarters area in the southwestern corner and four range centers (Stallion, Oscura, North Oscura, and Rhodes Canyon Range Centers), two of which are regularly inhabited by government personnel (Fig. 3-6). The post headquarters area consists of 1,900 acres (U.S. Army 1985) and provides living quarters for about 850 families and 65 single people (Anon. 1992). The range centers occupy less than 65 acres each and primarily consist of maintenance, shop, and storage buildings. These sites have temporary housing facilities for 20 to 80 people (U.S. Army 1985). All of the support facilities are located in lowland basin areas.

More than 1,100 instrumentation sites are scattered throughout the missile range (U.S. Army 1985). Many of these consist simply of elevated concrete pads used occasionally to support portable equipment during specific tests. A few sites have structures manned occasionally. Collectively, these sites occupy about 1,480 acres, mostly in basin areas (U.S. Army 1983).
Figure 3-6. Impact areas and range centers in White Sands Missile Range.
Historic homesteads, mostly in dilapidated condition, are scattered throughout the missile range. The Hardin Ranch and Mocking Bird Gap House are maintained by the Army and used mostly by staff working in remote areas.

**Livestock Grazing**

The only part of the WSWRA with private livestock grazing is the narrow, sparsely-populated ranching area in the secondary recovery zone to the west of the missile range. Twelve ranchers graze a total of about 2,120 cattle year-round. Some of their BLM allotments are only partially within the secondary recovery zone (Howard 1993). Cattle occasionally trespass onto the missile range, especially where fences do not exist or are not maintained, and a small band (10 to 20) of feral cows reportedly lives in the southern part of the San Andres (D. Taylor, WSMR, pers. comm.).

**Mining and Other Natural Resource Extraction**

There are no active mines or other natural resource extraction activities occurring within the WSWRA, with the exception of an exploration permit granted for an alleged historic gold cache on Victorio Peak in the southern part of the San Andres range. Active mines for precious metals are found in the northwest part of the Oscura Mountains just outside the WSWRA boundary near Bingham. Portions of the secondary recovery zone to the west have been leased for oil and gas development (Howard 1993). However, the few wells drilled have not produced and the development potential appears low.

**Military Activities**

White Sands Missile Range is a multi-service test range. Its main function is to support missile development and test programs for the Army, Navy, Air Force, NASA, other government agencies, and private industry. The missile range is under the operational control of the U.S. Army Test and Evaluation Command, Aberdeen Proving Ground, Maryland. The primary purpose is to test new high-technology weapons systems and equipment. In conducting these tests, the missile range uses sophisticated instruments such as radar, fixed and tracking optics, and telemetry.

White Sands Missile Range also operates various Army laboratories and test facilities, including the Temperature Test Facility, Atmospheric Sciences Laboratory, Aerial Cable Range, and Nuclear Effects Laboratory. Simulated nuclear explosions are conducted in the northwest area to the west of the Oscura Mountains. White Sands Missile Range also provides an alternate landing site for the space shuttle program. In 1992, 91 testing programs were active and 3,468 different tests were completed (Public Affairs Office 1993). Many sites are used as missile or weapons impact areas or for other types of potentially hazardous experiments. Most operations that involve some risk to wildlife and humans are carried out in the Tularosa Basin; however, the mountainous areas are subject to occasional impact risk.

Many missile firing programs are underway. Surface-to-surface type missiles, with ranges in excess of twenty miles and requirements for large impact areas, use much of the range area and assets. Surface-to-air missiles along with their associated targets use even more range area and assets, often scattering debris over wide areas. The proposed reopening of the off-range corridor over White Sands Missile Range, which would enable the firing of target missiles from Fort Wingate, New Mexico and Green River, Utah, would increase surface-to-air test activity. Several air-to-air missile test programs are ongoing with the attendant problem of debris falling over wide areas. Air-to-surface missile tests also are ongoing and have large surface area danger zones as well as specific target areas.

Most of the instruments are mobile and may be operated from any of the more than 1,100 sites distributed throughout the missile range, depending upon the test requirements. There also are a number of autonomous, manned facilities scattered throughout, the operators of which frequently conduct their own operations. Most of those sites, such as Aerial Cable, Large Blast Thermal Simulator, and Nuclear Effects facilities, are located in the basin areas. However, some facilities are located in or adjacent to mountainous areas. North Oscura Peak is occupied intermittently by test programs requiring a mountain-top location.

Although a majority of the live firing tests have the potential to impact the mountainous areas of the range, the more routine impacts in the San Andres area will result from Air Force and Air National Guard training missions. Most of these missions occur at altitudes over 10,000 feet. Duds and damaged drone
targets are scattered throughout the mountain range. Targets are not normally shot down over the San Andres because of the difficulty in recovering the debris; however, this area is a safety buffer zone and impacts can occur.

The Red Rio and Oscura impact areas (Figure 3-6, above), managed by Holloman Air Force Base, are mainly used for bomb drop exercises and by tactical fighter aircraft for air-to-ground gunnery and strafing practice. These locations in the relatively dry foothills are contaminated with 20-mm shells, but are policed periodically for duds by the Air Force to the maximum extent possible (U.S. Army 1985). Programs involving the testing of air defense system weapons have been active in the foothill areas east of the Oscura Mountains (U.S. Army, n.d.). The testing programs involve numerous missile firings at fixed-wing and rotary drone aircraft. The Oscura Mountains primarily serve as a “back stop” for launched missiles that miss the targets. Live ordnance has occasionally caused fires in this area (U.S. Army, n.d.).

A hazardous test area in the southwestern portion of the missile range (Fig. 3-6, above) lies adjacent to the San Andres. Contaminants at this site include ordnance, explosives, and propellants that may be potentially toxic to wildlife.

Public Access and Recreation

The entire missile range is closed to the public with the following exceptions: occasional temporary openings of specified areas such as the Trinity Site, which commemorates the first atomic bomb test; big game hunts; and special use permits, such as for research. Additional public access has been proposed for future special events. Holloman Air Force Base is closed to the public with the exceptions of Lakes Holloman and Stinky. The White Sands National Monument is open to the public (see separate section below on the Monument). Highway 70 provides the major public access across the WSWRA.

The secondary recovery zone to the west of White Sands Missile Range is primarily BLM land that is open to public use. However, due to its isolation and lack of developed recreational opportunities, recreational use is low (Howard 1993). The exception is during the deer hunting season when numerous hunters occupy BLM land along the missile range boundary.

Regional Economy, Employment, and Population

The economic activity generated by missile range testing activities and nearby military and space facilities dominate the economy of the WSWRA. The combined civilian and military payrolls of the missile range exceed $143 million annually. An additional payroll is attributable to the contractors working on the range (Public Affairs Office 1993).

The Post area, where 1,724 personnel live, is the only population concentration within the WSWRA. Most of the rest of the 8,800 missile range employees (military, civilian, and contractors) live in the Las Cruces, El Paso, or Alamogordo areas (Public Affairs Office 1993). The other large employers in the region are Holloman Air Force Base near Alamogordo and New Mexico State University in Las Cruces.

The population of Doña Ana County, which is concentrated in the Las Cruces area, is projected to grow rapidly in the near future, from 136,470 in 1990 to 182,430 in 2000 (Bur. of Bus. and Econ. Res. 1991). Slower growth rates are projected for Lincoln, Otero, Sierra, and Socorro Counties surrounding the WSWRA. Table 3-17 summarizes U.S. census data for the census areas that correspond best to the boundaries of the WSWRA. There are no permanent inhabitants of the WSWRA primary recovery zone, thus no summary table is provided for it.

White Sands National Monument

White Sands National Monument occupies approximately 145,000 acres of the Tularosa Basin and is surrounded by White Sands Missile Range. The Monument was established to preserve the white gypsum sand dunes and crystalline formations that cover about 37% of the area (NPS 1993). The Monument contains no perennial water sources. Lake Lucero, a playa lake, contains water about 10% of the time. During periods of heavy rainfall, the lake may contain water for up to three to four months (J. Mangmeli, White Sands Natl. Mon., pers. comm.).

The vegetation is generally representative of the Chihuahuan desert ecosystem. The harsh alkaline soils support little growth, however. No deer, pronghorn, or javelina inhabit the Monument (R. Appling, White
Table 3-17. Summary of regional U.S. Census data for White Sands wolf recovery area.1

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Total population</td>
<td>3,868</td>
</tr>
<tr>
<td>Population density</td>
<td>0.8/mi²</td>
</tr>
<tr>
<td>Number in civilian labor force</td>
<td>1,870</td>
</tr>
<tr>
<td>Percent of civilian labor force unemployed</td>
<td>9.2%</td>
</tr>
<tr>
<td>Percent of civilian labor force employed in agriculture, forestry or fisheries</td>
<td>10.0%</td>
</tr>
<tr>
<td>Median household income</td>
<td>$23,393</td>
</tr>
<tr>
<td>Percent of population below poverty level</td>
<td>8.4%</td>
</tr>
</tbody>
</table>

1Region covered by census tracts does not correspond exactly with recovery area boundaries; generally, census tracts include some adjacent rural areas around the recovery areas. Portions of additional census tracts in Dona Ana, Lincoln, Otero, and Socorro counties also occur within the WSWRA secondary recovery zone; however, these portions lack permanent residents, and census data from these tracts are not included here. There are no permanent inhabitants of the WSWRA primary recovery zone, thus no summary table is provided for it.

SOURCES: 1990 U.S. Census for Dona Ana County census tract 19 and Sierra County census tract 982 1.

Sands Natl. Mon., pers. comm.), Oryx number 100 to 200. No mountain lions or black bears are present. Coyotes and kit foxes are common.

The western half of the Monument is administered as a joint-use area with the missile range and is subject to frequent closures during testing periods. Development plans consist of expanding the trail system and continuing construction of an oryx exclosure fence. A total of eight miles of public roads, a one-mile trail, and three picnic areas have been constructed for public use. An average of 600,000 visitors per year visit the Monument, and the one backcountry campsite attracts 1,000 to 1,700 people per year (R. Appling, White Sands Natl. Mon., pers. comm.).

Jornada Experimental Range

The Jornada Experimental Range (JER), administered by the Agricultural Research Service of the U.S.D.A., is located mainly on the Jornada de Muerto Plain between the Rio Grande Valley on the west and the San Andres Mountains on the east (Fig. 3-4, above). Elevations on the 193,394-acre tract range from 4,200 feet on the plains to 8,500 feet in the San Andres. Average annual precipitation is 9.7 inches, falling mostly from July through September. The average maximum temperature is 97°F in June and 56°F in January. Eighteen permanent water tanks and wells are distributed throughout the plains portion of the JER.

The primarily Chihuahuan desert vegetation types range from grassland to desert scrub. Research has documented the historical conversion of semi-desert grasslands to desert shrubs caused by drought, shrub seed dispersal by animals, and overgrazing. Grasses are interspersed with encroaching snakeweed, honey mesquite, creosotebush, and tarbush. On the mountain slopes, honey mesquite, creosotebush, sotol, and mountain mahogany are predominant, although some areas support one-seed juniper and pinyon.

No federally endangered or threatened mammals occur in the JER. New Mexico state-endangered desert bighorn sheep number about 20, including the overlap area with the San Andres National Wildlife Refuge. Mule deer in the foothills and mountains are estimated at 100 to 300. Pronghorn (70 to 100 animals) roam the Jornada plain. Eighty oryx inhabit the plain and foothills. Coyotes are the most numerous carnivore and are increasing in number. Coyote density is three to four animals per mi². Two to three mountain lions inhabit approximately 55 square miles, all in the San Andres Mountains.
The mission of the JER is to acquire knowledge of ecosystem processes for development of remediation technologies and management of desert rangelands. Research conducted by JER staff is augmented by interagency research programs, including the National Science Foundation’s Long-Term Ecological Research Program and the Environmental Protection Agency’s Environmental Monitoring and Assessment Program. Over 30 scientists conduct agricultural and ecological studies.

For experimental purposes, the JER maintains approximately **1,100** cattle (640 cows and 400 to 500 calves), 300 sheep (plus **300** to **400** lambs annually), and a small number of horses. No livestock grazing occurs in the San Andres National Wildlife Refuge portion of the JER. Coyotes are the major predator. The JER’s experimental predator control program consists of electric fences, guard dogs, and bonding of sheep to cattle. Fifty coyotes were removed in **1989** and none since then. Most of the land is managed for livestock grazing, including **42,720** acres managed jointly with White Sands Missile Range as a missile test safety buffer zone. A total of **4,1280** acres of the JER in the San Andres is off-limits to livestock. Unescorted public access and hunting are prohibited (Anon. 1987a; K. Havstad, JER, pers. comm.).

### The Potential Natural Recolonization Areas

The following are potentially suitable areas for natural recolonization by wolves that might disperse north from Mexico: southeastern Arizona, southwestern New Mexico (Fig. 3-7), and Big Bend National Park in south Texas (Fig. 3-8). They are not proposed for active releases of captive-raised wolves. These areas are described here for the purpose of assessing speculative, long-term, impacts under Alt. D, the no action alternative (see Chap. 2). No impacts will occur in these areas under the other alternatives, unless reintroduced wolves were to disperse into these areas under Alt. C, the full-endangered reintroduction approach.

### Southeastern Arizona Potential Natural Recolonization Area

#### Coronado National Forest South of Interstate 10

#### Geography

The potential natural recolonization area within southeastern Arizona is that portion of the Coronado NF south of Interstate Highway 10 together with Coronado National Monument, Chiricahua National Memorial, and Fort Huachuca (see sections below on the latter three areas). The area takes in parts of Cochise, Santa Cruz, and Pima Counties.

The Coronado NF in this area consists of seven separate blocks **totalling 1,531 mi²**, or **979,840** acres, and comprises the Tumacacori (3 **10 mi²**), Santa Rita (218 **mi²**), Huachuca (380 **mi²**), Whetstone (69 **mi²**), Dragoon (81 **mi²**), and Chiricahua (445 **mi²**) Mountains, and the Arizona portion of the southern Peloncillo Mountains (28 **mi²**) (Girmendonk 1994b). Landforms are typical of the Basin and Range physiographic province, with isolated mountain ranges rising above desert valleys. Elevations vary from slightly under **4,000** feet in the interspersed desert valleys to more than **9,000** feet at the crests of the Santa Rita, Huachuca, and Chiricahua ranges (Allen 1993).

#### Climate

Climate varies with elevation, with mild winters and hot summers at lower elevations and the opposite extremes in the high mountains (Allen 1993). The Atascosa and Patagonia Mountains average **19.2** inches of rain per year with extreme temperatures ranging from **-7°F to 114°F** and averaging **62°F**. The Chiricahua Mountains receive **16.7** inches of rain annually and temperature extremes are **-9°F to 112°F**, with an average of **60.8°F** (Johnson et al. 1992).

#### Water

Several thousand water sources have been developed by the Forest Service and its permittees in this area (Allen 1993). Based only on sources registered for livestock or wildlife use, the Arizona Game and Fish Department determined that the Atascosa, Santa Rita,
Figure 3-7. Mexican wolf potential natural recolonization areas in southeastern Arizona and southwestern New Mexico.

NOTE: Areas in southeastern Arizona consist of all the Coronado National Forest units south of Interstate 10, together with the separately labelled areas.
Figure 3-8. Mexican wolf potential natural recolonization area in Big Bend National Park.
Huachuca, Whetstone, and Patagonia Mountains have 2,395 developed sources and the Chiricahua Mountains have 1,576 developed sources. Four perennial waters are present in the Chiricahua, and 13 perennial water sources are spread throughout the Atascosa/Patagonia area (Johnson et al. 1992).

Vegetation

Because mountains in southeastern Arizona are surrounded by desert vegetation, these isolated ranges have developed unique plant and animal species. Valley floors support desert shrub or semi-desert grassland vegetation. Low elevation areas west of the Whetstone Mountains exhibit flora characteristic of the Sonoran desert, while low elevation areas to the east are part of the Chihuahuan desert. The dominant vegetation on the southern portion of the Coronado NF is Madrean evergreen woodland. This community includes live oaks, piñon, junipers, and a significant cover of grasses and forbs. Density of these woodlands varies with topographical aspect and fire history, and the area is a mosaic of dense to sparse woodlands, savannas, and grasslands. These woodlands are bordered by pine and mixed conifer forests at higher elevations and grasslands at the lower elevations (Allen 1993). 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 (Johnson et al. 1992). Riparian vegetation intergrades from mesquite, willow, and hackberry within the desert grasslands through cottonwood, sycamore, ash, and willow in the woodlands to willow and alder at the upper elevations (Allen 1993). The areas that include conifer forests, Madrean evergreen woodlands, and grasslands total 860 mi² in the Atascosa and Patagonia Mountains and 790 mi² in the Chiricahua Mountains (Parsons 1993).

Animals

History of Wolves.—In southeastern Arizona, Mexican wolves historically were common in the Santa Rita, Tumacacori, Atascosa, Patagonia, Chiricahua, Huachuca, and Pinaleño Mountains, and the Canelo Hills (Brown 1983). The area contained three historical wolf runways (paths regularly used by travelling wolves) (Young and Goldman 1944). One originated in Mexico and ran north through the Huachuca Mountains, west along the Canelo Hills near Patagonia, and back south along the Patagonia Mountains to the border. The second passed north through Ruby along Bear Mountain, west through Altar Valley, and into the Baboquivari Mountains. The third went northwest from Mexico through the Peloncillo Mountains and back into Mexico through the Animas/San Luis Range (Johnson et al. 1992).

Trapping data from Arizona revealed the presence of wolves throughout the region until 1950. In the 1920s and 1930s, about 40 wolves were taken by government trappers and private ranchers in Santa Cruz, Pima, and Cochise Counties. Approximately 30 more were trapped in the 1940s in the same area. A few wolves were reportedly captured in 1949, but no successful trapping occurred after that year (Brown 1983). Since 1983, 29 unconfirmed “wolf” observations have been reported in Cochise, Santa Cruz, and Pima Counties, more than half of those reported being lone animals. The greatest concentration of these reports (14) occurred in Santa Cruz County (Girmendonk 1994a). Intensive wolf howling surveys in the area in 1995 found no evidence of wolves (Whitaker et al. 1995).

Species of Special Concern.—Federally endangered wildlife include the Yaqui catfish, Yaqui chub, desert pupfish, Gila topminnow, Yaqui topminnow, bald eagle, peregrine falcon, thick-billed parrot, southwestern willow flycatcher, and lesser long-nosed bat. The federally threatened Sonora chub and Mexican spotted owl also occur here. Chihuahuan pronghorn are a state-threatened species, occurring in the Atascosa and Patagonia Mountain area and the Chiricahua Mountain area (Johnson et al. 1992). Other species listed by Arizona are the Sonora chub, Yaqui chub, Gila topminnow, Yaqui topminnow, and California leaf-nosed bat (L. Allen, Coronado NF, pers. comm.; D. Groebner, AGFD, pers. comm.).

Designated critical habitat associated with the federally threatened Sonora chub occurs in the Coronado NF, which encompasses Sycamore and Peñasco Creeks, an unnamed tributary, Yank’s spring, and a 25-foot wide riparian strip along each side of the creeks. Activities that would deplete or change the natural flow of these waters may be restricted. In addition, excessive groundwater pumping, impoundment, or water diversion, mining, excessive sedimentation, riparian destruction, release of pollutants,
and the introduction of exotic fish species also may adversely impact the Sonora chub’s critical habitat.

**Potential Wild Prey of Wolves.**—Prey species present include white-tailed deer, mule deer, javelina, and Chihuahuan pronghorn (Allen 1993). In southeastern Arizona white-tailed deer are associated with Madrean evergreen woodlands, while mule deer inhabit chaparral, semi-desert grasslands, and desert shrub communities (Johnson et al. 1992). In the Coronado NF south of Interstate 10 white-tailed deer are estimated at 1,640, mule deer at 2,700, javelina at 3,177, and transplanted Chihuahuan pronghorn at 500 animals (Table 3-18). In addition, about 100 North American pronghorn inhabit the Lochemi Valley. No elk or Rocky Mountain or desert bighorn sheep are found in southeastern Arizona south of Interstate-10 (Girmendonk 1994b), although the New Mexico Game and Fish Department recently relocated desert bighorns to the New Mexico side of the Peloncillos (L. Allen, Coronado NF, pers. comm.). Southeastern Arizona deer are increasing since a low in 1989, although fawn and buck survival remain relatively low. The Dragoon Mountains have had good mule deer fawn survival recently, while the Whetstone and Chiricahua Mountains have had the poorest mule deer fawn survival. Javelina populations are increasing. The pronghorn fawn and overall survival rates are increasing (AGFD 1994a).

Ungulate density in the Atascosa/Patagonia Mountains area is 8.5 per mi², with about 69% deer and 30% javelina (Girmendonk 1994b). The Chiricahua Mountains maintain an ungulate density of 3.2 per mi², with 73% deer and 25% javelina (Parsons 1993). Descriptions of habitat characteristics of the various prey are found in the previous section in this chapter on the BRWRA, with the additional observation that in southeastern Arizona, javelina usually occur at 2,000-6,500 feet near bajadas and canyon mouths, rarely going above the oak forests (Hoffmeister 1986).

Small prey species include jackrabbits, cottontails, skunk<, coatimundis, porcupines, various tree and ground squirrels, chipmunks, rats, voles, and other small mammals (Hoffmeister 1986).

**Hunting.**—White-tailed and mule deer, javelina, black bear, lion, and pronghorn hunting are permitted in the Coronado NF south of I-10. For 1991-1992, the average annual deer, javelina and pronghorn taken were 7,612 (24.0% hunter success), 1,206 (23.3% hunter success), and 6 (50.0% hunter success), respectively. Buck:doe:fawn buck ratios vary among the different units, although does consistently outnumber bucks and fawns, and fawns outnumber bucks (Girmendonk 1994b). Hunting seasons are comparable, but with some differences, to those for the Arizona side of the BRWRA, described above. Small game hunting is more common.

**Existing Livestock Predators.**—Coyotes and mountain lions are the primary livestock predators in the area. Coyote, black bear, mountain lion, and bobcat numbers are depicted in Table 3-19. No federal predator control actions were carried out on this part of the Coronado NF during fiscal year 1993. The ADC can respond to requests from livestock permittees when needed; however, because of a lack of funding agreements, work in Santa Cruz and Pima counties has been limited since 1989, and no federal control actions in the Atascosas, Santa Ritas, Patagonias, or Canelo Hills has occurred since 1991 (Phillips 1993). Grazing permittees are allowed to take depredating animals under state regulation. ADC has two full-time employees stationed in Cochise County. ADC has agreements with 39 ranches, which graze 398,789 acres of private lands, and with Fort Huachuca, covering another 12,130 acres. Livestock losses in the area are low. Between October 1992 and August 1993, a total of four adult cattle, eight calves, 25 lambs, two ostriches and four chickens were verified killed by predators. Control tools used include leghold traps, call and shoot, and foot snares (Phillips 1993).

**Land Ownership and Management**

The Forest Service administers the Coronado NF. Management emphasizes grazing, forest products, and recreation. The National Forest is surrounded by State of Arizona, BLM, and private lands, including approximately 75,000 acres of private inholdings (about 4% of the land area) (L. Allen, Coronado NF, pers. comm.).

Wilderness areas include Miller Peak Wilderness in the Huachuca Mountains, Pajarito Wilderness in the Pajarito Mountains, Mount Wrightson Wilderness in the Santa Rita Mountains, and Chiricahua Wilderness (totalling 87,150 acres). The Bunk Robinson Wilderness Study Area is in the Peloncillos. The private San
Table 3-18. Number and density (animals/mi²) of potential wild prey of wolves in Coronado National Forest south of Interstate 10.

Note: Densities are not available for white-railed deer or pronghorn.

<table>
<thead>
<tr>
<th></th>
<th>Mule Deer</th>
<th>White-tailed Deer</th>
<th>Javelina</th>
<th>Pronghorn</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tumacacori Mountains</td>
<td>992 (3.2)</td>
<td>&gt;200</td>
<td>1,054 (3.4)</td>
<td>---*</td>
</tr>
<tr>
<td>(310 mi²)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Santa Rita Mountains</td>
<td>153 (0.7)</td>
<td>&gt;260</td>
<td>414 (1.9)</td>
<td>0</td>
</tr>
<tr>
<td>(218 mi²)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Huachuca Mountains</td>
<td>114 (0.3)</td>
<td>&gt;360</td>
<td>684 (1.8)</td>
<td>&lt;100</td>
</tr>
<tr>
<td>(380 mi²)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Whetstone Mountains</td>
<td>200 (2.9)</td>
<td>&gt;200</td>
<td>97 (1.4)</td>
<td>&gt;100</td>
</tr>
<tr>
<td>(69 mi²)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dragoon Mountains</td>
<td>203 (2.5)</td>
<td>&gt;20</td>
<td>65 (0.8)</td>
<td>0</td>
</tr>
<tr>
<td>(81 mi²)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chiricahua Mountains</td>
<td>979 (2.2)</td>
<td>&gt;400</td>
<td>801 (1.8)</td>
<td>&gt;150</td>
</tr>
<tr>
<td>(445 mi²)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AZ Peloncillo</td>
<td>64 (2.3)</td>
<td>&gt;200</td>
<td>62 (2.2)</td>
<td>&gt;150</td>
</tr>
<tr>
<td>Mountains</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(28 mi²)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*This population is the result of recent transplants of Chihuahuan pronghorn. Information on population numbers is not yet available.


Rafael de la Zanja land grant, primarily comprised of one large ranch, lies on the U.S.-Mexican border surrounded by the Huachuca and Patagonia Mountains and the Canelo Hills.

Agency and Local Government Plans and Policies

The Coronado NF operates under its 1986 Forest Plan, as amended each year. This plan identifies major issues facing the National Forest, including: 1) inability to meet growing outdoor recreation demands; 2) appropriateness of predator control; 3) identification of critical wildlife habitat; 4) necessity to exclude mining in some sensitive areas; and 5) restricting public access in some areas. Specific goals of the Coronado NF include providing for ecosystem diversity “by at least maintaining viable populations of ... wildlife, fish and plant species through improved habitat management”; meeting the goals of the Endangered Species Act; and restoring rangeland to at
Table 3-19. Predator population estimates and densities (animals/mi$^2$) in Arizona Game and Fish Department management units corresponding to Coronado National Forest south of Interstate 10.

<table>
<thead>
<tr>
<th>Area</th>
<th>Coyote</th>
<th>Black Bear</th>
<th>Mountain Lion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tumacacori Mountains</td>
<td>550</td>
<td>0-1</td>
<td>21-47</td>
</tr>
<tr>
<td></td>
<td>(1.0)</td>
<td>(0-0.002)</td>
<td>(0.04-0.08)</td>
</tr>
<tr>
<td>Santa Rita Mountains</td>
<td>700</td>
<td>22-56</td>
<td>21-52</td>
</tr>
<tr>
<td></td>
<td>(1.0)</td>
<td>(0.03-0.08)</td>
<td>(0.03-0.08)</td>
</tr>
<tr>
<td>Huachuca Mountains</td>
<td>1,000</td>
<td>1-5</td>
<td>26-68</td>
</tr>
<tr>
<td></td>
<td>(1.0)</td>
<td>(0-0.002)</td>
<td>(0.03-0.08)</td>
</tr>
<tr>
<td>Whetstone Mountains</td>
<td>500</td>
<td>0</td>
<td>12-33</td>
</tr>
<tr>
<td></td>
<td>(1.0)</td>
<td>(0)</td>
<td>(0.02-0.07)</td>
</tr>
<tr>
<td>Dragoon Mountains</td>
<td>1,400</td>
<td>1-3</td>
<td>24-61</td>
</tr>
<tr>
<td></td>
<td>(1.0)</td>
<td>(0.001-0.002)</td>
<td>(0.02-0.04)</td>
</tr>
<tr>
<td>Chiricahua and AZ Peloncillos</td>
<td>2,700</td>
<td>81-204</td>
<td>60-123</td>
</tr>
<tr>
<td></td>
<td>(1.0)</td>
<td>(0.02-0.05)</td>
<td>(0.01-0.03)</td>
</tr>
</tbody>
</table>

**SOURCE:** AGFD (1994b).

At least a moderately high ecological condition (SW Region USFS 1992b).

**Land Development**

Subdivision of private holdings adjacent to and in between the National Forest units in southeastern Arizona is on the rise. This trend should continue in the foreseeable future. Inholdings tend to be concentrated along stream courses and valleys and have the potential for fragmenting wildlife habitat (L. Allen, Coronado NF, pers. comm.). Approximately 95 miles of trails are in need of construction or reconstruction in the Nogales, Sierra Vista, and Douglas Ranger Districts (SW Region USFS 1986c).

**Livestock Grazing**

Approximately 37,400 cattle (cows and calves) are permitted to graze the Coronado NF south of Interstate 10. There are 130 allotments, averaging 288 cattle per allotment. Roughly 70% of the cattle are on year-round allotments, while the rest are on the range in winter only. Almost all calves in this area are born on the range. About 50% of the area is grazed (Allen 1993).

**Forestry**

No commercial timber harvest is planned for the Coronado NF south of Interstate 10. Fuelwood harvest for personal use is permitted on three ranger districts. About 900,000 board feet is the anticipated annual harvest. The Forest Service manages the harvest for wildlife habitat improvement, watershed restoration, and range forage improvement. About 1,000 acres per year will be impacted and no new road construction for this purpose is anticipated (Allen 1993).

**Mining and Other Natural Resource Extraction**

No mines are active in the area. However, copper deposits have been located in the Santa Ritas and Patagonias and may be mined if markets improve (L. Allen, Coronado NF, pers. comm.).

**Public Access and Recreation**

The densities of roads in the rural areas in the Atascosa-Patagonia Mountains region and the Chiricahua Mountains are 0.10 and 0.24 miles/mi$^2$, respectively (Parsons 1993). The Huachuca Mountains are the
most heavily roaded region. Private inholdings that have been developed as subdivisions of larger blocks of land pose barriers to public access in some cases. The Forest Service is negotiating rights of way to some parts of the National Forest in southeastern Arizona (L. Allen, Coronado NF, pers. comm.).

Outdoor recreation is the fastest growing use. The Forest Service constructs and upgrades campgrounds and other recreational facilities to meet demand. Primary recreation uses are dispersed activities such as hiking, backcountry camping, hunting, fishing, birdwatching, and pleasure driving. Developed recreation areas include 19 campgrounds and three picnic areas. Many of these facilities have boat ramps, fishing docks, trail heads, nature trails, interpretive talks, and other attractions. The Coronado NF has two developed fishing lakes, Parker Canyon Lake in the Sierra Vista Ranger District and Peña Blanca Lake in the Nogales Ranger District.

Estimated use of the area in 1992 was 921,580 RVDs, including 369,900 RVDs for camping, 61,860 RVDs for hunting, 229,200 RVDs for hiking and horseback riding, 26,400 RVDs for fishing, and 234,220 RVDs for studying nature. These uses can be expected to grow at a moderate rate for the foreseeable future (Allen 1993). The Coronado NF permits 35 guides and outfitters (Coronado NF 1994). These are largely for hunting, but include some guiding for hiking, climbing, jeep tours, horseback rides, and other uses.

Regional Economy, Employment and Population

The portions of southeastern Arizona within the potential natural recolonization area depend economically on the military (Fort Huachuca employs 3,570 people, see separate section below on the Fort), ranching, and tourism/recreation. The metropolitan area of Nogales (population 19,850) is an important border crossing and warehousing area for trade with Mexico, lying between the Atascosa and Patagonia Mountains.

Some residential development north of Nogales extends into the Atascosas. Nevertheless, little or no residential developments occur within likely wolf habitat in the area. The area between Nogales and Patagonia is developing rapidly, particularly in subdivisions for vacation and retirement homes (see section on land development). Table 3-20 provides socioeco-

Chiricahua National Monument

Chiricahua National Monument is located in Cochise County at the northern end of the Chiricahuas. The southern boundary of the 12,900-acre Monument adjoins the Coronado NF and private livestock ranches. Administered by the National Park Service, the Monument was established to protect unique natural formations called “the Pinnacles” (columns and
Table 3-20. Summary of regional U.S. Census data for southeastern Arizona potential natural recolonization area.*

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total population</td>
<td>26,519</td>
</tr>
<tr>
<td>Population density</td>
<td>8.3/mi²</td>
</tr>
<tr>
<td>Number in labor force</td>
<td>12,148</td>
</tr>
<tr>
<td>Percent of civilian labor force unemployed</td>
<td>8.0%</td>
</tr>
<tr>
<td>Percent of civilian labor force employed in agriculture, forestry or fisheries</td>
<td>8.0%</td>
</tr>
<tr>
<td>Median household income</td>
<td>622,008</td>
</tr>
<tr>
<td>Percent of population below poverty level</td>
<td>18.3%</td>
</tr>
</tbody>
</table>

*Region covered by census tracts does not correspond exactly with recovery area boundaries; generally, census tracts include some adjacent areas around the recovery areas.

SOURCES: 1990 U.S. Census for Cochise County census tracts 5, 14, and 21 and Santa Cruz County census tracts 9960 and 9961.

spires created from differential erosion of volcanic rock). Elevations vary from approximately 4,800 to 7,400 feet (Anon. 1987b).

The Monument’s two canyon drainages contain ephemeral water, and five permanent springs occur. Pine-oak woodland is the characteristic vegetation community, interspersed with desert and riparian vegetation. No recent reports of wolf sightings have come from here. The federally endangered American peregrine falcon and federally threatened Mexican spotted owl occasionally have been sighted. A population of at least 24 Coues white-tailed deer live in the Monument and desert mule deer occur occasionally. Javelina and coatimundi are common. The Apache fox squirrel is endemic to the area. Coyotes are uncommon. At least one mountain lion and four bobcats inhabit the area (S. Clark, Chiricahua NM, pers. comm.).

There are eleven miles of roads. Visitation reached about 78,000 RVDs in 1990. Uses include scenic viewing, hiking, birdwatching, picnicking, and camping. Management is directed toward identifying, protecting, and perpetuating the Pinnacles and the Monument’s natural values. The Monument contains 11,120 acres of designated wilderness. No hunting or grazing is allowed. One 2.4-acre parcel of land in the northeastern corner is the only inholding and is part of a patented mining claim. Expansion of mining operations is not anticipated (Anon. 1987b).

Fort Huachuca

U.S. Army Garrison Fort Huachuca encompasses 12,130 acres, mostly in Cochise County. The south and west sides of the fort border the Coronado NF (Fig. 3-7). Elevations range from 4,000 to 8,410 feet. The terrain varies greatly from flat grasslands and desert scrub to steep, rugged mountains. About 26,000 acres is mountainous. Sedimentary rocks underlie the major canyons, and limestone forms the major conduits for springs. The average temperature is 72°F. Average annual rainfall ranges from nine inches at lower elevations to almost 24 inches at higher elevations. At least 35 acres of artificial ponds and four to five miles of natural streams constitute the fort’s perennial water sources. In addition, about 80 water catchments and wildlife watering troughs are found around the fort, as well as several ephemeral ponds, springs, and seeps.

Five overlapping habitat types are represented. Lower elevation vegetation consists of desert grassland. Above 5,000 feet elevation are oak-pine, piñon-juniper and mixed conifer woodlands. Riparian habitat comprises the smallest acreage.
No recent wolf reports have come from the fort; however, several unconfirmed reports originated around Parker Canyon Lake south of the fort and along its south-southwest border. The federally endangered American peregrine falcon and lesser long-nosed bat, and the federally threatened Mexican spotted owl occur here. Potential wild prey of wolves include 1,100 to 1,500 Coues white-tailed deer and 200 to 300 desert mule deer. Javelina number 200 to 300. A population of 30 to 40 North American pronghorn live on the fort, originating from a herd introduced from Wyoming. An additional herd of 10 to 11 Chihuahuan pronghorn reside on the fort from a population translocated from Texas in 1987. The indigenous Gould’s turkey has been re-established and numbers 50 to 100.

Hunting is open to military personnel, civil service employees of the fort, and dependents. Between 1987 and 1993, an annual average of about 200 white-tailed deer, 15 mule deer, 20 javelina, and four North American pronghorn were harvested. Every year, 20 to 25 coyotes are taken by hunters to reduce the threat to Chihuahuan pronghorn fawn recruitment or trapped by the ADC. Six to eight mountain lions and a similar number of black bears range on the fort. Lion hunting is open year-round under state regulations, and one lion is harvested about every three years. One spring bear tag is issued annually, but no bear harvest has occurred in recent years.

The fort contains 73,315 acres that are committed to a natural resource management program. Cattle and sheep grazing are prohibited. A horse stabling and rental program on the fort maintains about 50 to 60 horses, a significant reduction in recent years. Mining activity has ceased. Over 50 miles of roads are open to the public. A minimum of 15,000 people visit annually, including 6,000 to 8,000 bird watchers. Visitors can fish, bird watch, hike, picnic, camp, and ride horses. Limited recreational vehicle camping and off-road vehicle recreation also are available. Approximately 45 miles of trails provide public access to 24,450 acres of forested areas in the Huachuca Mountains.

The fort population is growing and has reached over 15,500, including approximately 7,000 military personnel. No mechanized military activities occur in the mountainous areas (Anon. 1989).
Water

Few perennial surface water sources occur in the bootheel. Playas Lake, located in the Playas Valley, is a shallow basin that occasionally contains water. Cloverdale Creek, which originates in the Coronado NF, flows over most of the year. The Animas, Deer, and Double Adobe Creeks flow only during periods of heavy rainfall. Stock tanks are plentiful, but few natural cienegas or springs occur here (C. Siepel, Hidalgo County Agric. Extension Office, pers. comm.).

Vegetation

The bootheel historically was dominated by semi-desert grasslands. In response to increased livestock production, the dominant vegetation generally has degraded from semi-desert grasslands to desert shrub. The Animas Valley in the southwestern part of the bootheel is an exception, hosting extensive grasslands characterized by tobosa and black grama, and a 44,000-acre prairie of blue grama and buffalograss. Nearly 55% of the privately-owned, 321,700-acre Gray Ranch (in the Animas Mountains area) is grasslands. The Animas, Peloncillo, and Alamo Hueco Mountains contain extensive juniper-oak vegetation between 5,500 and 8,000 feet elevation. The major drainages support sycamore and cottonwood forests. Big Hatchet State Wildlife Refuge contains primarily desert shrub habitat with piñon-juniper communities interspersed (USBLM 1991; Brown 1990).

Animals

History of Wolves

Historically, Hidalgo County was a Mexican wolf stronghold. Wolves were most common in the Animas Mountains. They dispersed mainly from Mexico into New Mexico along the mountain ranges in the bootheel. By the 1930s, the Animas and Peloncillo Mountains were the last places in New Mexico to which wolves dispersed from Mexico.

Intensive federal eradication efforts began around 1916. Wolves were systematically trapped, poisoned, and shot as they crossed the border. By the time trappers were employing Compound 1080 and M-44s in the 1950s, the number of wolves was waning. Only two were trapped in New Mexico in 1950, both in Hidalgo County. Single or no wolves were taken in the county each subsequent year until 1970, when the carcass of the last wild wolf confirmed in New Mexico was discovered in the Peloncillos (Brown 1983). Since 1983, nine “wolf” sightings have been reported in the area, although none have been confirmed. However, the most reliable-appearing report in the last ten years in the Southwest came from this area in 1989 (Wolok 1994). Intensive wolf howling surveys in the area in 1995 found no evidence of wolves (Whitaker et al. 1995).

Species of Special Concern

Federally endangered species in southern Hidalgo County include the northern aplomado falcon, peregrine falcon, lesser long-nosed bat, and Mexican long-nosed bat. The New Mexico ridgenose rattlesnake and Mexican spotted owl are federally threatened species occurring in the bootheel. New Mexico state-endangered desert bighorn sheep, white-sided jackrabbits, southern pocket gophers, Gould’s wild turkeys, and several other species also occur (NMNHP 1993).

Potential Wild Prey of Wolves

Potential prey of Mexican wolves are Coues white-tailed deer, mule deer, javelina, bighorn sheep, jackrabbits, and feral hogs. Fewer than 1,000 Coues white-tailed deer inhabit southern Hidalgo County. This subspecies lives in scattered, small populations at mid to high elevations in oak and oak-piñon woodlands (D. Weywright, NMDGF, pers. comm.). Mule deer in southern Hidalgo County number approximately 10,140 and reside in all mountain ranges in the area. Population trends from 1988 through 1992 have been stable (Gonzales 1993).

An estimated 500 Chihuahuan pronghorn inhabit the grasslands between the Peloncillo, Animas, Alamo Hueco, and Hatchet Mountains, but populations declined from 1988 through 1992. Javelina number about 3,000, primarily in the low grassland and desert scrub communities, and declined from 1988 through 1992. Desert bighorn sheep total 140 individuals. Over five years, the bighorn sheep populations in the Big Hatchet and Peloncillo Mountains were stable and rising, respectively, and the Alamo Hueco Mountain herd was stable from 1988 to 1992 (Hubbard 1994).
Feral hogs total approximately 800. Approximately 50 introduced bison occasionally roam from Mexico onto private ranch lands near the international border.

**Hunting**

Coues white-tailed deer, mule deer, javelina, and pronghorn are hunted in Hidalgo County. Hunters harvested an average of 297 deer, 67 javelina, and 23 pronghorn per year from 1988 through 1992. Unregulated feral hog hunting occurs. Public hunting on the large Gray Ranch is prohibited, although the adjacent Coronado NF permits hunting. No season has been established for desert bighorn sheep, oryx, or mountain lions because of their low numbers.

Big game hunting seasons primarily are between fall and mid-winter. Two archery deer seasons are scheduled in September and January, during which hunters can take one fork-antlered deer. One muzzle-loader deer season occurs in September, when one fork-antlered deer can be harvested. No muzzle-loader seasons are scheduled for other big game. Three rifle deer seasons usually are scheduled in early November, which allow one fork-antlered deer to be killed. One limited entry javelina hunt is scheduled in February. One limited entry mature buck pronghorn season usually is scheduled for two days in late October (Gonzales 1993).

**Existing Livestock Predators**

Coyotes and bobcats are common. Roughly 45 breeding adult mountain lions (0.03/m²?) are found in southern Hidalgo County (K. Logan, Hornocker Wildlife Research Inst., pers. comm.). Coyotes and mountain lions are the major targets for animal damage control. The New Mexico ADC office has agreements with 22 ranches, covering 566,940 acres of private, 11,460 acres of State, and 122,250 acres of BLM lands. In 1992, ADC verified 32 calves killed by coyotes and five calves killed by mountain lions; however, the number of livestock losses verified by ADC is only a fraction of the reported losses (Phillips 1993). Also in 1992, ADC killed 231 coyotes (U.S. Department of Agriculture 1992). No mountain lions were taken by ADC in Hidalgo County in 1993 or 1994 (A. May, NM ADC, pers. comm.). State regulations also allow private livestock operators and federal grazing permittees to take depredating predators.

In the bootheel, ADC has employed M-44s, aerial hunting, leghold traps, and calling and shooting (Phillips 1993). However, ADC has agreed to cease using M-44s, neck snares, and traps (larger than number 2) south of State Route 9 to reduce the likelihood of harming any potential naturally-recolonizing Mexican wolves (Fowler-Propst 1993). Private livestock operators are still permitted by the state to use these devices on their land.

**Land Ownership and Management**

Southern Hidalgo County contains mostly private land, consisting of about 15 large ranches. The next largest ownership is federal, mostly BLM. The BLM manages three wilderness study areas, the Big Hatchet Mountains, Alamo Hueco Mountains and Cowboy Springs Wilderness Study Areas. Habitat Management Plans (HMPs) have been established on BLM lands for two areas. Under the Big Hatchet/Alamo Hueco and Peloncillo HMPs, priority wildlife are bighorn sheep and deer and management focuses on prescribed burning and fence modification. The BLM’s wildlife habitat management goals for the bootheel include maintaining ungulate populations and reaching desired vegetation goals through proper grazing practices, including eliminating grazing on 8,026 acres, and through land treatments such as fire and chemicals (USBLM 1991).

**Agency and Local Government Plans and Policies, and Land Development**

Hidalgo County passed an ordinance in 1992 related to wolves, which prohibits the release of non-resident canids (Hidalgo County Ord. No. 92-1). The county operates under a land use plan. None of its provisions relate directly to possible natural wolf recolonization. In addition, Hidalgo County has a Comprehensive Plan for Development that encourages economic and mineral development as well as growth in recreational opportunities and preservation of natural resources such as wildlife.

The BLM’s Mimbres Resource Management Plan encompasses all of the bootheel as well as federal public lands in the rest of Hidalgo County and in Doña Ana, Luna, and Grant Counties. The Plan’s
primary vegetation management goals are to provide for livestock, wildlife, watershed, aesthetic, and biodiversity values (USBLM 1991).

The Animas Foundation, which owns the 32 1,700-acre Gray Ranch, provided conservation easements to the former owner, The Nature Conservancy, designed to keep the important natural communities intact. However, the ranch has no numeric livestock stocking limits placed upon it under the land purchase agreement (B. Brown, The Nature Conservancy, pers. comm.).

Ranching will continue to be the dominant land use south of State Route 9 (C. Siepel, Hidalgo Co. Agric. Ext. Office, pers. comm.). No major types of new development activities are foreseen.

Livestock Grazing


Mining and Other Natural Resource Extraction

While some historic mining areas exist, there is little current activity. Phelps Dodge Corporation owns and operates a large copper smelter in the Playas Valley. Copper is mined elsewhere and shipped to the smelter. The company also owns the rights to copper deposits in the Little Hatchet Mountains (C. Siepel, Hidalgo Co. Agric. Ext. Office, pers. comm.). A guano mining operation and paleontological excavations are conducted in U-Bar Cave in the Alamo Hueco Mountains. The intermountain basins hold some undeveloped oil and gas potential.

Public Access and Recreation

Very sparse public transportation routes extend through southern Hidalgo County. Antelope Wells is the only international border crossing to Mexico, but it is closed to commercial traffic. The Coronado NF, the only large area accessible to the public, provides a wide range of recreational opportunities. These include hunting, hiking, camping, picnicking, rock hounding, fishing, birdwatching, and vehicle recreation. The BLM has designated no special recreation areas in the bootheel; emphasis on BLM lands is placed on dispersed recreation (USBLM 1991). No major guiding, outfitting, or other recreational establishments are based in the area and no significant tourist facilities exist.

Regional Economy, Employment and Population

The regional economy is dominated by the Phelps Dodge copper smelter (535 employees) and by ranching. Small areas of crop farming occur, mostly near Animas. The most important crops are chile and cotton. Median household incomes are high in southern Hidalgo County because of the several hundred residents of Playas with relatively well-paying jobs at the copper smelter and because of the relatively prosperous large-holding ranchers. Unemployment and poverty are low (Table 3-21).

The scattered small communities in the area include Rodeo and Hachita (each of approximately 150 people), Animas (population 250), Playas (population 850), and Cotton City (population 150). Slow population growth is projected for the county as a whole through the year 2000 (Bur. of Bus. and Econ. Res. 1991).

Big Bend National Park Potential Natural Recolonization Area

Geography

Big Bend National Park covers 80,1,160 acres in southwest Texas. The park is on the northern side of the Rio Grande and makes up the southern third of Brewster County (Fig. 3-8). Surrounding tracts of land are primarily cattle ranches. Big Bend Ranch State Natural Area, a 265,000-acre tract owned by the state of Texas, is located 30 miles west of the park along the western upswing of the Rio Grande. East of the park is the Black Gap Wildlife Management Area, a 99,920-acre tract owned by Texas and used primarily for recreational hunting. The park lies within the northern extension of the Chihuahuan desert into the United States. The majority of the park consists of an arid to semi-arid basin plain interspersed with uplifts
of primarily igneous formations (Waid 1990). Elevations vary from 1,880 feet along the Rio Grande to 7,822 feet at Emory Peak in the Chisos Mountains. At the center of the park, the Chisos Mountains form a circle of peaks approximately three miles across.

**Climate**

The area has hot summers and mild winters. Temperatures in the Chisos Mountains are about 15°F cooler than the surrounding basin during the summer and often dip below freezing in the winter (Waid 1990). Rainfall occurs primarily from May through October and the annual average ranges from 11 inches or less in the arid areas to 16 inches in the Chisos Mountains (Leopold 1984).

**Water**

Over 300 water sources occur in the park. The Rio Grande is the predominant surface water feature. Terlingua Creek is a perennial stream recharged by groundwater north of the park that empties into the Rio Grande at Santa Elena Canyon. Other permanent water sources include wells, stock tanks, watering holes, and approximately 100 springs, which are largely in or near the Chisos Mountains. Creeks, streams, seeps, tinahas (pools in shallow rock depressions that collect rainwater), and approximately 100 springs represent the ephemeral water sources (NPS et al. 1992; R. Skiles, BBNP, pers. comm.).

**Vegetation**

The park’s only woodland communities occur in the Chisos Mountains above 3,700 feet elevation and comprise less than 3% of the total land base (Waid 1990). At the higher elevations, emory and gray oak, three species of juniper, and piñon dominate (Krausman 1976). Between and sometimes overlapping with the piñon-oak-juniper formation and the lower grasslands are the deciduous woodlands, in which black walnut, Texas madrone, and apacheplume are common. Extensive sotol grassland communities (about 49% of the total park area) surround the Chisos basin, with grasses and lechuguilla predominating. Beyond the sotol grasslands and comprising another 49% of the park’s land base are desert scrub communities, with creosotebush, prickly pear, and Torrey yucca being common residents (Plumb 1987).

**Animals**

**History of Wolves**

Historically, Mexican wolves probably were common in the Big Bend region of Texas (Bailey 1905). Aggressive predator control programs, begun in the late
1800s and supported by local, state, and federal agencies, effectively eliminated packs from the area by 1945. Lone wolves occasionally were seen and sometimes killed by ranchers or hunters until 1970, when two were killed (Brown 1983). Since 1983, occasional reports of “wolves” within park boundaries have occurred; all these are unconfirmed (Wolok 1994).

Species of Special Concern

Federally endangered wildlife includes the Big Bend gambusia, peregrine falcon, southwestern willow flycatcher, black-capped vireo, and Mexican long-nosed bat (NPS 1992). Ocelots are federally endangered and extremely rare in the park (BBNP 1992). Two reports of ocelots have been made in the last 15 years. Jaguarundis are federally endangered and also extremely rare (BBNHA 1989), with ten being reported in the last eight years. Several other species are listed as threatened or endangered by Texas, including the spotted bat, coatimundi, jaguar and black bear (Texas Dep’t of Parks and Wildlife 1994; BBNP 1992).

Potential Wild Prey of Wolves

The parks large herbivores include Sierra del Carmen white-tailed deer, desert mule deer, javelina, and pronghorn. Desert bighorn sheep were extirpated before the establishment of the park.

Mule deer are common below 4,920 feet elevation in the Chisos Mountain foothills, the surrounding grasslands, and the arid shrub communities. Overlap with white-tailed deer occurs in the Chisos foothills between 3,940 and 4,760 feet elevation (Waid 1990). An estimated 1,000 mule deer inhabit the park. White-tailed deer are abundant in the Chisos Mountains primarily above 4,500 feet elevation, although population estimates are not available. They are found exclusively in woodlands.

Javelina are common in all habitats from the Rio Grande floodplain to the Chisos Mountains, although population estimates are not available. Javelina are commonly found in dense vegetation during the hotter seasons and in the arid lowlands from November through February (Bissonette 1982). One pronghorn herd of 13 individuals represents the entire park population. They occur in the northern and northeastern desert areas at about 2,500 feet elevation (BBNHA 1989).

Black-tailed jackrabbits and desert cottontails are common residents found in the sotol grasslands and scrub desert regions. Eastern cottontails are seen only occasionally and occur above 4,700 feet elevation (BBNHA 1989).

Existing Livestock Predators

Coyotes are common, though rarely occurring above 5,000 feet (BBNHA 1989). Mountain lions are uncommon, occurring mostly in the Chisos Mountains where prey concentrations are highest. Black bears, considered an endangered species by Texas, are making a comeback in the park, with a current estimate of 12 bears, all in the high Chisos Mountains (BBNP 1992; R. Skiles, BBNP, pers. comm.). The park is developing a black bear emergency management plan. Bobcats are uncommon (BBNHA 1989). They may occur throughout the park, but are densest in the Chisos Mountains (R. Skiles, BBNP, pers. comm.).

Hunting, livestock grazing, and predator control are prohibited. Poaching of mule deer has been reported occasionally in the northwestern section of the park near private ranching properties (R. Skiles, BBNP, pers. comm.).

Land Ownership and Management, and Agency Policies

The park, established in 1935, is managed by the National Park Service for recreation and the conservation of scenic, natural, wildlife, and historical resources. It is designated as an International Biosphere Reserve in recognition of its biological, research, and environmental monitoring potential (NPS 1992).

Ranch access roads are permitted in the northern and western parts through written contracts. No wilderness areas have been designated, although 560,900 acres are under consideration by Congress. Until a decision is made the park administration manages the proposed areas so as not to preclude such designation (NPS 1992).

A state statute prohibits the possession, transportation, receipt, or release of live wolves into Texas (Tex. Parks and Wild. Code Ann. § 63.104). Texas law also protects state and federally listed endangered species, including Mexican wolves (Tex. Parks and Wild. Code Ann. 568.00 1).
Land Development

Visitor accommodations include overnight lodging in the Chisos Basin, camping and recreational vehicle facilities at two sites along the Rio Grande, a network of trails and campsites in the Chisos Mountains and along the Rio Grande, and various other trails scattered throughout the park. The park is planning several minor developments including upgrading the trail network in the Chisos Mountains and expanding resident accommodations, if funding permits. The park permits neither forestry nor mining. Residential development and recreational hunting west of the park are on the rise.

Across the Rio Grande in Mexico livestock grazing continues to be the predominant land use. Three minor, low-water border crossings are located in the park, though none are used for commercial travel (NPS 1992).

Livestock Grazing

Livestock grazing is not permitted. Nevertheless, illegal grazing is a recurring problem along the Rio Grande floodplain. Cattle and horses belonging to Mexican ranchers routinely cross over and cause serious habitat degradation (NPS et al. 1992; W. Wright, BBNP, pers. comm.). Park officials have seen dozens and even hundreds of cattle at any given time. Preventative measures such as building fences along the U.S. side of the border are either ineffective or have not been attempted for practical and comity reasons. Park officials are negotiating with Mexican officials to reach a solution.

Public Access and Recreation

The park contains 162 miles of paved roads and 257 miles of unpaved roads, all open to the public. In 1990, over 250,000 people visited and in 1992 almost 297,000 people visited. The Chisos Mountains receive the most visitor use, especially during summer months and holidays (NPS 1992).

Regional Economy and Employment

The economy of southern Brewster County is dependent on tourism, government, and ranching (Table 3-22). Less than 9.1% of the total labor force is employed in agricultural occupations. Approximately 80 full time position equivalents are filled by the National Park Service and 45 to 50 people work for the park’s concessionaires.

Permanent residents include park personnel and their families, concessions employees, and U.S. Border Patrol agents. Between 250 and 300 people are normally in residence at Panther Junction making it the second largest residential area in Brewster County (R. Skiles, BBNP, pers. comm.).
Table 3-22. Summary of regional U.S. Census data for Big Bend National Park potential natural recolonization area.’

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Total population</td>
<td>1,915</td>
</tr>
<tr>
<td>Population density</td>
<td>0.6/mi²</td>
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<tr>
<td>Number in labor force</td>
<td>1,010</td>
</tr>
<tr>
<td>Percent of civilian labor force unemployed</td>
<td>3.8%</td>
</tr>
<tr>
<td>Percent of civilian labor force employed in agriculture, forestry or fisheries</td>
<td>9.1%</td>
</tr>
<tr>
<td>Median household income</td>
<td>$20,970</td>
</tr>
<tr>
<td>Percent of population below poverty level</td>
<td>28.0%</td>
</tr>
</tbody>
</table>

1Region covered by census tracts does not correspond exactly with recovery area boundaries; generally, census tracts include some adjacent rural areas around the recovery areas.

SOURCE: 1990 U.S. Census for Brewster County census tract 9502.
Chapter 4

Environmental Consequences
CHAPTER 4
Environmental Consequences

Introduction

This chapter presents the foreseeable consequences of the four alternative approaches to re-establishing Mexican wolves on the natural and physical environment and on related social and economic concerns. Table 2-8 at the end of Chap. 2 summarizes the information presented here.

To avoid repetition, the impact topics are most fully explained the first time they come up; later discussions are more brief. The impact analysis generally attempts to be as quantitative as possible, but most of the projections involve considerable uncertainty. At root, this uncertainty is due to incomplete information about the behavior of wild Mexican wolves multiplied by uncertain future trends in prey populations, hunting management (which is, and will be, done by state and tribal, not federal, managers), hunter numbers, livestock numbers, land uses, and so on. The analysis, therefore, identifies the methods and assumptions involved in the projections, usually in separate text “boxes.” All quantifiable impacts are presented in terms of high and low ranges; the actual impacts generally should be expected to fall between these extremes. For quantifiable impacts, the point in time at which they are quantified is when the wolf population goal for the area is achieved (the exceptions are the impacts on prey and hunting, which are projected at five years after the goal is achieved). Impacts likely will be intermediate in earlier years of the re-establishment efforts, generally related to the wolf population size at the time. Of course, for each of the alternatives, if the wolf populations grow at different rates-faster or slower-than the rates projected in Chap. 2 (Tables 2-2, -3, -4, -5, and -6), then the rates at which the impacts occur would vary accordingly.

The high percentage of captive-raised wolves in the total population in the early years of the re-introduction alternatives makes impacts somewhat less predictable than during later years, when wild-raised wolves will predominate. During the initial releases of red wolves in North Carolina, the captive-raised animals exhibited behaviors that were more erratic (that is, less predictable) than the animals that, later, were born in the wild (Phillips, M.K., 1992).

The impact analysis here focuses on the areas expected to be primarily impacted by each alternative. The Blue Range Wolf Recovery Area (BRWRA) is treated first, reflecting its increased emphasis in this FEIS compared to the White Sands Wolf Recovery Area (WSWRA). Of course, not all reintroduced wolves will necessarily stay within recovery area boundaries. Recapture and removal of wolves are called for under Alt.s A and B to prevent impacts outside the designated wolf recovery areas or outside the primary recovery zones, respectively. However, dispersing wolves could cause some impacts outside these areas until they are recaptured. Most notably, some of the impacts discussed under Alt. C could also occur to a lesser degree under Alt.s A and B on the San Carlos and White Mountain Apache reservations, which lie immediately to the west of the BRWRA and share an 80 mile border with it (see Fig. 34: Affected Areas under Alt.s A, B, and C in the BRWRA Region).

Analysis of each alternative concludes with a summary of the adverse effects of the full alternative followed by a discussion of its short and long-term effects in relationship to the long-term productivity of the environment, any irreversible commitments of resources, and cumulative effects. While this chapter includes economic analysis, the emphasis is on quantifiable adverse impacts. Potential benefits are discussed, but they are less direct and harder to project quantitatively. (Appendix J includes examples of economic benefits resulting from wolf recovery in the northern Rockies and northern Minnesota.) This FEIS is not intended as a cost-benefit analysis. Monetary cost-benefit analysis is not required under National Environmental Policy Act implementing regulations and it is specifically not recommended when, as here, important qualitative considerations exist (40 CFR sec. 1502.23).
Consequences of Alternative A  
(Preferred Alternative):

Reintroduction of Mexican wolves, classified as nonessential experimental, into the Blue Range Wolf Recovery Area. Wolves will be released into the primary recovery zone and allowed to disperse into the secondary recovery zone. If feasible and necessary to achieve the recovery objective of 100 wolves, a subsequent reintroduction of wolves into the White Sands Wolf Recovery Area will be conducted.

Blue Range Wolf Recovery Area (BRWRA)

Impacts on Wild Prey of Wolves

The projected population in the BRWRA under Alt. A is 100 wolves. They will kill prey totalling approximately 282,300 lbs. (live weight) annually (Parsons 1994). The species composition of the prey killed and the impact of the predation rate on the prey populations are modelled for each of the reintroduction alternatives in this FEIS as described in Box 4-1. The prey impacts projected are those expected at the point in time five years after the wolf population goal for the area is achieved (Green-Hammond 1994). Because of the difficulty and uncertainty involved, the non-static interrelationship among wolf and prey populations that likely would develop was not modelled (Mech 1970). In other words, the model does not address the long-term effects of changes in the prey population on the wolf population, or vice versa.

The prey impacts projected are those expected at the point in time five years after the wolf population goal for the area is achieved (Green-Hammond 1994). Because of the difficulty and uncertainty involved, the non-static interrelationship among wolf and prey populations that likely would develop was not modelled (Mech 1970). In other words, the model does not address the long-term effects of changes in the prey population on the wolf population, or vice versa.

The prey impacts projected are those expected at the point in time five years after the wolf population goal for the area is achieved (Green-Hammond 1994). Because of the difficulty and uncertainty involved, the non-static interrelationship among wolf and prey populations that likely would develop was not modelled (Mech 1970). In other words, the model does not address the long-term effects of changes in the prey population on the wolf population, or vice versa.

In the BRWRA under Alt. A, the deer population is projected to be between a high of 64,100 and a low of 35,500 five years after the wolf population reaches the goal of 100. This is 14 years after the initial BRWRA releases. The deer population at that point is projected to be 7% lower than it would be without wolves in the high ungulate population scenario and 22% lower than it would be without wolves in the low ungulate population scenario. The net effect will be an estimated 4,800 to 10,000 fewer deer than would occur without wolves.

The elk population is projected to be between a high of 18,000 and a low of 9,300 five years after the wolf population reaches the goal of 100. The elk population is projected to be 6% lower than it would be without wolves in the high ungulate population scenario and 17% lower than it would be without wolves in the low ungulate population scenario. The net effect will be an estimated 1,200 to 1,900 fewer elk than would occur without wolves.

Notably, under the high ungulate population scenarios these populations still would increase “with wolves” relative to current populations, by 13% for both deer and elk. Of course, they would increase even more without wolves. Put differently, the effect of wolf predation would be to slow the rate of increase in the increasing scenario; wolf predation also would speed up the rate of decrease in the decreasing scenario.

Impacts to bighorn sheep populations were not modelled because sheep make up less than 3% of the available wild ungulate biomass in the BRWRA and scientific information from northern areas where wolves and sheep co-exist does not suggest that wolves would prey heavily on these animals. It appears unlikely that wolves would have a significant impact on the overall bighorn sheep population. But, some sheep herds in the BRWRA are relatively small (e.g., 20 animals) and isolated, so predation of even a few breeding adults could reduce the productivity of these groups. The likelihood of this occurring appears low.

Bighorn sheep in the BRWRA may not have widely available access to rugged escape cover. Where this is lacking, the sheep may be more vulnerable to wolf predation than they would be if escape cover was readily accessible. Ongoing bighorn sheep surveys, coupled with a wolf food habit study, could provide information on actual impacts of wolves on sheep in the BRWRA.

Wolves that did severely impact big game populations could be captured and moved under the Proposed Mexican Wolf Experimental Population Rule (Appendix C; see definition of “Impacts on game populations in ways which may inhibit further wolf recovery” in Appendix G - Glossary). This is not projected to happen in the BRWRA (Green-Hammond 1994). Also, wolves are not likely to exert a major influence on secondary prey populations of small mammals or on any threatened or endangered species in the area (Appendix D - Section 7 Consultation on Preferred Alternative).
Potential impacts of wolf reintroduction on deer and elk populations were estimated through computer modeling of future populations with and without wolf predation (Green-Hammond 1994). However, uncertainty exists regarding these issues:

- future deer and elk population trends;
- Mexican wolf use of prey other than deer and elk (called alternate prey use); and
- the degree of compensation for wolf-caused mortality of deer and elk that will occur through reduction of other mortality factors, for example, when a wolf kills a deer that would have died of another cause around the same time period (called compensatory mortality).

The model addressed these uncertainties as follows. Reasonable increasing, stable, and decreasing deer and elk population trend scenarios without wolves (i.e., assuming no wolf reintroduction) were created, using the New Mexico Department of Game and Fish Deer Model for predicting birth and survival rates, state wildlife agency information on current populations, historic population trends, and future agency management plans (Green-Hammond 1994). This model was applied to both the New Mexico and Arizona populations. Using these scenarios and other assumptions about Mexican wolf predation (Parsons 1994), the Green-Hammond model produced corresponding computer simulations with wolves (i.e., assuming wolf reintroduction occurred as planned). These initial simulations used a variety of alternate prey use and compensatory mortality values. The output was a plausible range of impacts to deer and elk populations five years after achievement of the recovery area goals.

Then, a survey of recognized wolf experts was conducted to narrow down the expected ranges of alternate prey use and compensatory mortality (Parsons 1994). The initial simulations that had the closest fit with the wolf experts’ conclusions regarding these variables were used. For example, for the BRWRA under Alt. A, the experts concluded that alternate prey use would probably fall between 6% and 29%; the closest model simulations of 0% and 25% alternate prey use were used. The experts also concluded that compensatory mortality would probably be between 15% and 47%; the initial model simulations of 17% to 50% were used.

Thus, a range of plausible, expert-assisted, impact scenarios are presented in this EIS. The high ungulate population scenario is the one in which the deer or elk population experiences the least reduction due to wolf predation. For the BRWRA under Alt. A, this was the scenario with increasing deer or elk populations, with only 75% of the reintroduced wolves’ diet consisting of deer or elk (50% for the WSWRA), and half of the wolf-caused mortality on deer and elk being offset by reductions in other mortality causes. The Low ungulate population scenario—the one in which the ungulate population experiences the greatest wolf-caused reduction—for the BRWRA under Alt. A was the scenario with decreasing deer or elk populations, with 100% of the reintroduced wolves’ diet consisting of deer or elk (88% for the WSWRA), and only one-sixth of the wolf-caused mortality on deer and elk being offset by reductions in other mortality causes.

This modelling was done for the deer and elk populations under each of the three reintroduction alternatives. But, it was not done for the “no action” alternative (Alt. D) and was not done for potential prey other than deer and elk, due to lack of data and high uncertainty regarding impacts. The actual alternate prey use and compensatory mortality figures that were used in the impact analysis here are given in the notes in the tables that accompany the “Impacts on Hunting” discussion for Alts A, B, and C (Tables 4-1, -5, -9, -12, and -14).
Potential positive impacts of the wolf, a top predator in North American ecosystems, on its prey include: (1) sanitation (removal of diseased animals to prevent epidemics), (2) natural selection (culling of deformed or genetically inferior animals before reproduction), (3) stimulation of prey productivity (acceleration of reproductive rates among prey through higher twinning and fertility), and (4) population control (maintenance of prey populations at levels that can be supported by the habitat, protecting against overgrazing and erosion) (Mech 1970).

Conclusion: Although uncertainty exists, wolves are not expected to severely impact prey populations in the BRWRA under Alt. A, even under the low population ungulate scenario.

Impacts on Hunting

Under Alt. A, a re-established population of 100 wolves in the BRWRA is projected to lead to an overall decline in average legal kills of deer of between 6% and 17% in the high and low ungulate population scenarios, respectively, and a decline in legal kills of elk of between 5% and 13% in the high and low population scenarios, respectively (Green-Hammond 1994, Parsons 1994). That is, 300 to 560 fewer deer and 120 to 200 fewer elk may be killed by hunters annually. Because the projected declines would occur over a many-year period it is not clear that they would be large enough to be detectable or measurable by state game managers.

The total expected reduction in hunter days due to wolf reintroduction in the BRWRA ranges from 12,400 to 23,000 days annually (Table 4-1). Box 4-2 explains the calculation of these projected reductions; associated economic impacts are discussed below under Regional Economic Impacts.

Conclusion: Hunter take may fall, with a maximum projection of 17% for deer in the greatest impact case. Actual reductions in permits issued by state game managers likely would occur only if measurable herd reductions were observed.

Impacts on Livestock

Box 4-3 explains how this FEIS projects likely livestock depredation rates for each alternative (see also Tables 4-2 and 4-3). For the BRWRA, after the Preferred Alternative is completed and 100 wolves are distributed throughout the area, losses are projected to be between one and 34 cattle per year (average: 17.5), mostly calves (Table 4-4). This represents a range of between 0.001% and 0.04% annual loss of the approximately 82,600 total cattle present in the area. These projections are best estimates; rates could be different. (The EIS prepared for the FWS’s proposal to reintroduce wolves into Central Idaho (USFWS 1994b), a primarily National Forest area comparable to the BRWRA, projected similar rates of annual cattle depredation, that is, ranging between a low of one and a high of 19 cattle killed; average: ten. In reality, after one year of experience with 14 wolves reintroduced in Central Idaho, no confirmed depredations have occurred.)

Some cattle likely will be killed but not detected, however, the intensive monitoring and research carried out on the reintroduced population under the Preferred Alternative will also serve to monitor livestock depredation, at least in the initial several years. Another key to mitigating impacts on livestock will be active, professional, management of depredation as has been implemented in Minnesota and in the Northern Rockies (Niemeyer et al. 1994; Paul 1995). Depredation management, in conjunction with public education and information, should, over the long term, improve local tolerance of wolves.

The lost value associated with livestock depredation is calculated as the estimated number of cattle lost multiplied by their market value (Table 4-4). Ranchers may be reimbursed for the lost market value by the private Defenders of Wildlife Depredation Compensation Fund. A very few horses and sheep may also be taken.

From 1987 to 1991, total estimated livestock losses—all cattle—from existing predators averaged about 1% of permitted livestock on the Apache National Forest (Myers and Baxter 1993). Comparable depredation rates occurred on the Gila National Forest (S. Libby, Gila NF, pers. comm.). The projected increase in depredation over these existing rates due to the presence of wolves is quite small. Nevertheless, as described in Box 3-1, above, livestock ranching in this area tends to be economically marginal. If uncompensated wolf depredations occur the results could be further decreases in the attrac-
Table 4-1. Estimated annual reduction in hunting five years after achievement of recovery goals in the BRWRA under Alternative A.

Note: the low estimate is based on the “high population” scenario of increasing ungulate populations with high (25%) alternate prey use and high (50%) compensatory mortality; the high estimate is based on “low population” scenario of decreasing ungulate populations, no alternate prey use, and low (17%) compensatory mortality (Green-Hammond 1994, Parsons 1994). Impacts in Arizona and New Mexico are determined based on the proportion of the ungulate populations existing in each state.

<table>
<thead>
<tr>
<th>Statistic</th>
<th>Low Estimate</th>
<th>High Estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Reduced elk harvest</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>120</td>
<td>200</td>
</tr>
<tr>
<td>AZ</td>
<td>40</td>
<td>70</td>
</tr>
<tr>
<td>NM</td>
<td>80</td>
<td>130</td>
</tr>
<tr>
<td><strong>Reduced deer harvest</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>300</td>
<td>560</td>
</tr>
<tr>
<td>AZ</td>
<td>95</td>
<td>180</td>
</tr>
<tr>
<td>NM</td>
<td>205</td>
<td>380</td>
</tr>
<tr>
<td><strong>Reduced elk hunting days</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>2,700</td>
<td>4,630</td>
</tr>
<tr>
<td>AZ</td>
<td>950</td>
<td>1,620</td>
</tr>
<tr>
<td>NM</td>
<td>1,750</td>
<td>3,010</td>
</tr>
<tr>
<td><strong>Reduced deer hunting days</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>9,700</td>
<td>18,400</td>
</tr>
<tr>
<td>AZ</td>
<td>3,100</td>
<td>5,900</td>
</tr>
<tr>
<td>NM</td>
<td>6,600</td>
<td>12,500</td>
</tr>
</tbody>
</table>


**SOURCE:** Duffield and Neher (1994).
Box 4-2. Calculating Mexican wolf impacts on hunting and associated economic values.

This EIS calculates the effect of reduced hunter opportunity caused by wolves in two ways:

First, the social cost of the lost enjoyment of hunting is estimated. A straightforward method converts the projected reductions in deer and elk kills into lost hunter days in the field. Reductions in hunter days are calculated based on average success rates and days hunted per hunter (Ariz. Game and Fish Comm. 1993, New Mexico Dep’t of Game and Fish 1993, USFWS and Dept of Commerce 1991 a and 1991 b).

The simplifying assumption is made that the reduction in hunter days equals the reduction in harvest divided by the success rate, multiplied by the average number of days per hunter. The projected declines in deer and elk harvested imply reduced hunting, either through a reduction in available deer and elk permits in the affected game management units or through a reduction in hunter success rates in these units. This somewhat simplistic assumption, aimed at projecting impacts that will occur up to 15 years in the future, necessarily does not consider potential complicating factors. Such factors that cannot reasonably be taken into account now could include, for example: a) changes in hunt management strategies by the Arizona and New Mexico Game and Fish Departments, such as moving to trophy hunts; b) positive or negative values that hunters may associate with hunting in an area where wolves are present that may compensate for - or conversely exacerbate - the projected reduction in hunter opportunity; c) the presence of wolves affecting hunter success rates independently of reducing total game availability (e.g., by causing more, or less, clustering of deer and elk); d) changes in the numbers of hunters applying for permits; e) habitat management effects on prey densities and hunter success. State game managers are not expected to reduce permit numbers just because wolves are introduced.

The economic values of the projected reductions in deer and elk hunter days are calculated by multiplying the number of lost hunter days by the average net “willingness-to-pay” for a day of hunting, which is estimated at $58.00 (all estimates are adjusted to 1994 dollars). Average willingness-to-pay for a hunter day is derived from a survey of 56 big game hunting willingness-to-pay studies in the United States (Walsh et al. 1988).

Second, the reduction in hunting-related expenditures in the region of each wolf recovery area is computed in a similar way, that is, by multiplying the number of lost hunter days by the average hunter expenditure per day. Hunter expenditures per day are obtained from survey information for New Mexico and Arizona (USFWS and Dept. of Commerce, 1991 a and 1991 b). Also, a reduction in big game license and permit fees collected by the two states is calculated.

The text of Chap. 4 includes caveats about the roughness of the resulting values as far as predicting net economic changes in Arizona and New Mexico. It should be emphasized that the point in time that these levels of annual impacts are projected to occur is five years after full achievement of the recovery area wolf population goals.

Box 4-3. Projecting rates of Mexican wolf livestock depredation.

Rates of gray wolf depredation on livestock have been studied in Alberta, Minnesota, and Montana (Table 4-2; see Appendix F for background information on the livestock depredation experiences in each of these areas). Estimating future Mexican wolf depredation rates based on these northern areas presents difficulties due to differences in climate, terrain, vegetation, size of operations, livestock husbandry practices, and prey populations. The Minnesota livestock industry, in particular, is quite different from that in the Southwest because pastures are smaller, calving often occurs in barns, and cattle are more easily protected from predators. Also, Mexican wolves are typically smaller than northern wolves, which could lessen the rate at which they depredate.

To estimate depredation in a given Mexican wolf recovery area the equation below is used, which standardizes depredation rates in relation to livestock and wolf numbers in the northern study areas. (Sheep are disregarded in the equation because of the small number of sheep in the Mexican wolf recovery areas.)

The difference in year-round presence of cattle on the range is a key factor. In Alberta, Minnesota, and Montana cattle graze in free-ranging situations (although in Minnesota the pastures they range in are relatively small) for four to six months. In contrast, in many areas of the Southwest cattle are on the range from eight months to year-round. The equation accounts for this difference by multiplying the northern study area rates by a multiplier based on the comparative length of the typical grazing season for the allotments in the wolf recovery area being analyzed. For example, if livestock are present year-round in a southwestern area—or twice as long as the northern area—then the length-of-grazing-season multiplier is 2.0 (see Appendix F for the actual multipliers used for each southwestern area). This FEIS uses just the length-of-grazing-season multiplier for the area for calculating the low range of likely depredation (Table 4-3). For calculating the high range of likely depredation, the length-of-grazing-season multiplier is used as a base and 3.0 is added to it. This increase reflects the general feeling of experts that were surveyed on this issue that depredation rates will be higher in the Southwest than in the three northern study areas for a variety of reasons besides differences in the length of the grazing season (the expert survey responses are summarized in Appendix F). Adding 3.0 to the base length-of-grazing-season multiplier represents the high end of the range of specific multipliers proposed by the survey respondents. Thus, the equation used is:

\[
\text{No. of cattle (recovery area)} \times \text{No. of wolves (recovery area)} \times \frac{\text{Mean annual no. depredations}}{\text{No. of cattle (northern area)} \times \text{No. of wolves (northern area)}} \times \text{multiplier} = \text{Estimated annual no. depredations (recovery area)}
\]

“Plugging in” the numbers from the three northern study areas, and multiplying by the appropriate low range and high range multipliers, produces a range of estimates for the BRWRA and the WSWRA (Appendix F, Tables F-1 and F-2). Table 4-3 presents the lowest low estimate and the highest high estimate from Tables F-1 and F-2 as the “low” and “high” estimates, respectively. Table 4-3 also provides the average of these. (These low, high, and average projections are also provided in the discussion of “Impacts on Livestock” for each of the reintroduction alternatives in this chapter.)

Wolves are expected to prey more on calves than adult cattle. In northern areas calves make up 68 to 95 percent of cattle losses. It is uncertain whether the addition of wolves into an area that already has other predators, such as lions and coyotes, will add to, or redistribute, overall cattle depredation. Mexican wolf depredation will certainly vary from year to year and place to place.

A small fraction of one percent of the total livestock available is expected to be taken in the typical year. (Table 4-3). Most wolves will not depredate even when livestock are present. A small number of livestock

(continued)
owners are expected to be affected; however, some could sustain significant losses in a given year. Depredated livestock may be replaced on grazing allotments, thus effects on the overall number of livestock present during a grazing season should be marginal.

Livestock may also suffer non-lethal wounds from wolf attacks that could reduce their market value and compel the rancher to incur veterinary expenses. Ranchers may also be compelled to devote time and expense to investigating possible depredations, to dealing with government officials and others regarding depredations and compensation claims, to replacing stock that has been killed, and to taking steps to prevent depredations. Finally, it should be expected that some wolf depredations will not be found or, even if they are found, will be so old that evidence of wolf involvement may no longer exist. No accepted method exists to project unconfirmed predation losses.


Table 4-2. Mean livestock depredation rates from northern study areas.

<table>
<thead>
<tr>
<th>Area</th>
<th>No. Years Studied</th>
<th>No. Wolves</th>
<th>No. Cattle</th>
<th>No. Sheep</th>
<th>Mean Cattle Killed</th>
<th>Mean Sheep Killed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alberta</td>
<td>17</td>
<td>1,500</td>
<td>257,041</td>
<td>10,000</td>
<td>235 (0.09%)</td>
<td>31 (0.3%)</td>
</tr>
<tr>
<td>Minnesota</td>
<td>13</td>
<td>1,460</td>
<td>229,064</td>
<td>23,713</td>
<td>27 (0.01%)</td>
<td>50 (0.2%)</td>
</tr>
<tr>
<td>Montana</td>
<td>7</td>
<td>44</td>
<td>75,000</td>
<td>1,000</td>
<td>3 (0.004%)</td>
<td>2 (0.02%)</td>
</tr>
</tbody>
</table>

Table 4-3. Number and percentage of cattle available projected to be killed annually by Mexican wolves after achievement of recovery area goals.

Notes: The top number in each box is the number of cattle expected to be killed annually; the bottom number is the percentage of the total cattle available projected to be killed. “Low” and “high” estimates are the lowest low and highest high estimates from background Tables F-1 and F-2 in Appendix F.

<table>
<thead>
<tr>
<th>Mexican Wolf Recovery Area</th>
<th>Low Estimate</th>
<th>High Estimate</th>
<th>Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>BRWRA Primary and Secondary Zones combined (Alts. A and B) - 82,617 cattle</td>
<td>1.0</td>
<td>33.9</td>
<td>17.5</td>
</tr>
<tr>
<td></td>
<td>(0.001%)</td>
<td>(0.04%)</td>
<td>(0.02%)</td>
</tr>
<tr>
<td>- 100 wolves</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BRWRA Primary Recovery Zone (Alt. B) - 10,494 cattle</td>
<td>0.03</td>
<td>0.9</td>
<td>0.5</td>
</tr>
<tr>
<td></td>
<td>(0.0003%)</td>
<td>(0.009%)</td>
<td>(0.005%)</td>
</tr>
<tr>
<td>- 20 wolves</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>WSWRA Primary and Secondary Zones combined (Alts. A and B) - 3,220 cattle</td>
<td>0.0</td>
<td>0.3</td>
<td>0.16</td>
</tr>
<tr>
<td></td>
<td>(0.0005%)</td>
<td>(0.015%)</td>
<td>(0.008%)</td>
</tr>
<tr>
<td>- 20 wolves</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>WSWRA Primary Recovery Zone (Alt. B) - 0 cattle</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

tiveness of affected ranches as businesses to own, invest in, or lend money to (A. Thal, Western NM Univ., pers. comm.).

The impact of wolf depredation on the “custom and culture” of livestock grazing in the BRWRA and other recovery areas defies quantification. Clearly, most ranchers view the wolf as a negative (Biggs 1988, Johnson 1990, Kellert 1985). (However, opinion polling by Duda and Young (1995), indicates about 50% of the public in the most-affected, ranching-oriented, rural New Mexico counties actually support wolf reintroduction, which undercut the idea that major cultural impacts would occur.) It is unlikely that the small projected increase in livestock losses will have more than a marginal impact on the viability of ranching in the BRWRA. A potential positive impact to ranchers from wolf recovery is the projected reduction in the size of the deer and elk herds that can compete with livestock for forage on grazing allotments. In addition, coyote and lion densities may be reduced by competition with reintroduced wolves, which could reduce livestock depredation losses from coyotes and lions.

Conclusion: Wolves likely will take between one and 34 cattle per year, representing less than one-twentieth of one percent of all the cattle present. This should not cause a major impact to ranching as a whole in the area, but some ranchers may experience significant losses.
Table 4-4. Estimated annual livestock depredation costs after achievement of recovery area goals in the BRWRA under Alt. A.

<table>
<thead>
<tr>
<th></th>
<th>Low Estimate</th>
<th>High Estimate</th>
<th>Average Estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cattle lost</td>
<td>1</td>
<td>33.9</td>
<td>17.5</td>
</tr>
<tr>
<td>Average value per animal$^a$</td>
<td>$638$</td>
<td>$638$</td>
<td>$638$</td>
</tr>
<tr>
<td>Total lost value/year</td>
<td>$640$</td>
<td>$21,600$</td>
<td>$11,200$</td>
</tr>
</tbody>
</table>

$^a$Value based on average of the January 1994 average value of cows and calves in Arizona (D. Dewalt, AZ Agric. Statistics Service, pers. comm.) and the February 1994 average value of cows and calves in New Mexico (B. Nedom, NM Agric. Statistics Service, pers. comm.). Average values include high value stock, culls, and all others.


Impacts on Predator Control Programs

The experimental population rule will restrict all use of M-44s and choking-type neck snares in “occupied Mexican wolf range” (see definition in Appendix G - Glossary). Label restrictions on M-44s already limit their use in areas where threatened or endangered species may be adversely affected (USFWS 1994b). The FWS, with USDA Animal Damage Control (ADC) cooperation, will provide private users of these devices with the locations where the EPA label restrictions would apply. Other changes in ADC operations, such as limiting trap sizes and increasing frequency of trap checks, may be agreed to following conferencing between ADC and FWS. The restrictions on control methods likely would reduce ADC’s effectiveness in controlling other predators in the area, unless the agency commits additional resources. However, in Arizona, an anti-trapping law (ARS 17-301 (D)), passed in 1994, already disallows use of traps and snares on public lands for control of other predators. No additional restrictions on control methods for other predators should result from wolf recovery in Arizona.

Wolves may displace other large predators (see Appendix A section on Influence on Other Predators); coyotes and mountain lions could most likely be affected (populations of black bears and wolves apparently co-exist without appreciable impacts on each other). This potential displacement may result in temporarily higher concentrations of the other predators in surrounding areas, presumably until some equilibrium level is restored. However, because wolf populations will recover gradually, such changes likely would be difficult to detect if they occurred. The ultimate impact wolf recovery would have on these predators, and on animal damage control needs for them, cannot be determined now with confidence. In other words, it is unclear whether the presence of wolves in an area would reduce, displace, or perhaps somehow increase the overall private and ADC workloads for other predators.

Impacts on Agency, Tribal, and Local Government Policies and Plans

**U.S. Forest Service**—The current management focus on the two national forests in the BRWRA should not change significantly with the presence of wolves. Addressing habitat diversity loss and exotic species invasions should not conflict with management for wolves. Enhancement of native vegetation communities may enhance ungulate populations upon which wolves depend. No formal ESA Section 7 consultation with the FWS would be required regarding potential impacts of Forest Service activities on nonessential experimental Mexican wolves.

The Forest Service may choose to amend the Apache and Gila National Forest Plans to reflect changes related to wolf recovery. No amendments
are required under the Preferred Alternative, however. The most significant topics of possible amendments include Grazing Use, Timber Volume, Vegetation Management Practices (especially fire) and Acres Treated, and management for multiple protected species. Generally, these changes would serve to enhance ungulate prey and harmonize management for wolves with the other “multiple uses” of the forests.

The Forest Service would need to informally “confer,” but a conference would not be required for each individual project, development, or plan amendment in the BRWRA that the agency undertakes. According to the FWS’s Section 7 Process and Policy Handbook: “a conference is required if the action is judged to likely jeopardize” the species involved (USFWS 1993f). This “threshold” is “reached if the likelihood of the species’ survival is appreciably reduced.” Few, if any, Forest Service activities would pose this level of threat to a reintroduced Mexican wolf population. In those few cases where conferences are undertaken, the Service will provide “advisory recommendations for minimizing or avoiding adverse effects.”

It is expected that this informal conferencing will occur on a more programmatic basis under the umbrella of a cooperative wolf management plan that all of the affected agencies will develop. This management plan would include various measures to implement and support wolf recovery and to minimize conflicts with other Forest Service duties on the Apache and Gila National Forests. Such measures would need to avoid conflict with management for other threatened or endangered species with full ESA protection, such as the Mexican spotted owl, that would have a higher degree of legal protection than the nonessential experimental wolves.

State of Arizona.—Although neither Arizona’s Game and Fish Department nor its Commission has taken a final position on wolf reintroduction, the Department has applied its twelve-step procedure for re-establishing endangered species in the state to the Mexican wolf (AGFD 1987; Appendix E describes the complete procedure). The FWS’s Preferred Alternative includes working cooperatively with the Department. The proposed federal and state recovery efforts are consistent; Arizona’s plan is essentially a subset of the Preferred Alternative that covers only Arizona (Groebner et al. 1995).

State of New Mexico.—The Preferred Alternative is consistent with New Mexico’s Wildlife Conservation Act. The FWS’s Preferred Alternative includes working cooperatively with New Mexico’s Department of Game and Fish.

Tribes.—While no reservations are within the designated BRWRA, dispersing wolves could cause some impacts on the neighboring White Mountain and San Carlos Apache reservations until they were captured. This could compel those tribes to develop wolf management plans that are approved by the FWS or to enter into cooperative wolf management plans directly with the FWS. Both tribes have adopted resolutions opposing wolf recovery in the BRWRA. Further potential impacts on these tribes are discussed under Alt. C.

Counties.—The Catron and Sierra counties land use ordinances that call for equal authority with federal agencies over decisions affecting federal lands within these counties could conflict with the Preferred Alternative. Similar assertions are made in both Apache and Greenlee counties’ Land and Resource Policies. Catron and Sierra counties have expressed concern about wolf recovery and sought to extend local planning jurisdiction over it. The federal ESA and the Mexican Wolf Experimental Population Rule, after adoption as a federal regulation, would preempt any conflicting local mandates. Wolf recovery under the Preferred Alternative does not directly conflict with Catron and Sierra counties’ ordinances prohibiting the release of wolves into those counties as no wolves will be released there. Nevertheless, releasing wolves in nearby counties with foreseeable dispersal into Catron and Sierra counties, as proposed here, does appear to conflict with the goals of these ordinances.

1 The National Environmental Policy Act and implementing regulations require the federal government to attempt to cooperate with local governments when planning federal actions that may affect them. The FWS has pursued cooperation in preparing this EIS through meetings with county officials, inviting county representatives as consultants to the EIS Interdisciplinary Team, making background information available, reviewing and responding to comments and studies prepared by county consultants, and other measures. In addition, the EIS process included holding public comment meetings in each area potentially affected.
Conclusion: Wolf reintroduction as proposed under Alt. A will not seriously impact existing federal or state policies or plans. But, wolf reintroduction and the accompanying federally-adopted experimental population rule would conflict with and preempt certain county ordinances.

Impacts on Land Use

Wolf reintroduction under Alt. A should not significantly impact four major land uses in the BRWRA: forestry, mining, recreation, and grazing (the section above addressed livestock depredation). No formal ESA Section 7 consultation would be required regarding potential impacts of land uses on nonessential experimental Mexican wolves. The FWS’s management of this experimental population will impose no restrictions on these activities, with some exceptions that apply only within the one-mile radius protected areas on public lands around occupied pens, dens, and rendezvous sites. Commencing operations on a new timber sale, mine, or engaging in other “disturbance-causing land use activities” (see detailed definition, including exemptions, in Appendix G - Glossary) could be temporarily delayed until the pen, den, or rendezvous site is no longer occupied (see Appendix C - Proposed Mexican Wolf Experimental Population Rule). The release pens will not be located near existing or planned timber sales, mines, or developments. No involuntary restrictions will be imposed on any private land use.

Timber harvesting generally benefits wolves by maintaining shade-intolerant vegetation favored by ungulates on which wolves prey (Thiel 1988). Further, wolves in Minnesota are able to tolerate noise and blast effects associated with logging and heavy mining (Mech 1993a). Mech (1993b) has also pointed out that low density development for homes, recreational facilities, power lines, and so on do not deter wolf recovery. No additional wilderness areas or other land designations are called for under the Preferred Alternative.

Grazing strategies could be affected by depredation by wolves and by their establishment of dens and rendezvous sites. However, the proposed Mexican Wolf Experimental Population Rule allows extensive flexibility in the relocation of wolves. They could be relocated if they became habituated to humans or human facilities, preyed on livestock, caused major ungulate population decreases, and for other reasons.

Conclusion: It is expected that any land use restrictions due to the reintroduction of wolves to the BRWRA will be minor. While some activities may be inconvenienced due to temporary access restrictions, this inconvenience is unlikely to result in major economic losses.

Impacts on Recreation

Presence of the wolf may deter some visitors from the BRWRA, but it may attract others. The large majority of people surveyed in Arizona (Johnson 1990) and New Mexico (Biggs 1988) indicated they would enjoy seeing or hearing a wolf in the wild (see also Duda and Young 1995). The demand for recreational facilities in the BRWRA may increase. (Millions of people recreate annually, in Minnesota, Wisconsin, Alaska, and Canada, within the range of gray wolves.)

Protection of reintroduced wolves from disturbance by visitors may require occasional temporary access restrictions within a one-mile radius of a den site, rendezvous area, or release pen, depending on location and terrain. Wolf pups cannot regulate their own body temperatures during the first several days of life and are vulnerable if disturbance compels the adults to move their pups to more secure areas during this period. However, wolves tend to den in secluded areas in the spring prior to the peak visitation periods, so little impact on hiking, hunting, or other activities should result. Limiting overall rural road density is not required for wolf recovery (Mech 1993b, but see Thiel 1985). In any event, road densities in the BRWRA are low and are not expected to increase greatly (USFWS 1993c).

Conclusion: Wolf reintroduction is expected to cause increased visitation to the BRWRA as a whole, but also to require minor temporary restrictions on human access to particular areas as necessary to prevent harm to the wolves.

Regional Economic Impacts

As shown in Table 4-5, reduced elk and deer harvest due to wolf reintroduction could result in major lost benefits to hunters in the region, ranging in value
Table 4-5. Estimated annual reduction of hunting-related economic value and expenditures in region five years after achievement of recovery area goals in the BRWRA under Alternative A.

**Note:** low and high estimates are based on range of impacts on hunting described in Table 4-1

<table>
<thead>
<tr>
<th>Statistic</th>
<th>Low Estimate</th>
<th>High Estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reduced value of elk and deer hunting”</td>
<td>$716,800</td>
<td>$1,336,600</td>
</tr>
<tr>
<td>Share by State of reduced hunting value</td>
<td>AZ - $243,700</td>
<td>AZ - $454,450</td>
</tr>
<tr>
<td>Reduced expenditures associated with deer and elk hunting</td>
<td>$579,100</td>
<td>$1,079,100</td>
</tr>
<tr>
<td>Share by State of reduced hunter expenditures</td>
<td>AZ - $115,900</td>
<td>AZ - $215,820</td>
</tr>
<tr>
<td>Reduced hunting permit revenue - New Mexico</td>
<td>$51,200</td>
<td>$93,400</td>
</tr>
<tr>
<td>Reduced hunting permit revenue - Arizona”</td>
<td>$17,500</td>
<td>$32,100</td>
</tr>
</tbody>
</table>

*Based on average economic value per day of big game hunting of $58.00 (Walsh et al. 1988).*

*Based on average AZ and NM trip related expenditures per day of $46.38 for deer and $48.60 for elk (weighted by number of hunters) (USFWS and Dep’t of Commerce 1991a and 1991b).*

*Based on current AZ and NM license and tag costs for residents and nonresidents and the split between resident and nonresident deer and elk tags sold in AZ and NM.*


from about $716,800 to $1,336,600 per year.

(Again, this represents hunters’ assessments of the lost personal value of the sport, not actual expenditures.) About 34% of these lost benefits would occur in Arizona and 66% in New Mexico. Additionally, an estimated $579,100 to $1,079,100 reduction in hunter expenditures could occur. About 20% of this reduction would occur in the Arizona portion of the region and 80% in the New Mexico portion. New Mexico bears a greater share of the expenditure reduction because it has a higher percentage of nonresident hunters than Arizona and thus a higher average hunter expenditure per day.

Hunting-related losses represent the greatest predicted economic impacts of Mexican wolf recovery under the Preferred Alternative. However, they probably are overstated because hunters probably will not actually hunt less overall because of fewer deer and elk in the BRWRA, but instead turn their attention to substitute areas or species (Duffield and Neher 1994). In other words, the losses are unlikely to reach the amounts shown in Table 4-5. Further, deer and elk hunting in both Arizona and New Mexico are dominated by resident hunters (over 96% of total hunting days by residents in Arizona and over 74% by residents in New Mexico) (USFWS and Dep’t of Commerce 1991a and 1991b). Most of the money not spent by residents on hunting probably will be spent in some other sector of the state economy (Duffield and Neher 1994). However, reductions in Arizona and New Mexico expenditures by the 4% to 26% of hunter.
days that are by nonresident hunters would result in reduced overall expenditures in these states. These lost hunter expenditures represent only a small part (0.7 to 1.3%) of the total estimated expenditures (approximately $80,000,000) by all big and small game hunters in Arizona and New Mexico (USFWS and Dep’t of Commerce 1991a and 1991b; C. Neher, Bioeconomics, pers. comm.).

Guides and outfitters operate heavily in the area now, particularly in Catron County, primarily for hunting, but some also offer photography trips, trail rides, and other non-hunting trips (SW Center for Res. Analysis 1994). Hunting guides could experience a reduction in business because less game may be available due to wolf predation. However, some guides may add wolf-watching and howling trips to their offerings. The forested regions of northern Minnesota support over 1,500 wolves and a minor “wolf-watching” industry has sprung up around them (Thiel 1988). Educational touring packages and guided “howling” trips have gained popularity and contributed to some regional economies. This could occur in the BRWRA depending on local initiatives. (Appendix J includes examples of economic benefits resulting from wolf recovery in the northern Rockies and northern Minnesota.)

Greenlee County in particular could benefit because it contains the primary recovery zone, it represents the gateway for visitors coming from major population centers to the south and west, and county management has emphasized facilitating tourism and recreation as economic growth sectors (Ariz. Dep’t of Commerce, n.d.). Alpine, in Apache County, is already very oriented toward tourism and recreation and wolves could enhance this. Also, expenditures by wolf management field staffs, which may include local residents, represent potential positive economic impacts.

Average annual livestock losses in the BRWRA are projected to total between $640 to $2,160. These could impact a few economically marginal ranchers if adequate funds are not available to fully compensate them or if numerous undetected wolf kills occur (A. Thal, Western NM Univ., pers. comm.). Catron County likely would be more affected than any other BRWRA county because it has the largest share of cattle in the recovery area, mostly on small- to medium-sized ranches, which are more likely to be economically marginal than larger ranches. Further, with the lowest median incomes in the BRWRA, Catron County could be most affected by any negative economic impacts caused by wolves. The tax base and local economy could be negatively impacted if the effects of wolf depredation in Catron or other counties were to lead to ranch failures. Ranch failures are not expected, however. In Minnesota, with about 1,500 wolves inhabiting the cattle range and an average of about 27 cattle depredated per year (i.e., within the range of depredations projected for the BRWRA), no known ranch failures have resulted from such depredation (W. Paul, ADC, pers. comm.). Similarly, no known ranch failures have resulted from natural wolf recolonization in northern Montana.

One final area of potential economic impact is the value (positive or negative) people may place on having a recovered wolf population. Just as the value hunters place on a day of hunting may be economically quantified, potential visitors may place a quantifiable value on a day of hearing or seeing wolves in the BRWRA (Duffield and Neher 1994). Another type of economic value is “passive use” or “existence value.” Existence value is the value a person associates with the knowledge that a resource exists, even if that person has no plans or expectations of ever directly using or observing that resource (Krutilla 1967). For example, a wolf enthusiast living in Albuquerque or Phoenix might place a measurable monetary value on the knowledge that a recovered Mexican wolf population exists in the BRWRA even if he or she never anticipates visiting there (Johnson 1990, Duda and Young 1995). Other people may value their absence. Some ranchers or big game hunters, for instance, might value the absence of wolves because they view the wolf as a potential threat.

The potential use and existence values (positive and negative) associated with wolf reintroduction in the BRWRA have not been quantified. However, the FWS projected substantial net economic benefits in the millions of dollars associated with the use and existence values of wolf reintroduction to the Yellowstone and central Idaho areas (USFWS 1994b). In the Southwest, negative economic impacts likely would be offset to some extent by positive economic impacts. 

Conclusion: Negative economic effects are projected predominantly in the lost value of hunting and reduced hunter expenditures.
White Sands Wolf Recovery Area

Impacts on Wild Prey of Wolves

The projected population in the White Sands Wolf Recovery Area (WSWRA), assuming it is used, would be 20 wolves. They would kill prey totalling approximately 56,460 lbs. (live weight) annually (Parsons 1994). The deer population is projected to be between a high of 7,360 and a low of 3,550 five years after the wolf population reaches the goal of 20. The deer population is projected to be 14% lower than it would be without wolves in the high population scenario and 46% lower than it would be without wolves in the low population scenario. The net effect will be approximately 1,200 to 3,000 fewer deer than would occur without wolves.

Considerable uncertainty remains over the extent to which wolves will compete with, and thereby reduce, the high (75 to 80) mountain lion population in the San Andres (Logan 1994). Because of their numbers and greater average body weight, these lions likely currently consume more deer than the projected 20 wolves would consume. Thus, wolves’ ultimate impacts on the deer population may depend largely on whether they displace lions.

Wolves’ impacts on the other potential large prey species—oryx, feral horse, and pronghorn—cannot be predicted with confidence, but are expected to be much less than their impact on deer. Major management reductions in the horse population occurred in 1995 and are continuing (Morrow 1996), which should reduce the likelihood of wolves preying on horses.

Wolves that severely impact big game populations (which excludes feral horses) could be captured and moved, under the proposed experimental population rule (Appendix C). The greatest concerns arise with the projected 46% decline in the deer population under the low population scenario (Green-Hammond 1994), and with the small herd of desert bighorn sheep in the San Andres (Hubbard 1994). Wolves are relatively inefficient predators on all species of mountain sheep due to the cursorial nature of their hunting techniques (Bednarz 1989). However, in other areas gray wolves do occasionally kill bighorn sheep and packs may routinely visit bighorn sheep habitats seeking vulnerable animals (Huggard 1992). If wolves displace mountain lions (an uncertain effect) and reduce deer populations as predicted, then predation on bighorn sheep by the lions could increase. The scabies-infected desert bighorn sheep may be especially vulnerable to predation and any additional mortality may threaten the viability of this herd of a state-listed endangered species.

Conclusion: While considerable uncertainty exists, wolves are unlikely to severely impact the deer population under the high population scenario, but they are likely to severely impact the deer population under the low population scenario, reducing the population almost in half. Wolves also could negatively impact the desert bighorn sheep herd.

Impacts on Hunting

Under Alt. A, a reintroduced wolf population in the WSWRA—a lightly hunted area—would lead to a decline in average legal kills of deer of between 11% and 34% in the high and low population scenarios, respectively (Green-Hammond 1994, Parsons 1994) (Table 4-6). That is, 10 to 24 fewer deer may be killed by hunters annually.

Conclusion: While a relatively high percentage of lost hunting opportunity could result, the small amount of hunting that occurs in the WSWRA means that actual losses of hunter days will be minor.

Impacts on Livestock

In the WSWRA, after the Preferred Alternative is completed and 20 wolves inhabit the area, losses are projected to be between 0.01 and 0.3 cattle per year (average: 0.16), mostly calves (Table 4-7). (In other words, if 0.3 cattle are taken per year this means that one animal would be taken every three years, on average.) This represents a range of between 0.0005% and 0.0 15% annual loss of the 3,220 total cattle present in the area. These projections are best estimates; rates could be different. Bednarz (1989) also predicted very low depredation rates. The low rates are largely due to White Sands Missile Range (WSMR) being free of livestock; apart from a few trespassing cattle, the only livestock in the WSWRA are in the secondary recovery zone to the west of WSMR.
Environmental Consequences

Table 4-6. Estimated annual reduction of hunting five years after achievement of recovery area goals in the WSWRA under Alternative A.

Note: the low estimate is based on the “high population” scenario of an increasing deer population with high (50%) alternate prey use and high (50%) compensatory mortality; the high estimate is based on the “low population” scenario of a decreasing deer population, low (12.5%) alternate prey use, and low (17%) compensatory mortality (Green-Hammond 1994; Parsons 1994).

<table>
<thead>
<tr>
<th>Statistic</th>
<th>Low Estimate</th>
<th>High Estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reduced deer harvest(^a)</td>
<td>10</td>
<td>24</td>
</tr>
<tr>
<td>Reduced deer hunting days(^b)</td>
<td>51</td>
<td>120</td>
</tr>
</tbody>
</table>

\(^a\) Green-Hammond 1994; Parsons 1994.
\(^b\) Based on 1992 success rate for CMU 19 of .39 and average number of days per hunter of 2.0 for the limited entry White Sands Missile Range hunts.

**Source:** Duffield and Neher (1994).

Table 4-7. Estimated annual livestock depredation costs after achievement of recovery area goals in the WSWRA under Alt. A.

<table>
<thead>
<tr>
<th>Statistic</th>
<th>Low Estimate</th>
<th>High Estimate</th>
<th>Average Estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cattle lost</td>
<td>0.01</td>
<td>0.3</td>
<td>0.16</td>
</tr>
<tr>
<td>Average value per animal(^a)</td>
<td>$665</td>
<td>$665</td>
<td>$665</td>
</tr>
<tr>
<td>Total lost value/year</td>
<td>$10</td>
<td>$200</td>
<td>$110</td>
</tr>
</tbody>
</table>

\(^a\) Value based on the February 1994 average value of all cattle and calves in New Mexico (B. Nedom, NM Agric. Statistics Service pers. comm.).

**Source:** Duffield and Neher (1994).
The lost value associated with livestock depredation is calculated as the estimated number of cattle lost times the market value of those animals (Table 4-7). Ranchers may be reimbursed by the private Defenders of Wildlife Depredation Compensation Fund. A very few of the livestock present on the Jornada Experimental Range may also be taken. The experimental mission of this area provides an opportunity to conduct research on wolf depredation, should it occur, and ways to mitigate it.

**Conclusion:** Annual livestock losses in the WSWRA will be minor.

**Impacts on Predator Control Programs**

Little predator control occurs in the area, thus no significant impacts are anticipated. However, a need might arise for control of mountain lions if, as has been speculated (Bednarz 1989), the wolves do displace some of the large mountain lion population from the missile range into livestock grazing areas, where the lions might depredate (see Appendix A section on Influence on Other Predators).

**Impacts on Agency, Tribal, and Local Government Policies and Plans**

No formal ESA consultation with the FWS would be required regarding potential impacts of actions by the U.S. Army or other federal agencies on nonessential experimental Mexican wolves (except for actions in the White Sands National Monument and the San Andres National Wildlife Refuge where consultation could be required). The agencies would need to informally “confer,” but a conference would not be required for each individual test or project in the WSWRA. According to the FWS’s Section 7 Process and Policy Handbook: “a conference is required if the action is judged to likely jeopardize” the species involved (USFWS 1993f). This “threshold” is “reached if the likelihood of the species’ survival is appreciably reduced.”

Few, if any, WSMR activities are likely to pose this level of threat to a reintroduced Mexican wolf population. In those few cases where conferences are undertaken, the Service will provide “advisory recommendations for minimizing or avoiding adverse effects.” It is expected that this informal conferencing will occur on a more programmatic basis under the umbrella of a cooperative wolf management plan that FWS will develop with WSMR and cooperating agencies, which will include various measures to support wolf recovery in the WSWRA while allowing for the normal military use of WSMR.

Most of the area is devoted to military use (discussed in next section). Portions of the WSWRA lie within Sierra and Otero Counties, which have land use ordinances that call for equal authority with federal agencies over decisions affecting federal lands within these counties. These could conflict with the Preferred Alternative. Both counties have expressed concern about wolf recovery and sought to extend local planning jurisdiction over it. Further, Sierra County has an ordinance banning wolf reintroduction in the county. The federal ESA and the experimental population rule, after adoption as a federal regulation, would preempt any conflicting local mandates.

While no Indian reservations are within the designated WSWRA, dispersing wolves could cause some impacts on the nearby Mescalero Apache Reservation until they were captured. This could compel the tribe to develop wolf management plans that are approved by the FWS or to enter into cooperative wolf management plans directly with the FWS.

**Conclusion:** Impacts on WSMR planning are expected to be minor. Limited potential conflicts with local land use ordinances exist.

**Impacts on Military Activities and Land Use**

Under the nonessential experimental classification, the Mexican wolf will receive a slightly higher degree of legal protection than other large mammals like the mountain lion and the oryx with which the WSMR test community has co-existed for years. The presence of these animals has never delayed or cancelled a test. (Indeed, no known cases exist of test activities directly killing a large mammal, although such cases have not been actively looked for and would not necessarily have been recorded if they occurred.)

Except on the San Andres National Wildlife Refuge (SANWR) and the White Sands National Monument (WSNM), the wolf would have the same status as a species “proposed” for ESA listing, such
that only a non-binding conference would be required between the FWS and other federal agencies on proposed activities that might harm the wolves. In the WSWRA sub-areas within the National Wildlife Refuge System, i.e., the SANWR, and within the National Park System, i.e., the WSNM, federal agencies must treat members of the experimental population as a threatened species for purposes of complying with Section 7 of the ESA. No major management conflicts are expected in these areas. The SANWR is already under FWS management. Further, wolves are not expected to inhabit the desert basins and sand dunes of the WSNM.

Gray wolves are able to tolerate noise and blast effects associated with heavy mining in Minnesota, which may be comparable to military testing activities on WSMR (Mech 1993a). Further, wild red wolves live in North Carolina in and adjacent to an Air Force and Navy training area without negative impacts (Phillips 1993). If humans are active in an area the wolves likely will avoid them. However, some test areas in the basins where wolves are least likely to go are contaminated with unexploded shells and could be dangerous to both wolves and field personnel (Bednarz 1989).

While limited access restrictions could be imposed under the proposed Mexican Wolf Experimental Population Rule around release sites, dens, and rendezvous sites, the effects will be minimal due to the very limited public access in the WSWRA. Further, the proposed rule allows extensive flexibility in the relocation of wolves. They could be moved if they endangered themselves by remaining in a military impact area, became habituated to humans or human facilities, caused major ungulate population decreases, preyed on livestock, preyed on desert bighorn sheep in the San Andres Mountains, and for other reasons.

Likely the greatest issue related to military activities and land use will be the need for FWS field personnel to coordinate with WSMR headquarters and limit their wolf monitoring and management in the event of potentially dangerous or high-security testing activities. This may inconvenience both WSMR and the field personnel; nevertheless, such coordination was achieved in a comparable project which occurred in the San Andres Mountains in the same areas likely to be used by wolves. A large-scale mountain lion study conducted for several years, involving radio-telemetry monitoring and recapturing similar to what will take place with the wolf, has caused very little conflict with WSMR’s primary mission (K. Logan, Hornocker Wildlife Research Inst., pers. comm.).

Conclusion: Overall, no major impacts on military activities are expected.

Impacts on Recreation

Minimal impacts are anticipated, beyond the potential impact on hunting discussed above, because very little other recreational use occurs within the areas the wolves would likely occupy. Potential impacts would increase if, as has been proposed, more public access to WSMR is allowed in the future. The only backcountry recreation in the area occurs in the single overnight camping area in the sand dunes of the WSNM, which are not considered suitable wolf habitat.

Regional Economic Impacts

As shown in Table 4-8, reduced harvest of deer in the WSWRA due to wolf recovery could result in lost benefits to hunters valued at $3,000 to $7,100 per year. Additionally, an estimated $2,900 to $7,000 in hunter expenditures could be lost. The estimated reductions in hunter expenditures likely overstate actual reduced expenditures in New Mexico due to the large proportion of resident hunters who will spend that money not spent on hunting in some other sector of the state economy. Hunters probably will not actually hunt less overall because of fewer deer in the WSWRA, but instead turn their attention to substitute areas or species (Duffield and Neher 1994). Livestock losses are projected to have minor economic impacts.

Conclusion: Minor negative economic effects are projected predominantly in the lost value of hunting and reduced hunter expenditures. These could be
Table 4-8. Estimated annual reduction of hunting-related economic value and expenditures in region five years after achievement of recovery area goals in the WSWRA under Alternative A.

Table: Environmental Consequences

<table>
<thead>
<tr>
<th>Statistic</th>
<th>Low Estimate</th>
<th>High Estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reduced value of deer hunting</td>
<td>$3,000</td>
<td>$7,100</td>
</tr>
<tr>
<td>Reduced expenditures associated with deer hunting</td>
<td>$2,900</td>
<td>$7,000</td>
</tr>
<tr>
<td>Reduced hunting permit revenue - New Mexico</td>
<td>$870</td>
<td>$2,100</td>
</tr>
</tbody>
</table>

Note: low and high estimates are based on range of impacts on hunting described in Table 4-6.

SOURCE: Duffield and Neher (1394).

offset to some extent by positive economic impacts but these have not been quantified.

Summary of Adverse Effects of Alternative A in the BRWRA and the WSWRA

Adverse effects of Alt. A in the BRWRA include projected lost value to hunters as high as $1,336,600 per year and an associated reduction in hunter expenditures as high as $1,079,100 per year. Additionally, losses to area ranchers due to livestock predation by wolves are projected to average as high as $21,600 per year, but these may be privately compensated. Some ranchers may suffer significant losses. Predator control activities will be impacted. Wolves may impact the neighboring White Mountain and San Carlos Apache reservations by dispersing onto the reservations and preying on valuable big game and livestock, until the wolves were controlled. Predation by wolves on elk and deer that migrate from the BRWRA primary recovery zone to the reservations may reduce tribal hunting and sales of tags to non-members.

Adverse effects of Alt. A in the WSWRA include major impacts on the deer population under the low population scenario and potential harm to the desert bighorn sheep population. Lost value to hunters is projected to be as high as $7,100 per year and the associated reduction in hunter expenditures as high as $7,000 per year. Additionally, losses to area ranchers due to livestock predation by wolves are projected to average as high as $200 per year, but these may be privately compensated.

Relationship Between Short-term and Long-term Effects and the Enhancement of Long-term Productivity

Losses of livestock and hunting opportunities, and their associated economic impacts, should be less than predicted in the short-term when wolf numbers are low, then rise to the predicted levels after achievement of the recovery area goals. Full achievement of the recovery objective is projected to take longer—until 2005—under the Preferred Alternative than under the other reintroduction alternatives. This is primarily because of the high population goal for the BRWRA (100 wolves) and the fact that...
of the population is expected to be removed annually for depredation control and other management purposes (see Chap. 2, Table 2-2).

In the long term, if wolves are fully recovered and the objectives of the Mexican Wolf Recovery Plan have been met, the wolves may be delisted (removed from ESA protection). If that occurs, the wolves in the BRWRA and the WSWRA (if used) may be managed as a game animal and furbearer by the States of Arizona and New Mexico similar to the way wolves are currently managed in Alaska and Canada. The wolves would represent a potentially valuable resource for both consumptive and non-consumptive use.

The wild Mexican wolf will also be an important natural force in the regulation of prey populations (Mech 1970). Long-term re-establishment of the complex, age-old, highly-evolved relationship between this top predator and its prey is considered beneficial. It may reduce ungulate over-population effects (see Peterson 1977), particularly for elk in the BRWRA, including over-grazing, over-browsing, and competition with livestock. Wolf predation affects deer and elk populations differently than human hunting does (Boyd et al. 1994). Wolves kill a larger proportion of young-of-the-year, males of all ages, and older individuals.

The presence of the wolf will provide opportunities to observe and, through research, to understand the dynamics of natural predator-prey-scavenger relationships in the Southwest, that is, to learn more about ecosystem function and productivity (see, e.g., Murir 1944, Peterson 1977). Returning the wolf, which may go extinct outside of zoos otherwise, will restore a missing component of native biodiversity to the area furthering the goals of the ESA. In conclusion, wolf recovery should enhance the long-term natural productivity of the environment.

Irreversible and Irretrievable Commitments of Resources

From an economic perspective the only irreversible and irreplaceable commitments of resources lie with the wolf reintroduction and management costs and the hunter and rancher economic losses as they occur (Duffield and Neher 1994). Reintroduction and management costs will be more than $500,000 per year until about the year 2010 (Appendix B - Estimated Costs of Implementing the Alternatives). This includes a five-year monitoring/research phase after full achievement of the recovery area goals. Total reintroduction and management costs are estimated at $7,247,000 over 14 years.

Wolves could possibly take some livestock that represent key breeding lines that might then be lost to ranchers, but ranchers probably would not put irreplaceable, uninsured, breeding stock out on the open range, where they could be taken by a whole suite of predators besides wolves. The likelihood of key adult breeding stock being taken by wolves appears remote, given the preference wolves show for calves.

Cumulative Effects

Gray wolf recovery, on roughly the same scale proposed here, has occurred in recent years in northern Montana, Wisconsin, and Yellowstone National Park/Central Idaho. In none of those areas has wolf recovery been shown to have acted cumulatively with other federal actions to significantly negatively affect the overall magnitude or nature of any industry, social institution, or other aspect of the environment. (Further, as a general observation, analysis has found that ESA "protections offered to threatened animals and plants do not impose a measurable burden on development activity at the state level... [T]he economic effects of endangered species listings are so highly localized, of such small scale, and short duration that they do not substantially affect state economic performance in the aggregate." (Meyer 1995).) Nevertheless, there are areas of potential concern as far as negative cumulative impacts in the BRWRA region in particular:

Livestock

The effects of wolf depredation on livestock likely will be relatively minor, with a fraction of 1% of the available livestock taken by wolves. But some ranchers could be significantly affected if they suffer multiple uncompensated depredations. The livestock industry is cyclical and it is conceivable that wolf recovery, along with other negative pressures on the industry, could contribute to significant cumulative impacts. Chief among the other pressures are: a) declines in beef prices, which has occurred markedly
since 1994; b) increases in production costs; c) limitations and reductions of public land grazing, some of which have already been proposed in parts of the BRWRA and are mostly under appeal, and increased costs resulting from government management decisions, including protection of other endangered species, e.g., the Mexican spotted owl (USFWS 1995); and d) increases in fees for public land grazing (see U.S. BLM 1994), although these have decreased lately.

Other Predators

Another issue between wolf recovery and ranching is the cumulative effect of adding another predator into what are already multi-predator (primarily bear, lion, and coyote) areas. The restrictions on predator control tools used in occupied wolf range could lead to increased livestock depredation by the other predators. However, considerable uncertainty regarding the effect wolves will have on the other predators, and therefore on the net livestock depredation rates, precludes quantitative analysis. As wolf populations become more dense, coyotes may be reduced (B. Paul, USDA ADC, pers. comm.). Some evidence exists that wolves aggressively compete with mountain lions (Hornocker Wildlife Res. Inst. 1993), but overall effects of gray wolves on lion populations have not been documented to date. Little impact on bear populations is expected.

Wild Prey and Hunting

The uncertainties about the eventual inter-relationships among wolves and other predators relate not only to the cumulative effect on ranchers, but also to the cumulative effect a new multi-predator system will have on deer, elk, and other prey populations. The projected impacts on the value of hunting and hunter expenditures are the highest categories of projected negative economic effects; nevertheless, the cumulative effect on hunting in Arizona and New Mexico are projected to be minor in relation to the overall value of hunting in these states (USFWS and Dep’t of Commerce 1991 a and 1991 b; C. Neher, Bioeconomics, pers. comm.). Notably, the deer population within the wolf range in northern Minnesota has reached historically high levels, as has the hunter take, notwithstanding the fact the wolf population has increased steadily at the same time (M. Nelson, Nat’l Biol. Survey, pers. comm.). The prey populations are more influenced by the harshness of the winters than by wolf predation. Similarly, weather and drought cycles should have greater impacts on the size of ungulate populations in the Southwest than wolf predation (Green-Hammond 1994).

As indicated in the discussion regarding impacts on prey populations, 100 Mexican wolves on the BRWRA would be expected in the low population scenarios to reduce the deer and elk populations compared to what they would be without wolves, by 22% and 17%, respectively. For the WSWRA, 20 wolves would be expected in the low population scenario to reduce the deer population compared to what it would be without wolves by 46%. These low population scenarios considered negative habitat and weather trends (Green-Hammond 1994). Nevertheless, if these scenarios occurred in combination with unexpected trends, such as a prolonged severe drought, then the long-term cumulative impacts could be a serious decline in the prey population. Unless corrective actions were taken, the areas could lose their capacity to achieve the wolf population goals.

Land Management

Deer generally benefit from human management of the land for forest openings with early successional vegetation. Logging and other clearing tends to ultimately benefit wolves by enhancing deer habitat (M. Nelson, Nat’l Biol. Survey, pers. comm.). In the BRWRA the trend has been toward less logging and clearing, largely resulting from reductions imposed to protect the uneven-aged forest habitat favored by the federally-threatened Mexican spotted owl and by the Forest Service “sensitive” northern goshawk (SW Region USFS 1993). This closed canopy forest provides less ungulate forage than more open areas (U.S. BLM 1994). Also, many decades of fire control have contributed to the dominance of formerly open areas by woody species. Approximately 125,000 acres, or about 5% of the Apache NF, would require treatment annually to mimic disturbance to the ecosystem that occurred under a more natural fire occurrence regime (Hayes 1994). This far exceeds the current prescribed burning rate of about 2,000 to 3,000 acres annually (Hayes 1995). The result is a forest with a higher risk of
catastrophic crown fires that kill virtually all trees within a burned area.

Thus, a potential management conflict exists between supporting wolf recovery and preserving Mexican spotted owl and northern goshawk habitat. Wolf recovery would not directly impact owls or goshawks, or any other endangered species in the area such as the spikedace, loach minnow, or Apache trout (see Appendix D - Section 7 Consultation). Further, this alternative imposes no requirements to preserve wolf habitat. Nevertheless, the Forest Service may amend the Apache and Gila National Forest Plans to reflect changes related to wolf recovery. If federal or state managers choose to take such actions to support wolves and their prey through timber harvesting, thinning, chaining, and prescribed burning (or allowing natural fires to burn), these could indirectly affect those species. Owls and goshawks could be affected by direct habitat alteration and the protected fish could be indirectly affected by excessive burning and other land-clearing activities that result in stream degradation. On the other hand, the owl management guidelines in the Mexican spotted owl recovery plan (USFWS 1995) are intended to provide land managers with flexibility to allow most silvicultural practices to occur, apart from even-aged management and harvest of large trees in key habitat areas, and to reduce excessive fuel levels to abate fire risks. This flexibility is most limited within the 100 acres surrounding owl nest sites.

If management conflicts occur, they may be resolved or mitigated through the interagency cooperative wolf management plan that will facilitate implementation of the Preferred Alternative. This plan will be very specific and will be distinct from the Mexican Wolf Recovery Plan, which is a broader guidance document.

The critical habitat designations for the loach minnow and spikedace (which have yet to become applicable due to legal appeals) are expected to cause no economic impacts to private individuals and to cause less than $20,000 of total local government costs (Souder 1992a and 1992b). The FWS recently released two documents related to the Mexican spotted owl, a Recovery Plan (USFWS 1995) and an economic analysis for the designation of critical habitat (Ekstrand et al. 1995) (the former largely supersedes the economic impact scenarios in the latter). None of the loach minnow, spikedace, or spotted owl studies identify any conflict or negative inter-relationship between spotted owl recovery and wolf recovery. Indeed, wolf recovery may contribute positively to owl recovery by reducing overgrazing by deer and, particularly, elk in the BRWRA (USFWS 1995). The spotted owl economic analysis indicated that most of the negative impacts from protection have already occurred, brought about by listing of the owl and associated management changes by the Forest Service.

The owl economic analysis does identify Catron County, New Mexico, as one of the counties most likely to suffer a continuing reduction in Forest Service payments due to the timber harvest reductions. Payments to county road and school funds could be at risk (Ekstrand et al. 1995). Catron County also is identified in this FEIS as the county most subject to negative economic effect from Mexican wolf recovery, although the potential also exists for some economic benefits (see Regional Economic Impacts section, above).

On the White Sands Missile Range increased military test activity may occur in the future, particularly as other military bases nationally are closed and more testing is consolidated at White Sands (WSMR 1994). This would result in greater potential for conflict with wolf reintroduction, management, monitoring, and research.

The cumulative public land area that BRWRA and WSWRA managers would actually need to temporarily close to public access to protect wolf release pen sites, den sites, and rendezvous areas should amount to a small fraction of one percent of the designated wolf recovery areas. Access restrictions would not apply to research, management, emergencies, important military needs, and similar cases. It is not expected that the limited restrictions associated with reintroduction of nonessential experimental wolves will act in combination with other current or prospective governmental restrictions so as to cause significant hardship. No planned land uses in the BRWRA or WSWRA, beyond those discussed above, are anticipated to act in combination with Mexican wolf recovery to result in cumulative impacts.

The full potential impact of Alternative A consists of the combined impacts of the BRWRA and the WSWRA, if the latter is used. However, little interaction of effects between the two areas is expected with the possible exception of occasional translocations of wolves.
Consequences of Alternative B

Reintroduction of Mexican wolves, classified as nonessential experimental, into both the Blue Range Wolf Recovery Area and the White Sands Wolf Recovery Area primary recovery zones. Wolves dispersing from the primary recovery zones will be captured and returned to the primary zones or captivity.

Blue Range Wolf Recovery Area
Primary Recovery Zone

Impacts on Wild Prey of Wolves

The projected population in the BRWRA primary recovery zone under Alt. B is 20 wolves. They will kill prey totalling approximately 56,460 lbs. (live weight) annually (Parsons 1994). The deer population is projected to be between a high of 15,120 and a low of 10,030 five years after the wolf population reaches the goal of 20. The deer population is projected to be 6% lower than it would be without wolves in the high population scenario and 16% lower than it would be without wolves in the low population scenario. The net effect will be an estimated 970 to 1,900 fewer deer than would occur without wolves.

The elk population is projected to be between a high of 3,580 and a low of 2,340 five years after the wolf population reaches the goal of 20. The elk population is projected to be 6% lower than it would be without wolves in the high population scenario and 13% lower than it would be without wolves in the low population scenario. The net effect will be an estimated 230 to 350 fewer elk than would occur without wolves.

Notably, under the high population scenario deer and elk populations actually increase relative to current populations. Of course, those populations would increase even more without wolves. Wolves that severely impact big game populations could be captured and moved under the experimental population rule. However, this is not projected to happen in the BRWRA primary recovery zone (Green-Hammond 1994).

Conclusion: While uncertainty exists wolves likely will not severely impact prey populations even under the low ungulate population scenario.

Impacts on Hunting

Under Alt. B a re-established population of wolves in the BRWRA primary recovery zone is projected to lead to a decline in average legal kills of deer of between 5% and 12% in the high and low population scenarios, respectively, and a decline in legal kills of elk of between 5% and 9% in the high and low population scenarios, respectively (Green-Hammond 1994, Parsons 1994). This means that 60 to 110 fewer deer and 24 to 33 fewer elk may be killed by hunters annually. All these reductions will occur in Arizona. The total expected reduction in hunter days due to wolf reintroduction in the BRWRA primary recovery zone ranges from 2,140 to 3,700 days (Table 4-9).

Conclusion: Hunter take may fall, with a maximum projection of 12% for deer in the greatest impact case. Actual reductions in permits issued by state game managers likely would occur only if measurable herd reductions were observed.

Impacts on Livestock

After Alt. B is completed in the BRWRA primary recovery zone and 20 wolves are distributed throughout the area, losses are projected to be between 0.03 and one cow per year (average: 0.5), mostly calves (Table 4-10). This represents a range of between 0.0003% and 0.009% annual loss of the 10,490 total cattle present in the primary recovery zone. These projections are best estimates; rates could be different. Ranchers may be reimbursed by the private Defenders of Wildlife Depredation Compensation Fund. A very few horses may also be taken.

From 1987-1991, total estimated livestock losses (all cattle) from existing predators averaged about 1% of permitted livestock on the Apache NF (Myers and Baxter 1993). The projected increases in depredation over these existing rates are quite small.

Conclusion: Wolves likely will take far less than one-tenth of one percent of the cattle present. This should not cause a measurable impact to ranching as
Table 4-9. Estimated annual reduction of hunting five years after achievement of recovery area goals in the BRWRA primary recovery zone under Alternative B.

Note: the low estimate is based on the “high population” scenario of increasing ungulate populations with high (25%) alternate prey use and high (50%) compensatory mortality; the high estimate is based on the “low population” scenario of decreasing ungulate populations, no alternate prey use, and low (17%) compensatory mortality (Green-Hammond 1994, Parsons 1994).

<table>
<thead>
<tr>
<th>Statistic</th>
<th>Low Estimate</th>
<th>High Estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reduced elk harvest</td>
<td>24</td>
<td>33</td>
</tr>
<tr>
<td>Reduced deer harvest</td>
<td>60</td>
<td>110</td>
</tr>
<tr>
<td>Reduced elk hunting days</td>
<td>440</td>
<td>600</td>
</tr>
<tr>
<td>Reduced deer hunting days</td>
<td>1,700</td>
<td>3,100</td>
</tr>
</tbody>
</table>


*b* Based on average success rate of .470 for Ariz. GMU 1 and 27 (1988-1992 statistics) and average number of days hunted per big game hunter of 8.568 (USFWS & Dept. of Commerce 1991a).

*c* Based on average success rate of .290 for Ariz. GMU 1 and 27 (1988-1992 statistics) and average number of days hunted per big game hunter of 8.568.

**Source:** Duffield and Neher (1994).

Table 4-10. Estimated annual livestock depredation costs after achievement of recovery area goals in the BRWRA primary recovery zone under Alternative B.

<table>
<thead>
<tr>
<th>Statistic</th>
<th>Low Estimate</th>
<th>High Estimate</th>
<th>Average Estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cattle lost</td>
<td>0.03</td>
<td>0.9</td>
<td>0.5</td>
</tr>
<tr>
<td>Average value per animal $^a$</td>
<td>$665</td>
<td>$665</td>
<td>$665</td>
</tr>
<tr>
<td>Total lost value/year</td>
<td>$20</td>
<td>$600</td>
<td>$330</td>
</tr>
</tbody>
</table>

$^a$ Value based on the January 1994 average value of cows and calves in Arizona (D. Dewalt, AZ Agric. Statistics Service, pers. comm.).

**Source:** Duffield and Neher (1994).
a whole in the area, but some ranchers will experience losses.

**Impacts on Predator Control Programs**

In Arizona, an anti-trapping law (ARS 17-301 (D)), passed in 1994, disallows use of traps and snares on all public lands for depredation control. No additional restrictions should result from wolf recovery in the BRWRA primary recovery zone.

Wolves may displace other predators; coyotes and lions would most likely be affected. This potential displacement may result in temporarily higher concentrations of the other predators in surrounding areas. However, the ultimate impact this might have on control needs for these predators cannot be determined with confidence.

**Impacts on Agency and Local Government Policies and Plans**

The current management focus on the Apache NF in the BRWRA primary recovery zone should not change significantly with the presence of wolves. The State of Arizona’s Cooperative Reintroduction Plan resembles Alt. B in the BRWRA closely, except that it includes areas to the north and south of the primary recovery zone (Groebner et al. 1995) (see discussion under Alt. A). The only county with jurisdiction is Greenlee County and it does not have laws in conflict with wolf recovery.

**Impacts on Land Use**

Wolf reintroduction under Alt. B should not significantly impact four major land uses in the BRWRA primary recovery zone: forestry, mining, recreation, and grazing (the section above addressed livestock depredation). No formal ESA Section 7 consultation would be required regarding potential impacts of land uses on nonessential experimental Mexican wolves. The FWS’s management of this experimental population will impose no restrictions on these activities, with some exceptions that apply only within the one-mile radius protected areas on public lands around occupied pens, dens, and rendezvous sites. Commencing operations on a new timber sale, mine, or engaging in other “disturbance-causing land use activities” (see detailed definition, including exemptions, in Appendix G - Glossary) could be temporarily delayed until the pen, den, or rendezvous site is no longer occupied (see Appendix C - Proposed Mexican Wolf Experimental Population Rule). The release pens will not be located near existing or planned timber sales, mines, or developments. No involuntary restrictions will be imposed on any private land use.

Grazing strategies could be affected by depredation by wolves and by their establishment of dens and rendezvous sites. However, the proposed rule allows extensive flexibility in the relocation of wolves. They could be relocated if they became habituated to humans or human facilities, preyed on livestock, caused major ungulate population decreases, and for other reasons.

**Conclusion:** It is expected that any land use restrictions due to the reintroduction of wolves to the BRWRA primary recovery zone will be minor. While some activities may be inconvenienced due to temporary access restrictions this inconvenience is unlikely to result in major economic losses.

**Impacts on Recreation**

Presence of the wolf may deter some visitors from the BRWRA primary recovery zone, but it may attract others. The large majority of people surveyed in Arizona indicated they would enjoy seeing or hearing a wolf in the wild (Johnson 1990). The demand for developed and dispersed recreational facilities in the Apache NF may increase. Protection of release pens, wolf dens, and rendezvous sites from disturbance may require occasional temporary access restrictions within one-mile of the site, depending on location and terrain.

**Regional Economic Impacts**

As shown in Table 4-11, reduced hunter elk and deer harvest in the BRWRA primary recovery zone could result in lost benefits to hunters valued between $123,100 to $214,800 per year. Additionally, an estimated $58,200 to $101,500 in hunter expenditures could be lost. These projected losses likely overstate the actual losses in Arizona. Hunters probably will not actually hunt less overall because of fewer deer and elk in the BRWRA primary recovery zone, but instead turn their attention to substitute areas or species. Also, deer and elk hunt-
Table 4-l 1. Estimated annual reduction of hunting-related economic value and expenditures in region five years after achievement of recovery area goals in the BRWRA primary recovery zone under Alternative B.

Note: low and high estimates are based on range of impacts on hunting described in Table 4-9.

<table>
<thead>
<tr>
<th>Statistic</th>
<th>Low  Estimate</th>
<th>High Estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reduced value of elk and deer hunting”</td>
<td>$123,100</td>
<td>$214,800</td>
</tr>
<tr>
<td>Reduced expenditures associated with deer</td>
<td>$58,200</td>
<td>$101,500</td>
</tr>
<tr>
<td>and elk hunting b</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reduced hunting permit revenue - Arizona c</td>
<td>$8,000</td>
<td>$13,000</td>
</tr>
</tbody>
</table>

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a Based on average economic value per day of big game hunting of $58.00 (Walsh et al. 1988).

b Based on average AZ trip related expenditures per day of $27.41 for deer and elk (USFWS & Dept. of Commerce 1991).

c Based on current AZ license and tag costs for residents and nonresidents and the split between resident and nonresident deer and elk tags sold in AZ.


Environmental Consequences

ing in Arizona is dominated by resident hunters (over 95%). Most of the money not spent by residents on hunting will be spent in some other sector of the Arizona economy. Therefore, reduced resident hunting opportunity should not result in a major reduction in total expenditures in Arizona. However, reduced expenditures by the 5% of nonresident hunters would result in reduced overall expenditures in Arizona.

Hunting guides could experience a reduction in business if fewer game are available due to wolf predation. Some guides may add wolf-watching and howling trips to their offerings. Because of their locations, Clifton, in Greenlee County, and Alpine, in Apache County, are the communities most likely to benefit from possible increases in tourism and recreational visitation.

Average annual livestock losses in the BRWRA primary recovery zone are projected to be between $20 to $600. One final area of potential change in economic value associated with wolf reintroduction is the value people may place on having a recovered wolf population. While some people may attach a value to the existence of wolves in the area, others may value their absence. Some ranchers or big game hunters, for instance, might value the absence of wolves because they view the wolf as a potential threat.

The potential use and existence values (positive and negative) associated with wolf reintroduction in the BRWRA primary recovery zone have not been quantified. However, the FWS found substantial net economic benefits associated with the existence value of wolf reintroduction to the Yellowstone and central Idaho areas (USFWS 1994).

Conclusion: Negative economic effects are projected predominantly in the lost value of hunting and reduced hunter expenditures. These likely would be offset to some extent by positive economic impacts but these have not been quantified.
Impacts on Wild Prey of Wolves

The projected population in the WSWRA primary recovery zone under Alt. B is 14 wolves. They will kill prey totalling approximately 39,500 lbs. (live weight) annually (Parsons 1994). The deer population in this area is projected to be between a high of 5,070 and a low of 2,600 five years after the wolf population reaches the goal of 14. The deer population is projected to be 13% lower than it would be without wolves in the high population scenario and 43% lower than it would be without wolves in the low population scenario. The net effect will be an estimated 760 to 2,000 fewer deer than would occur without wolves.

Wolves that severely impact big game populations could be captured and moved, under the experimental population rule (Appendix C; see definition of “Impacts on game populations in ways which may inhibit further wolf recovery” in Glossary). The greatest concern exists with the deer population and with the small herd of desert bighorn sheep in the San Andres (Hubbard 1994). Scabies-infected desert bighorns may be vulnerable to predation and any additional mortality may threaten the viability of this herd of a New Mexico state-listed endangered species.

Conclusion: While uncertainty exists, wolves are unlikely to severely impact the deer population under the high population scenario, but they are likely to severely impact the deer population under the low population scenario, reducing the population almost in half (Green-Hammond 1994). Wolves also could negatively impact the desert bighorn sheep herd. Avoiding these negative impacts could require extensive wolf population management.

Impacts on Hunting

Under Alt. B a re-established population of wolves in the WSWRA primary recovery zone is projected to lead to a decline in average legal kills of deer of between 10% and 30% in the high and low population scenarios, respectively (Green-Hammond 1994, Parsons 1994). In terms of actual numbers of animals, 5 to 11 fewer deer are projected to be killed annually by hunters in this lightly-hunted area. The total expected reduction in hunter days due to wolf recovery in the WSWRA primary recovery zone ranges from 26 to 56 days (Table 4-12).

Environmental Consequences

Table 4-12. Estimated annual reduction of hunting five years after achievement of recovery area goals in the WSWRA primary recovery zone under Alternative B.

Note: the low estimate is based on the “high population” scenario of an increasing deer population with high (50%) alternate prey use and high (50%) compensatory mortality; the high estimate is based on the “low population” scenario of a decreasing deer population, low (12.5%) alternate prey use, and low (17%) compensatory mortality (Green-Hammond 1994, Parsons 1994).

<table>
<thead>
<tr>
<th>Statistic</th>
<th>Low Estimate</th>
<th>High Estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reduced deer harvest a</td>
<td>5</td>
<td>11</td>
</tr>
<tr>
<td>Reduced deer hunting days b</td>
<td>26</td>
<td>56</td>
</tr>
</tbody>
</table>

b Based on 1992 success rate for GMU 19 of .39 and average number of days per hunter of 2.0 for the limited entry White Sands Missile Range hunts.

Conclusion: While a high percentage of hunting loss could result, the very small amount of hunting that occurs in the WSWRA primary recovery zone means that the actual reduction in hunter days in the area will be minor.

Impacts on Livestock

No livestock are legally present in the WSWRA primary recovery zone; therefore, cattle losses there are projected to be close to zero (Table 4-3, above). However, a very few trespassing cattle could be killed. Also, a small number of cattle could be killed if wolves leave the primary recovery zone until the wolves were controlled.

Impacts on Predator Control Programs

No predator control activities occur within the WSWRA primary recovery zone, thus no impacts will occur. However, wolves could displace other predators resulting in higher concentrations of the other predators in surrounding areas, at least temporarily.

Impacts on Agency and Local Government Policies and Plans

Because the area is predominantly managed by the White Sands Missile Range, impacts are discussed in the following section.

Impacts on Military Activities and Land Use

Potential impacts of Alt. B largely will be limited to the mountainous areas where very little missile testing or other military activity occurs. Parts of the primary recovery zone are overlaid by the Yonder Air Force training impact area (Fig 3-6, above), but it is unlikely that the high altitude training that occurs there will impact wolves, or vice versa (Bednarz 1989). Gray wolves are able to tolerate noise and blast effects associated with heavy mining in Minnesota, which may be comparable to testing activities on WSMR (Mech 1993a). Further, red wolves exist in North Carolina in and adjacent to an Air Force and Navy training area without negative impacts (Phillips 1993). If humans are active in an area, the wolves likely will avoid them. If the wolves are in danger, they can be removed. No major impacts are expected on the wolves or on the military activities (Bednarz 1989).

Impacts on Recreation

Except for hunting, discussed above, no recreational activities occur within the WSWRA primary recovery zone, thus impacts on recreation are not expected.

Regional Economic Impacts

As shown in Table 4-13, reduced hunter deer harvest in the WSWRA primary recovery zone could result in lost benefits to hunters valued at about $1,500 to $3,300 per year, after wolf re-establishment. Additionally, an estimated $1,500 to $3,200 in hunter expenditures could be lost. These estimated reductions likely overstate the actual losses in the region. Hunters probably will not actually hunt less overall because of fewer deer in the WSWRA primary recovery zone, but instead turn their attention to substitute areas or species. Most of the money not spent by residents on hunting probably will be spent in some other sector of the state economy, but likely not in the WSWRA region. However, reductions in expenditures by the nonresident hunters would result in reduced overall expenditures in New Mexico.

Annual livestock losses are expected to be near zero in the WSWRA primary recovery zone. Further, no economic impacts (positive or negative) related to changes in hunting guide use or visitor use will occur because neither of these uses occurs within the WSWRA primary recovery zone. Positive or negative economic values may be associated with the existence of wolves in the area. Such values have not been measured.

Summary of Adverse Effects of Alternative B in the BRWRA and WSWRA Primary Recovery Zones

Re-establishment of the Mexican wolf in the BRWRA primary recovery zone under Alt. B is projected to result in a reduction in economic value to hunters as high as $214,800 per year and an associated reduction in hunter expenditures in the
Table 4-13. Estimated annual reduction of hunting-related economic value and expenditures in region five years after achievement of recovery area goals in the WSWRA primary recovery zone under Alternative B.

Note: low and high estimates are based on range of impacts on hunting described in ‘Table 4-12.

<table>
<thead>
<tr>
<th>Statistic</th>
<th>Low Estimate</th>
<th>High Estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reduced value of deer hunting”</td>
<td>$1,500</td>
<td>$3,300</td>
</tr>
<tr>
<td>Reduced expenditures associated with deer hunting”</td>
<td>$1,500</td>
<td>$3,200</td>
</tr>
<tr>
<td>Reduced hunting permit revenue - New Mexico$^c$</td>
<td>$440</td>
<td>$960</td>
</tr>
</tbody>
</table>

$^a$ Based on average economic value per day of big game hunting of $58.00 (Walsh et al. 1988).

$^b$ Based on NM rip-related expenditures per day of $56.81 (USFWS & Dept. of Commerce 1991b).

$^c$ Based on current NM license and tag costs for residents and nonresidents and the split between resident and nonresident deer and elk tags sold in NM.


region as high as $101,500 per year. Average losses to livestock owners due to wolf predation are projected to be as high as $600 per year under Alt. B. Predator control activities in the area will be affected. Wolves may impact the neighboring White Mountain and San Carlos Apache reservations by dispersing onto the reservations and preying on valuable big game and livestock, until the wolves were controlled. Predation by wolves on elk and deer that migrate from the BRWRA primary recovery zone to the reservations may reduce tribal hunting and sales of hunting permits to non-members.

The relatively small WSWRA primary recovery zone deer population could be severely impacted, i.e., up to 43% reduction. Reduced hunter deer harvest are projected to result in hunting value losses as high as $3,300 per year, after wolf re-establishment. Additionally, an estimated $1,500 to $3,200 in hunter expenditures could be lost.

**Irreversible and Irretrievable Commitments of Resources**

From an economic perspective the only irreversible and irretrievable commitments of resources lie with the wolf reintroduction and management costs and the hunter and rancher economic losses as they occur (Duffield and Neher 1994). This alternative also presents the possibility of irretrievable loss of the...
Consequences of Alternative C

Reintroduction of Mexican wolves, classified as endangered, into the Blue Range Wolf Recovery Area only. Wolves will be released into the primary recovery zone and unlimited dispersal will be allowed. Wolves will receive full protection under the Endangered Species Act.

Introduction

Impacts discussed below should be considered the minimum, as wolves would probably eventually expand to a greater area than just the BRWRA. The actual impacts in areas outside the BRWRA are generally identified but cannot be predicted with confidence.

Based on consideration of public and agency comments on the DEIS, the EIS Interdisciplinary Team and the FWS decided to drop reintroduction of full-endangered wolves in the WSWRA from this FEIS. Thus, the DEIS discussion has been eliminated regarding potential impacts in the WSWRA under Alt. C, as well as potential impacts in associated areas that were identified as likely dispersal areas, i.e., the Organ Mountains, the Chupadera Mesa, the Sacramento Mountains and Capitan Mountains units of the Lincoln NF, and the Mescalero Apache Indian Reservation.

Blue Range Wolf Recovery Area

Impacts on Wild Prey of Wolves

The projected population in the BRWRA under Alt. C is 100 wolves. They will kill prey totalling approximately 282,300 lbs. (live weight) annually (Parsons 1994). The deer population is projected to be between a high of 58,700 and a low of 40,200 five years after the wolf population reaches 100. The deer population is projected to be 6% lower than it would be without wolves in the high population scenario and 18% lower than it would be without wolves in the low population scenario. The net effect will be an estimated 3,700 to 8,800 fewer deer than would occur without wolves.

The elk population is projected to be between a high of 16,400 and a low of 10,300 five years after the wolf population reaches the goal of 100. The elk population is projected to be 5% lower than it would be without wolves in the high population scenario and 14% lower than it would be without wolves in the low population scenario. The net effect will be an estimated 870 to 1,700 fewer elk than would occur without wolves.

Notably, under the high population scenario, deer and elk populations actually increase (relative to current populations) by 3% each. Of course, those populations would increase even more without wolves. Wolves that did severely impact big game populations could not be captured and moved under full ESA protection, but this is not expected to happen in the BRWRA as a whole (Green-Hammond 1994).

Conclusion: While uncertainty exists, wolves likely will not severely impact prey populations even under the low population scenario.
Impacts on Hunting

Under Alt. C, a recovered population of wolves in the BRWRA is projected to lead to a decline in average legal kills of deer of between 5% and 13% under the high and low population scenarios, respectively; and a decline in legal kills of elk of between 4% and 9% under the high and low population scenarios, respectively (Green-Hammond 1994, Parsons 1994). In terms of actual numbers of animals, 240 to 480 fewer deer and 90 to 150 fewer elk are projected to be killed by hunters. The total expected reduction in hunter days due to wolf recovery in the BRWRA ranges from 10,100 to 19,300 days (Table 4-14).

Conclusion: Hunter take may fall, with a maximum projection of 13% for deer in the greatest impact case. Actual reductions in permits issued by state game managers likely would occur only if measurable herd reductions were observed.

Impacts on Livestock

After Alt. C is completed in the BRWRA and 100 wolves are distributed throughout the area, losses are projected to be between one and 34 cattle per year (average: 17.5), mostly calves (Table 4-15). This represents a range of between 0.001% and 0.04% annual loss of the 82,620 total cattle present in the area. These projections are best estimates; rates could be different. Ranchers may be reimbursed by the private Defenders of Wildlife Depredation Compensation Fund. A few horses and sheep may also be taken.

From 1987-1991, total estimated livestock losses (all cattle) from existing predators averaged about 1% of permitted livestock on the Apache NF (Myers and Baxter 1993). Comparable depredation rates probably occurred on the Gila National Forest (S. Libby, Gila NF, pers. comm.). The projected increases in depredation over these existing rates are quite small.

Because this alternative allows only limited control of wolves that kill livestock, livestock depredation is more likely to fall near the high range of the projections, or even to significantly exceed the projections, than under Alt.s A or B. This represents a more serious potential impact on ranchers. Further, since ranchers in the BRWRA and likely dispersal areas will not be permitted to harass wolves in the vicinity of their livestock or to kill them if they are attacking their livestock, rancher tolerance for wolves likely will be very low, possibly resulting in illegal killing of wolves (USFWS 1994b).

Conclusion: Wolves likely will take between one and 34 cattle per year, representing less than one-twentieth of one percent of all the cattle present, but the rate could go higher. This should not seriously impact ranching as a whole in the area, but some ranchers may experience significant losses.

Impacts on Predator Control Programs

Effects on ADC activities will be greater than for the other reintroduction alternatives. Under Section 7 of the ESA, techniques that could jeopardize wolves, such as trapping, snaring, and M-44s, will be limited or prohibited in areas that the full-endangered wolves choose to inhabit both within and outside the designated wolf recovery areas. However, in Arizona, an anti-trapping law (ARS 17-301 (D)), passed in 1994, disallows use of traps and snares on all public lands for depredation control. While no additional restrictions should result from wolf recovery on public lands in Arizona, restrictions of ADC activities on private lands are expected.

Private shooting of coyotes may be restricted if wolves are being mistaken for coyotes and shot. In Wisconsin, where wolves have full-endangered status, some of the many hunters in the field during deer hunting season have mistakenly (presumably) shot wolves. Therefore, managers have closed coyote hunting within occupied wolf range during this season (Wydeven 1992). If a similar trend causes high Mexican wolf mortalities, similar closures could be imposed through cooperative agreements with the state game and fish agencies.

Impacts on Agency, Tribal, and Local Government Policies and Plans

Section 7 of the ESA requires federal agencies to examine their proposed actions and to avoid those that would jeopardize full-endangered wolves. Additional habitat research and more biological assessments likely will be needed to assess potential impacts on wolves and their prey Vegetation management may be needed to provide improved
Table 4-14. Estimated annual reduction of hunting five years after achievement of recovery area goals in the BRWRA under Alternative C.

Note: the low estimate is based on the “high population” scenario of increasing ungulate populations with high (25%) alternate prey use and high (50%) compensatory mortality; the high estimate is based on the “low population” scenario of decreasing ungulate populations, no alternate prey use, and low (17%) compensatory mortality (Green-Hammond 1994, Parsons 1994).

<table>
<thead>
<tr>
<th>Statistic</th>
<th>Low Estimate</th>
<th>High Estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reduced elk harvest</td>
<td>90</td>
<td>150</td>
</tr>
<tr>
<td>Reduced deer harvest</td>
<td>240</td>
<td>480</td>
</tr>
<tr>
<td>Reduced elk hunting days</td>
<td>2,100</td>
<td>3,500</td>
</tr>
<tr>
<td>Reduced deer hunting days</td>
<td>8,000</td>
<td>15,800</td>
</tr>
</tbody>
</table>


c Based on average success rate of .2385 for New Mex. GMU 15, 16, 21, 22, 23, and 24 (1988-1992 statistics for elk; 1989-1992 statistics for deer) and Ariz. GMU 1 and 2 (1988-1992 statistics) and average number of days hunted per big game hunter of 7.787 (average of AZ and NM weighted by number of hunters).

Source: Duffield and Neher (1994).

Table 4-15. Estimated annual livestock depredation costs after achievement of recovery area goals in the BRWRA under Alternative C.

<table>
<thead>
<tr>
<th>Statistic</th>
<th>Low Estimate</th>
<th>High Estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cattle lost</td>
<td>1</td>
<td>33.9</td>
</tr>
<tr>
<td>Average value per animal</td>
<td>$638</td>
<td>$638</td>
</tr>
<tr>
<td>Total lost value/year</td>
<td>$640</td>
<td>$21,600</td>
</tr>
</tbody>
</table>


Source: Duffield and Neher (1994).
Environmental Consequences

private land, than under the nonessential experimen-
tal designation. Commencing or continuing opera-
tions on a timber sale, mine, or development could 
be delayed during the spring denning season if 
wolves denned in the immediate area. Timber 
harvesting generally benefits wolves by maintaining 
shade-intolerant vegetation favored by ungulates 
preyed on by wolves (Thiel 1988). Further, wolves 
in Minnesota are able to tolerate noise and blast 
effects associated with logging and heavy mining 
(Mech 1993a). Mech (1993b) has also pointed out 
that low density development for homes, recrea-
tional facilities, power lines, and so on do not deter 
wolf recovery.

With respect to the fourth major land use in the 
area, grazing management could be affected by 
depredation by wolves and by their establishment of 
dens and rendezvous sites. Unlike under Alt. A and 
B, which allow extensive flexibility in the relocation 
of wolves, little flexibility would exist under Alt. C. 
If depredations lead to illegal killings of wolves then 
restrictions on grazing may be imposed. Further, 
measures imposed under Section 7 consultations to 
mitigate potential long-term ecological impacts of 
grazing could be significant. These could include 
reductions in grazing where it is shown to negatively 
affect the deer and elk populations necessary for wolf 
recovery. However, these outcomes have not oc-
curred in other regions where threatened or endan-
gered wolves have recovered.

Case-by-case consultations on proposed land use 
changes that may affect wolves would be needed 
under Section 7 of the ESA; it is premature to say 
that the potential impacts under Alt. C would be 
minor. Wolf reintroduction is not expected to 
significantly impact three of the four major land uses 
in the BRWRA: forestry, mining, and recreation 
development. Nevertheless, the FWS’s management 
of this full-endangered population could impose 
more restrictions on these activities, including on 

Impacts on Land Use

With respect to state and local governments the 
same potential conflicts exist as under Alt. A. How-
ever, under Alt. C the FWS would have less flexibil-
ity to accommodate state, local, tribal, and other 
concerns. Direct federal involvement in state-run 
hunting programs likely would meet with significant 
agency and hunter opposition. The potential im-
pacts on state, local, and tribal governments will be 
broader if wolves disperse out of the BRWRA and 
WSWRA; these are addressed under the discussion 
of Impacts in Likely Dispersal Areas, below.

Impacts on Recreation

Presence of the wolf may deter some visitors from 
the BRWRA, but it may attract others. The large 
majority of people surveyed in Arizona (Johnson 
1990) and New Mexico (Biggs 1988; see Duda and 
Young 1995) indicated they would enjoy seeing or 
hearing a wolf in the wild. The demand for devel-
oped and dispersed recreational facilities in the 
BRWRA region may increase.
Environmental Consequences

Protection of release pens, dens, and rendezvous sites from disturbance by visitors may require temporary access restrictions within one-mile of the site, depending on location and terrain. However, wolves tend to den in secluded areas in the spring prior to the peak visitation periods, so little impact on hiking, hunting, or other activities should result.

Conclusion: Wolf reintroduction is expected to cause increased visitation to the BRWRA and to require minor temporary restrictions on human access to particular areas as necessary to prevent harm to the wolves.

Regional Economic Impacts

As shown in Table 4-16, reduced hunter elk and deer harvest in the BRWRA could result in lost benefits to hunters in the region valued from about $582,800 to $1,119,200 per year after re-establishment of full-endangered Mexican wolves. Roughly 34% of these lost benefits would occur in Arizona and 64% in New Mexico. Additionally, an estimated $470,700 to $902,700 in hunter expenditures could be lost. About 20% of the reductions would occur in the Arizona portion of the region and 80% in the New Mexico portion. (New Mexico bears a greater share of the expenditure reduction because it has a

Table 4-16. Estimated annual reduction of hunting-related economic value and expenditures in region five years after achievement of recovery area goals in the BRWRA under Alternative C.

Note: low and high estimates are based on range of impacts on hunting described in Table 4-14.

<table>
<thead>
<tr>
<th>Statistic</th>
<th>Low Estimate</th>
<th>High Estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reduced value of elk and deer hunting*</td>
<td>$582,800</td>
<td>$1,119,200</td>
</tr>
<tr>
<td>Share by State of reduced hunting value</td>
<td></td>
<td></td>
</tr>
<tr>
<td>AZ -</td>
<td>$198,150</td>
<td>AZ - $380,530</td>
</tr>
<tr>
<td>NM -</td>
<td>$384,650</td>
<td>NM - $738,670</td>
</tr>
<tr>
<td>Reduced expenditures associated with deer and elk hunting”</td>
<td>$470,700</td>
<td>$902,700</td>
</tr>
<tr>
<td>Share by State of reduced hunter expenditures</td>
<td></td>
<td></td>
</tr>
<tr>
<td>AZ -</td>
<td>$94,140</td>
<td>AZ - $180,540</td>
</tr>
<tr>
<td>NM -</td>
<td>$376,560</td>
<td>NM - $722,160</td>
</tr>
<tr>
<td>Reduced hunting permit revenue - New Mexico'</td>
<td>$41,100</td>
<td>$75,900</td>
</tr>
<tr>
<td>Reduced hunting permit revenue - Arizona'</td>
<td>$14,100</td>
<td>$26,300</td>
</tr>
</tbody>
</table>

* Based on average economic value per day of big game hunting of $58.00 (Walsh et al. 1988).

' Based on average AL and NM trip related expenditures per day of $46.38 for deer and $48.60 for elk (weighted by number of hunters)(USFWS and Dep’t of Commerce 1991a and 1991b).

B Based on current AL and NM license and tag costs for residents and nonresidents and the split between resident and nonresident deer and elk tags sold in A% and NM.

higher percentage of nonresident hunters than Arizona and thus a higher average hunter expenditure per day.)

These estimated reductions likely overstate the actual losses in Arizona and New Mexico. Hunters probably will not actually hunt less overall because of fewer deer and elk in the BRWRA, but instead turn their attention to substitute areas or species. Deer and elk hunting is dominated by resident hunters (over 96% in Arizona and 74% in New Mexico). Most of the money not spent by residents on hunting likely would be spent in some other sector of the state economy, but likely not in the BRWRA region. However, reductions in expenditures by the 4% to 26% of nonresident hunters would result in reduced overall expenditures in Arizona and New Mexico. Hunting guides could experience a reduction in business if fewer game are available due to wolf predation. Some guides may add wolf-watching and howling trips to their offerings.

Average annual livestock losses in the BRWRA under Alt. C are projected to be between $640 to $2,160 after wolf re-establishment. These could have a major impact on a few economically marginal ranchers if adequate funds are not available to compensate them.

The potential use and existence values (positive and negative) associated with wolf reintroduction in the BRWRA have not been quantified. However, the FWS found substantial net economic benefits associated with the existence value of wolf reintroduction to the Yellowstone and central Idaho areas (IJSFWS 1994b).

**Conclusion:** Negative economic effects are projected predominantly in the lost value of hunting and reduced hunter expenditures. These likely would be offset to some extent by positive economic impacts but these have not been quantified.

**Impacts in Likely Dispersal Areas**

**San Carlos Apache Reservation**

The San Carlos reservation contains extensive suitable wolf habitat that, if fully occupied, would likely support 20 to 30 wolves. They could cause adverse impacts on the game populations and resulting reductions in hunting, although these have not been modelled.

Wolves could take some of the older trophy bull elk for which the tribe received $57,000 each for three hunting permits in 1994. The larger bull elk will be in a depleted condition during the fall and winter because of the rigors of the rut, frequently isolated from other elk. This makes them vulnerable to predation. Wolves would be less likely to take a bull elk in prime condition. However, wolf predation on some older trophy animals could adversely impact the number of high-value permits the tribe could issue and the prices the tribe could obtain for them. Also, wolf predation on breeding cow elk and the younger age classes may negatively impact the recruitment of bulls into the trophy class.

If a decrease in elk migrating onto the reservation is detected by the San Carlos game managers, the first adjustment to hunting seasons would be removal of certain non-member elk permits, which amounted to $45,000 in total revenue to the tribe in 1994-95 (Brown 1995). In addition, a rough wolf predation model for the San Carlos Apache reservation prepared by Brown (1995) examined several scenarios for wolf impacts on deer, elk, and cattle and the resulting costs to the tribe. For the case of 30 wolves eventually inhabiting the reservation (which the FWS considers at the high range), Brown found that costs in lost deer, elk, and cattle would range between approximately $4,100 and $17,500 annually. (This modelling effort did not include lost value of hunting to the hunters themselves nor did it consider lost hunting expenditures in the region.)

Big game hunting is one of the major income sources (through permit fees, guide costs, and hunter expenditures) on this reservation. The other major source is livestock grazing. Depredation rates are already considered high and are probably aggravated by the low degree of livestock management. Many cattle die on the open range resulting in large amounts of carrion available for scavenging. The addition of another major predator with full-endangered species status could cause a marked increase in the amount of depredation, particularly if wolves are conditioned to feeding on cattle through scavenging opportunities (Bjorge and Cunson 1985).

If livestock depredation occurred regularly, as appears likely, the nature of the ownership of most of the cattle would make depredation compensation problematic. Many cattle are unbranded and differ-
ent family brands are intermixed so that even if a branded cow was killed by wolves, if the brand was not preserved the owner could not be determined. Unless some general compensation approach to the cattle association on whose land the depredation occurred was agreed to by the tribe and the Defenders of Wildlife, some wolf depredations may simply go uncompensated. The San Carlos Apaches have the lowest median household income and the highest percentage of people living below the poverty level of any area discussed in this FEIS (see Table 3-7, above). The importance of livestock income together with the big game hunting income means that the already economically marginal San Carlos Apaches could be more heavily impacted by Mexican wolf reintroduction than people in any other area. Deer, elk, and turkey hunting also have a high value to the tribe for food as well as recreational value. Potential adverse impacts from wolf dispersal out of the BRWRA would be exacerbated by the fact that up to 90% of the tribal elk hunting and 50% of the tribal deer hunting occurs within 10 miles of the BRWRA primary recovery zone.

Other impacts could occur. The action would conflict with the Tribal Council resolution opposing wolf recovery. Some recreational and other land use restrictions may be imposed under Section 7 of the ESA to avoid jeopardizing the full-endangered wolf population and restrictions on depredation control activities may be needed. Implementing and enforcing such restrictions, and preventing illegal killing of wolves, would present potential conflicts with tribal sovereignty unless cooperative agreements on these issues are achieved. Also, dispute exists about the extent to which negative impacts that the tribe may suffer, e.g., loss of trophy bull elk, would require compensation under the federal government’s trust responsibility to the tribes. On the other hand, the potential positive impacts of wolf recovery discussed for the BRWRA, i.e., increased tourism, existence value, and long-term ecological balance, could result on the San Carlos Apache reservation as well.

White Mountain Apache Reservation

The reservation contains extensive suitable wolf habitat that, if fully occupied, would likely support 20 to 30 wolves. They could impact the game populations and resulting reductions in hunting, although these have not been modelled.

The impacts on the White Mountain Apache reservation should be qualitatively similar to those discussed on the San Carlos reservation. However, the White Mountain Apaches have higher incomes overall and are less dependent on hunting and livestock revenues than the San Carlos Apaches; therefore the relative significance of negative economic impacts from wolf recovery should be less. More of the tribe’s income is derived from timber and recreation, which recovery of full-endangered wolves may impact in the form of temporary closures but should not seriously impact. Big game hunting may be reduced. About twice as much revenue, over $1 million, is generated by nonmember big game hunts on this reservation as on the San Carlos reservation. Trophy bull elk hunting accounts for the vast majority of the hunting revenue. (The discussion about the vulnerability and potentially lower recruitment of bull elk on the San Carlos Apache Reservation also applies here.) Wolf depredation of trophy animals could impact the number of trophy elk permits issued and the prices charged for these permits.

The cattle associations could be affected because calf production already is low; however, few commercial sales of calves occur. Livestock roam year-round over much of the reservation and the ownership of individual livestock is not always determinable. Large amounts of carrion could be available to the wolves. Animal damage control methods to reduce depredations may need to be restricted.

Temporary access restrictions may be needed to protect the wolf dens and rendezvous sites that could be affected by the relatively high rate of use for logging and outdoor recreational activities. The tribe’s ski area probably will not be affected, as temporary restrictions around denning sites in the spring likely will not overlap with winter recreation. The tribe’s economic development plan to expand passive recreation and retail and service businesses would not be impacted by fully-protected wolves. The discussion on potential conflicts with tribal sovereignty in the San Carlos Apache section apply here also.

The action would conflict with the Tribal Council resolution opposing wolf recovery. Additional conflicts may result from the Tribal Council resolution prohibiting most federal and state agency access to the reservation for scientific and wildlife management purposes. It is anticipated that a
cooperative management agreement would be needed to avoid conflicts. The potential positive impacts of wolf recovery discussed for the BRWRA, i.e., increased tourism, existence value, and long-term ecological balance, could result on the White Mountain Apache reservation as well.

**Lakeside Ranger District, Sitgreaves National Forest**

Impacts on deer, elk, livestock grazing, and other activities should be comparable here to those in the BRWRA, in proportion to the number of wolves that may occur. Likely the greatest potential conflict would occur in the form of land use restrictions under Section 7 of the ESA because of the high level of recreational and vacation use in the Pinetop-Lakeside and Show Low areas. Closing trails or back-country roads during denning season and, perhaps, limiting conversion of Forest Service land to private land in key wolf-use areas may be necessary to afford the wolves full-endangered protection.

**San Mateo Mountains Unit, Cibola National Forest**

Impacts on deer, elk, livestock grazing, and other activities should be comparable here to those in the BRWRA, in proportion to the number of wolves that may occur. Recreational use is relatively light so few conflicts should occur.

**Summary of Adverse Effects of Alternative C in the BRWRA and Likely Dispersal Areas**

Adverse effects of Alt. C after wolf re-establishment in the BRWRA include lost value to hunters as high as $1,192,200 per year and an associated reduction in hunter expenditures as high as $902,700 per year. Additionally, average losses to area ranchers due to livestock predation by wolves are projected to be as high as $2,160 per year, but these may be privately compensated. Wolves may impact the neighboring White Mountain and San Carlos Apache reservations by dispersing onto the reservations and preying on valuable big game and livestock. Predation by wolves on elk and deer on and near the reservations could reduce tribal hunting and sales of hunting permits to non-members.

Restrictions on predator control activities and potentially-disturbing land uses will be imposed. There is generally a greater likelihood of adverse effects and restrictions occurring, exceeding those projected, as a result of the lower management flexibility under Section 7 of the ESA.

**Relationship Between Short-term and Long-term Effects and the Enhancement of Long-term Productivity**

Losses of livestock and hunting opportunities, and their associated economic impacts, should be less than predicted in the short-term when wolf numbers are low, then rise to the predicted levels or above after achievement of the recovery area goals. Wolf recovery to a population level that meets the 1982 Mexican Wolf Recovery Plan objective in the BRWRA is projected to occur in a shorter term—five years—under this alternative than under any others. Cost savings in the captive breeding program should result. However, although the wolves will be more protected legally, enforcement difficulties and local sentiment against the wolves may result in a high rate of illegal killings that could impede wolf recovery. Extensive law enforcement efforts may be necessary to attempt to reduce illegal killings. This would, of course, increase the costs. It is not clear, however, that increased enforcement efforts actually would be able to reduce illegal killing of wolves in remote areas.

If Mexican wolf reintroduction is successful under this alternative the long-term result could be very widespread effects. The recovered population could eventually range over thousands of square miles of suitable habitat outside the designated recovery area such that the negative and positive impacts described above would occur on a larger scale, roughly correlated with the wolf population size. Because much of the land outside the BRWRA is private or tribal land, the potential for conflict with non-federal land management goals would be high.
Irreversible and Irretrievable Commitments of Resources

From an economic perspective the only irreversible and irretrievable commitments of resources lie with the wolf management costs and the hunter and rancher economic losses as they occur (Duffield and Nehtr 1994). Reintroduction and management costs will be on the order of $550,000 to $590,000 per year for the BRWRA until about 2006 (this includes a five-year monitoring/research phase after full achievement of the recovery area goal) (Appendix B). The total reintroduction and management costs of Alt. C are estimated at $5,692,000, which is less than the Alt. A total because Alt. C takes less time to achieve.

The ranchers’ losses would be highest under this alternative and some marginal ranching operations might be forced out of business. The likelihood of depletion of the Defenders of Wildlife Depredation Compensation Fund is highest here, although the reversibility of such a situation is unclear.

The reductions that wolves are projected to cause in the prey populations would likely only be reversible if the wolf population was reduced through illegal killing or higher natural wolf mortality due to lack of a prey base (although the wolves could switch their choice of primary prey if it was depleted, e.g., from deer to elk). Due to the lack of flexibility to remove wolves to assist the recovery of potentially severely impacted prey populations, the potential exists for a major decline in those herds, although this is considered unlikely.

Cumulative Effects

Cumulative effects would include those discussed, above, under the Preferred Alternative (Alt. A), which should be referred to. In addition, the full-endangered status of the wolves under Alt. C could create serious management complications. A key vegetation management issue will have to be confronted for the BRWRA in planning for the overall effects of wolf reintroduction on the prey populations and on the ecosystem. That is, at least for the Apache NF, the general long-term vegetation trends appear unfavorable for ungulates and wolves (Hayes 1995). This area historically had far more open, unforested areas than exist today and the trend is toward an even more heavily forested situation. (Also, local perceptions that this situation was caused by federally-imposed protections for the Mexican spotted owl and other threatened and endangered species has resulted in a “backlash” against them (L. Allen, Coronado NF, pers. comm.).)

Deer generally benefit from forest openings with early successional vegetation; thus, active logging and other clearing ultimately benefit wolves by enhancing deer habitat (M. Nelson, Nat’l Biol. Survey, pers. comm.). In the BRWRA the trend has been toward less logging and clearing, largely resulting from reductions imposed to protect the uneven-aged forest habitat favored by the federally-threatened Mexican spotted owl and by the Forest Service “sensitive” northern goshawk (SW Region USFS 1993). This closed canopy forest provides less ungulate forage than more open areas (U.S. BLM 1994). Also, many decades of fire control have contributed to dominance of woody species in formerly open areas. Approximately 125,000 acres, or about 5% of the Apache NF, would require treatment annually to mimic disturbance to the ecosystem that occurred under a more natural fire occurrence regime (Hayes 1994). This far exceeds the current prescribed burning rate of about 2,000 to 3,000 acres annually (Hayes 1995). The result is a forest with a higher risk of catastrophic crown fires that kill virtually all trees within a burned area.

Thus, a potential management conflict exists between supporting wolf recovery and preserving Mexican spotted owl and northern goshawk habitat. Wolf recovery would not directly impact owls or goshawks, or any other endangered species in the area such as the spikedace, loach minnow, or the Apache trout (see Appendix D - Section 7 Consultation). But indirectly managing to favor wolves and their prey through such actions as silvicultural treatment, tree thinning, chaining, and prescribed burning (or allowing natural fires to burn) could affect those species. Owls and goshawks would be affected by direct habitat alteration and the protected fish could be indirectly affected by excessive burning and other land-clearing activities that result in stream degradation. On the other hand, the owl management guidelines in the Mexican spotted owl recovery plan (USFWS 1995) are intended to provide land managers with flexibility to allow most silvicultural practices to occur, apart from even-aged management and harvest of large trees in key habitat
areas, and to reduce excessive fuel levels to abate fire risks. This flexibility is most limited within the 100 acres surrounding owl nest sites. Yet, wolf recovery may contribute positively to owl recovery by reducing overgrazing by deer and, particularly, elk in the BRWRA (USFWS 1995).

Consultation between the Forest Service and the FWS would be necessary to avoid actions favoring Mexican wolves that jeopardized the other endangered species. Also, these actions would be managed to minimize potential taking of wolves themselves, e.g., by fire. The ultimate effect likely will be greater need for biological impact assessments of proposed management actions. A carefully-planned management partitioning of the Apache and Gila NF landscape so as to provide the optimum distribution of required habitat to meet the life-history needs of all protected species in the area may be necessary (see Hansen et al. 1993). Site-specific planning efforts would assist the Forest Service in describing desired future conditions necessary to support outputs from the land (Hayes 1995). This would also provide background information for the Apache and Gila Forest Plan amendment process.

Needed studies and planning efforts likely would lead to additional costs and delays initially, but taking a proactive approach may reduce future costs and delays that would result from case-by-case analyses of impacts on a single endangered species basis. Mexican wolf recovery (under any alternative) likely would stimulate more of an ecosystem approach in the management of these multiple endangered species areas. This fits with the recent FWS policy emphasis on cooperative, ecosystem-wide recovery planning (Beattie et al. 1994). Put succinctly, this means (Beattie et al. 1994, citing Clark and Zaunbrecher 1987):

“Management of natural resources using systemwide concepts to ensure that all plants and animals in ecosystems are maintained at viable levels in native habitats and basic ecosystem processes are perpetuated indefinitely.”

**Consequences of Alternative D:**

**No action.**

**Introduction**

Under this “no action” alternative, no impacts are expected in the BRWRA or WSWRA as no wolves will be reintroduced. The most likely areas for possible natural wolf recolonization are closer to Mexico, that is, southwestern New Mexico, southeastern Arizona, and Big Bend National Park. However, if Mexican wolves somehow did eventually naturally recolonize the BRWRA or WSWRA, they would have full-endangered status. The consequences would be similar to those described under the Consequences of Alt. C, the reintroduction of wolves with full ESA protection.

Uncertainty exists regarding whether wild Mexican wolves survive in Mexico, whether they will recolonize the U.S. areas under consideration, and, if so, when and in what numbers. It appears likely that “no wolves”-and no impacts-will occur under this alternative. Thus, the value of quantitative modeling of impacts is limited. Impacts are discussed qualitatively only and should be considered highly speculative.

**The Potential Natural Recolonization Areas**

**Southeastern Arizona**

**Impacts on Wild Prey of Wolves.**—Both white-tailed and mule deer occupy the probable typical habitat for Mexican wolves in southeastern Arizona, from Madrean evergreen woodlands to chaparral and semi-desert grasslands. Javelina are abundant and could provide a secondary diet for wolves. If wolf recolonization occurs, the projected maximum population in the southeastern Arizona potential natural recolonization area would be 30 wolves. Given the relatively sparse deer population in the area, this number of wolves could exert a major impact on the deer. Thus, the ultimate carrying capacity of the area for wolves may be less than initially projected. Also, wolves could impact the small population of Chihuahuan pronghorns (listed by Arizona as threatened) in the area. The Fort
Huachuca herd, in particular, is currently heavily impacted by coyote predation on fawns that ADC is attempting to hold in check. The presence of full-endangered wolves might not only result in more fawn predation, but also could limit the tools ADC could use in its control efforts. On the other hand, wolves might reduce the numbers of coyotes.

**Impacts on Hunting.**—If Mexican wolves did disperse to the area from Mexico, wildlife managers would need to re-examine and possibly adjust hunting and ungulate management to reflect changes in prey mortality caused by wolves.

**Impacts on Livestock.**—If natural recolonization happens, some losses of the 37,400 cattle in the area would be expected. Ranchers may be reimbursed by the private Defenders of Wildlife Depredation Compensation Fund.

**Impacts on Predator Control Programs.**—Because federal ADC activities in the Coronado NF south of Interstate 10 have been very limited, the effects of wolves on ADC activities would be minimal. Because naturally recolonizing wolves would be fully protected as endangered the ADC may need to consult with the FWS under Section 7 of the ESA regarding ad hoc requests from livestock owners to control predators, as well as from Fort Huachuca. Techniques that could jeopardize wolves, such as trapping, snaring, and M-44s could be limited or prohibited in occupied wolf range. However, in Arizona, a new anti-trapping law passed in 1994 disallows use of traps and snares on all public lands for depredation control. Private taking of wolves would be illegal; private use of traps might be restricted if necessary to reduce the risk of illegally taking a wolf and private shooting of coyotes might be restricted if wolves were being mistaken for coyotes and shot.

Mexican wolves dispersing into the area could compete with coyotes, black bears, mountain lions, and bobcats. This competition could reduce or displace populations of these predators, but the extent of such competition cannot be predicted with confidence.

**Impacts on Agency and Local Government Policies and Plans.**—The Forest Service goals of enhancing ecosystem diversity and restoring range-lands would be consistent with management for wolves under this alternative, primarily because they may enhance ungulate populations. However, management to protect full-endangered wolves might impact the management of public land livestock grazing, pursuant to consultations with the FWS under Section 7 of the ESA. Grazing practices might need revision to reduce livestock depredation and the associated potential for illegal killings of wolves. Such steps could include, for example, seasonal removal of livestock from key areas and requiring changes in husbandry to produce a more controlled calving situation such as calving near the ranch headquarters and controlled breeding to produce a more uniform calving period. (However, these outcomes have not occurred in other regions where threatened or endangered wolves have recovered.) The Coronado NF plan likely would need amending to enhance management for ungulate prey and to prioritize management for wolves in relation to the other uses of the forest.

**Impacts on Land Use and Military Activities.**—Natural wolf recolonization under Ah. D should not affect the major land uses in the Coronado NF area: mining and recreational and vacation development (grazing is discussed above). Restrictions probably would not be imposed on these activities, with one exception. Commencing operations on a mine, development, or other disturbing activity could be delayed during the spring denning season or summer rendezvous season if wolves established a den or rendezvous site in the immediate area. However, wolves in Minnesota are able to tolerate noise and blast effects associated with mining (Mech 1993a). Mech (1993b) also has pointed out that wolf recovery need not conflict with low density development for homes, recreational facilities, power lines, and so on.

Fort Huachuca conducts few military tests or maneuvers in the mountainous areas. Wolf recovery likely would not pose a major conflict with the Fort’s activities.

**Impacts on Recreation.**—Visitor access by trail or road might be limited or temporarily blocked in the vicinity of an active den or rendezvous site. Roads might be closed to reduce illegal killings if they occur. Visitor use might increase. If so, the demand for recreational facilities could increase.
Regional Economic Impacts.—The large sector of the population in southeastern Arizona that relies economically on Fort Huachuca would not be affected by naturally recolonizing wolves, nor would businesses and trade associated with the heavily-used Nogales border crossing. Natural recovery of the Mexican wolf in southeastern Arizona likely would cause some economic losses to livestock owners and lost hunting value and hunter expenditures. Benefits associated with reintroduction might accrue due to the positive value many Arizonans would place on the existence of wolves in the state (Johnson 1990). The tourism industry could benefit if visitors come to the area to view or hear wolves.

Southwestern New Mexico

Impacts on Wild Prey of Wolves.—If natural recolonization occurs, the projected maximum population in southwestern New Mexico would be 20 wolves. Their prey would consist primarily of mule deer and some Coues white-tailed deer, javelina, and pronghorn. Some concern exists regarding wolf predation on Gould’s wild turkeys and white-sided jackrabbits, listed as endangered by the State of New Mexico, but major effects on these species are not expected (Hubbard 1994).

Impacts on Hunting.—If Mexican wolves did disperse to the area from Mexico, wildlife managers would need to re-examine and possibly adjust hunting and ungulate management to reflect changes in prey mortality.

Impacts on Livestock.—If natural recolonization happens, some losses of the 23,500 cattle in the area would be expected. Ranchers may be reimbursed by the private Defenders of Wildlife Depredation Compensation Fund.

Impacts on Predator Control Programs.—Because ADC has already agreed to limit its use of techniques that could jeopardize wolves in southwestern New Mexico, such as trapping, snaring, and using M-44s (Fowler-Propst 1993), there should not be additional impacts if wolves do, in fact, recolonize. Private taking of wolves would be illegal; private use of M-44s and traps may be restricted if necessary to reduce the risk of illegally taking a wolf and private shooting of coyotes might be restricted if wolves were being mistaken for coyotes and shot.

Mexican wolves dispersing into the area might compete with coyotes, black bears, mountain lions, and bobcats. This competition could reduce or displace populations of these predators, but the extent of such competition cannot be predicted with confidence.

Impacts on Agency and Local Government Policies and Plans.—Management to protect full-endangered wolves might impact the management of public land livestock grazing. Grazing practices might need revision to reduce livestock depredation and the associated potential for illegal killings of wolves. Such steps could include, for example, removal of livestock from key areas and requiring changes in husbandry so as to reduce open-range calving. (However, these outcomes have not occurred in other regions where threatened or endangered wolves have recovered.) The Coronado NF plan likely would need amending to enhance management for ungulate prey and to prioritize management for wolves in relation to the other uses of the forest.

Hidalgo County’s ordinance prohibiting the release of non-resident canids would not conflict with wolf management under this alternative because wolves would be naturally recolonizing. The county development plan’s emphasis on economic, mineral, and recreational opportunities should not conflict with management of full-protected wolves.

Impacts on Land Use.—Other than potential restrictions on grazing management and some road closures, few land use restrictions are likely. However, the high proportion of private land in the area compared to the other areas addressed in this FEIS means that government managers probably would face greater difficulty in implementing the minor temporary land use restrictions needed to protect wolf dens and rendezvous sites from disturbance than would be the case on public lands.

Impacts on Recreation.—Few developed recreational facilities exist. Visitor use of the Coronado NF lands might increase if wolves attract them. If so, the demand for developed and dispersed recreational facilities may increase.
Regional Economic Impacts.-Wolf recolonization in southwestern New Mexico likely would result in some economic losses to livestock owners and lost hunting value and hunter expenditures. Benefits associated with reintroduction might accrue due to the positive value many New Mexicans place on the existence of wolves in the state (Biggs 1988; Duda and Young 1995) and with increased visitation to the area.

Big Bend National Park

Impacts on Wild Prey of Wolves.-If wolves recolonized Big Bend National Park, some reductions in prey populations, primarily white-tailed deer, mule deer, and javelina, could result. Little data exists regarding these populations. Mech (1991) noted that none of the several long-term studies conducted in hunting-free U.S. and Canadian national parks have shown wolves to severely impact populations of their prey.

The projected maximum population in the park under this alternative would be five wolves. White-tailed deer and javelina might be more available as prey than mule deer because the Chisos Mountain habitat of white-tailed deer and javelina overlaps with the likely preferred wolf habitat.

Impacts on Hunting.-Hunting in the park is prohibited. Hunting might be affected outside the park if wolves dispersed into nearby areas, such as Big Bend State Natural Area and Black Gap Wildlife Management Area, where hunting is the primary management emphasis.

Impacts on Livestock.—No livestock are legally present in the park. However, a very small number of cattle trespassing from Mexico could be killed. Also, wolves might range out into ranch areas outside the park and take a very small number of cattle there.

Impacts on Predator Control Programs.—No predator control activities occur within park boundaries. Coyote control does take place on surrounding private ranches. If endangered Mexican wolves recolonize the park, predator control programs on these ranches could be restricted if necessary to reduce the risk of illegally taking a wolf and private shooting of coyotes may be restricted if wolves were being mistaken for coyotes and shot. Wolves dispersing into the park might compete with coyotes, black bears, mountain lions, and bobcats, especially in the Chisos Mountains, where all four predators occur. This competition could reduce or displace populations of these predators, but the extent of such competition cannot be predicted with confidence.

Impacts on Agency and Local Government Policies and Plans.—Under Ah. D, Mexican wolves dispersing into the park would receive full protection under the Endangered Species Act. The National Park Service would be required to formally consult with the FWS to determine whether proposed park activities would likely jeopardize the continued existence of the wolves. The park’s mission, to manage for recreation and conservation of scenic, natural, wildlife and historical resources, is consistent with wolf recovery. Park plans such as trail upgrading might need to be altered or limited if they affect wolves, but this is unlikely. Interpretive services also might need to accommodate increased visitor demand to see or hear wolves first-hand. Management of the 560,900 acres being considered for wilderness designation would not change, as designation would be consistent with wolf protection.

The Texas statutory prohibition against possessing, transporting, receiving, or releasing live wolves into the state (Tex. Parks and Wild. Code Ann. § 63.104) would not apply to naturally recolonizing wolves. Further, the Texas endangered species statute (Tex. Parks and Wild. Code Ann. § 68.001) supports wolf recovery.

Conclusion: Major impacts on agency policies and plans are not expected, but some changes in park plans might be necessary.

Impacts on Land Development.—If visitor use increases because of the presence of wolves, a greater demand for recreational facilities could ensue. Increased development could result both in the park and in nearby areas.

Impacts on Recreation.—Wolves probably would attract the public. The initiation of a wolf interpretive program could lead to enhanced visitor use. In Algonquin Provincial Park, Ontario, Canada, about 60 public howling sessions have been conducted.
since 1963 (except 1966-68), with 74,250 visitors participating through 1992 (averaging about 1,200 per session) (Strickland 1992). Prince Albert, Riding Mountain, and Jasper National Parks in Canada also have successful wolf howling programs, although on a smaller scale than those in Algonquin.

Visitor interactions with wolves in the Chisos Mountains could occur, due to the high concentration of visitor use in this area, especially during the summer months and holidays. Visitor access by trail or road might need to be limited or temporarily blocked to avoid disturbance of wolf dens and rendezvous sites. However, disturbance by visitors in the desert regions of the park is unlikely because of the low concentration of visitors and limited accessibility, and because wolves probably would not prefer these areas.

Conclusion: Wolf recolonization could result in increased visitation to the Big Bend National Park and could require minor temporary restrictions on human access to particular areas as necessary to prevent harm to the wolves.

Regional Economic Impacts.—If wolves attracted more visitors to the park, especially if the park initiates a special interpretive program, demand for concessionaire services such as dining, lodging, and gift items could increase. Such an increase might contribute to Brewster County economically, where the park already is the largest employer, by increasing employment and visitor expenditures.

Summary of Adverse Effects of Alternative D in the Three Potential Natural Recolonization Areas

Deer in southeastern Arizona are the most likely prey group to be impacted by recolonizing wolves. In addition, natural recolonization could result in economic losses to livestock owners in southwestern New México and southeastern Arizona. Losses of hunting value and hunter expenditures could occur. Restrictions on land use and predator control activities could be imposed in recognition of the wolves’ full-endangered status.

Natural recolonization in Big Bend National Park would have fewer adverse effects than any of the areas or alternatives discussed in this FEIS. The very low projected numbers of wolves, the absence of livestock and hunting, and park management objectives consistent with wolf recovery would preclude the main impacts that could occur elsewhere.

Relationship Between Short-term and Long-term Effects and the Enhancement of Long-Term Productivity

Under this alternative, no short-term effects would occur except for program costs because no indication exists that Mexican wolves will naturally recover in the foreseeable future. Over the longer term, the same types of potential adverse and beneficial effects could occur that arise under the other full-ESA protection alternative (Ah. C). However, the no action alternative has the highest likelihood that no long-term environmental effects will result at all, if natural wolf recolonization does not happen.

Irreversible and Irretrievable Commitments of Resources

From an economic perspective the only irreversible and irretrievable commitments of resources would lie with the wolf program and management costs and any hunter and rancher economic losses as they occurred (Duffield and Neher 1994). In Appendix B these costs are presented based on two reasonable scenarios: wolves do not recolonize (the status quo) and wolves recolonize one of the areas. In the first case annual costs for the Mexican Wolf Recovery Program would continue at about $150,000 per year. In the second case, monitoring, management, and other needs would cause annual costs to increase to about $218,000 per year. Due to uncertainty regarding the period of time over which these scenarios might occur, if at all, no total costs are estimated.

This alternative squarely presents the prospect of an irreversible and irretrievable loss of the wild Mexican wolf type. Maintenance of the captive population over several more generations, without natural selection pressures but with domestication pressures, may result in an animal too far removed from the wild type to be suitable for reintroduction. Risks of disease, possible future genetic problems, lack of zoo space, costs, and other factors could lead
to the permanent loss of the subspecies, if no additional Mexican wolves are discovered in the wild.

**Cumulative Effects**

Cumulative effects under this alternative are too difficult to predict with any confidence. If wolves do not recolonize, obviously no cumulative effects can be described. If they do recolonize, depending on where and how, the types of cumulative effects described under Alt. C might occur.
Chapter 5

Consultation and Coordination
CHAPTER 5
Consultation and Coordination

Development of the Proposal and the Draft and Final Environmental Impact Statements

The FWS—the lead agency—and cooperating agencies compiled a variety of information in order to systematically analyze the potential impacts of alternative approaches to re-establishing Mexican wolves. Needed information was identified and collected during and after the scoping process. Public scoping occurred in 1991 and 1992. The FWS held four public meetings attended by a total of over 838 people, at which a total of 65 comments were presented. The meetings were followed by a written comment period, during which the FWS received 1,342 written comments. The results of the scoping process are summarized in Chap. 1, Table 1-1.

Qualitative and quantitative data were gathered on Mexican wolf biology, ecology, and history; species of special concern; potential wild prey of wolves, including deer, elk, javelina, pronghorn, bighorn sheep, exotic ungulates, and small mammals; livestock predators such as coyotes, bears, and mountain lions; predator control activities; land ownership, use, and management, including military activities; grazing, forestry, mining, and recreational activities; and regional economies and populations. The information came from many sources, including federal, tribal, state, and local agency files, personal communications, on-site visits, scientific literature, and experts’ analyses. Wolf biologists, predator control experts, economists, resource managers, livestock producers, wildlife biologists, and others were consulted.

The FWS contracted with the Center for Wildlife Law at the University of New Mexico School of Law to coordinate the EIS process and to be primarily responsible for drafting the document. The FWS then asked cooperating federal agencies to appoint a representative to an interdisciplinary (ID) team to oversee the writing of the EIS (see List of Preparers). Also, representatives were sought as consultants from the Arizona and New Mexico Departments of Game and Fish and from the potentially affected tribes. The ID team oversaw the formulation of the Proposed Action (including the proposed Mexican Wolf Experimental Population Rule - Appendix C), the wolf recovery alternatives, and the analysis of their impacts.

The ID team met ten times during the development of this EIS, beginning in April, 1993. Also, FWS and Center for Wildlife Law staff attended many informal meetings with representatives of the potentially affected public, local governments, agencies, and organizations to discuss the EIS process and to obtain background information. A mailing list was compiled that now has over 6,000 individuals and organizations. Regular status reports on the progress of the EIS and Mexican wolf recovery were sent to those on the mailing list.

Consultants were contracted for technical analyses. These were Katherine Green-Hammond of Albuquerque, New Mexico, a prey population modeler, and John Duffield and Chris Neher of Bioeconomics, a natural resources economics consulting firm in Missoula, Montana. Also, two expert surveys were conducted, one on livestock depredation and the other on wild prey impacts.

All of the information was compiled at the Center for Wildlife Law. The FWS, the ID team members and their agencies, the Mexican Wolf Recovery Team, and other potentially affected agencies contributed to, reviewed, and revised the internal EIS drafts prepared at the Center for Wildlife Law. The FWS had final approval authority over the entire draft and final EISs.

Concurrently with preparation of the DEIS by the FWS, the State of Arizona developed a “Cooperative Reintroduction Plan for the Mexican Wolf in Arizona” (Groebner et al. 1995). The FWS cooperated in this effort. The FWS also has attempted to cooperate with the local governments that may be affected. The FWS has requested information relevant to drafting the EIS, held meetings with individual county officials, invited county representatives to ID team meetings as consultants, made background information available, held a joint DEIS public comment meeting with one county that
requested it, and reviewed and responded to comments and studies prepared by county consultants. The DEIS was released in June, 1995. Review comments on it are responded to at the end of this chapter. The Public Comment Summary document includes a full recounting of hearings and open houses that the FWS held on the DEIS.

**Notice**

The FWS has final sole responsibility for the contents of this EIS. Participation or review by representatives of other agencies does not imply concurrence, endorsement, or agreement to any recommendations, conclusions, or statements in this document.

**Agencies, Organizations, and Persons Sent the DEIS for Review**

Copies of the DEIS were provided to federal, state, and local agencies, Native American tribes, businesses, interest groups, and other organizations listed below that could be affected by the final decision, and to all contributors to the writing of this document. These individuals and organization are also being sent the FEIS, as are other individuals and organizations that requested it, as well some others that the FWS determined should receive it. A limited number of additional copies of the FEIS are available, upon request. Also, copies are being provided to public libraries, listed below, in cities and towns throughout the potentially affected areas in Arizona, New Mexico, and Brewster County, Texas.

**Federal Agencies**

Council on **Environmental Quality**

Director, Information Office

**Department of Agriculture**

Secretary of Agriculture

APHIS Animal Damage Control

Director, Western Region

State Directors - Arizona, New Mexico, Texas

Forest Service

Regional Forester, Southwest Region

Supervisor, Apache-Sitgreaves National Forest

Supervisor, Cibola National Forest

Supervisor, Coronado National Forest

Supervisor, Gila National Forest

Supervisor, Lincoln National Forest

Director, Jornada Experimental Range

**Department of the Army**

Commander, Fort Bliss Army Reserve Facility and Air Defense Artillery Center

Commander, Fort Huachuca Army Garrison

Commander, Holloman Air Force Base

Commander, White Sands Missile Range

**Department of the Interior**

Secretary of the Interior

Bureau of Indian Affairs

Office of Director

Area Director, Albuquerque

Bureau of Land Management

Office of Director

State Directors - Arizona, New Mexico, Texas

Fish and Wildlife Service

Office of Director

Regional Director, Region 2

Ecological Services Field Offices - Arizona, New Mexico, Texas

Manager, Bosque del Apache National Wildlife Refuge

Manager, San Andres National Wildlife Refuge

Manager, Sevilleta National Wildlife Refuge

National Biological Survey

Office of Director

National Park Service

Office of Director

Regional Director, Southwest Region

Regional Director, Western Region

Superintendent, Big Bend National Park

Superintendent, Chiricahua National Monument

Superintendent, Coronado National Memorial

Superintendent, Gila Cliff Dwellings National Monument

Superintendent, White Sands National Monument

**Environmental Protection Agency**

Director, Office of Federal Activities

Regional Director, Region 8, Denver, Colorado
National Aeronautics and Space Administration
Director, White Sands Test Facility

State Department
Ahmed Meer, Science Office,
U.S. Embassy, Mexico City

State Agencies

State of New Mexico
Office of Governor
Commissioner, State Land Office
Director, Department of Agriculture
Director, Department of Game and Fish
New Mexico State House of Representatives
New Mexico State Senate
President, University of New Mexico
President, New Mexico State University
President, Western New Mexico University

State of Arizona
Office of Governor
Arizona State House of Representatives
Arizona State Senate
Director, Department of Agriculture
Director, Department of Game and Fish
President, Arizona State University
President, University of Arizona

Tribal Governments

Chairman, Mescalero Apache Tribe
Chairman, San Carlos Apache Tribe
Chairman, White Mountain Apache Tribe

Government of Mexico

Biol. Javier de la Maza, Dirección General de Aprovechamiento Ecologico de los Recursos Naturals, Instituto Nacional de Ecologia

County Governments

County Managers, Boards of Supervisors, and County Commissions
Apache County, Arizona
Cochise County, Arizona
Gila County, Arizona
Graham County, Arizona
Greenlee County, Arizona
Navajo County, Arizona
Pima County, Arizona
Santa Cruz County, Arizona
Catron County, New Mexico
Doña Ana County, New Mexico
Grant County, New Mexico
Hidalgo County, New Mexico
Lincoln County, New Mexico
Otero County, New Mexico
Sierra County, New Mexico
Socorro County, New Mexico
Brewster County, Texas

Courtesy copies of the DEIS and FEIS were also provided to all members of the United States Congress that represent the potentially affected areas in Arizona, New Mexico, and Texas.

Senator Jon Kyl, Arizona
Senator John McCain, Arizona
Rep. Jim Kolbe, Arizona
Rep. Ed Pastor, Arizona
Senator Jeff Bingaman, New Mexico
Senator Pete Domenici, New Mexico
Rep. Joe Sken, New Mexico
Senator Phil Gramm, Texas
Senator Kaye Bailey Hutchinson, Texas
Rep. Henry Bonilla, Texas

Businesses and Organizations

AAZPA Conservation Center
Bethesda, MD
Albuquerque Wildlife Federation
Albuquerque, NM
Alpine Chamber of Commerce
Alpine, AZ
Alpine Golf Properties
Alpine, AZ
Animal Defense Council, Inc.
Tucson, AZ
Arizona Wildlife Federation
Mesa, AZ
Arizona Trail Riders
Phoenix, AZ
Arizona Cattle Growers Association
Phoenix, AZ
Arizona Wool Producers Association  
Phoenix, AZ
Arizona Nature Conservancy  
Tucson, AZ
Arizonans for Wildlife Conservation  
Yuma, AZ
Blue River Cowbells  
Blue, AZ
Board of Tourism  
Springerville, AZ
Coalition of AZ/NM Counties  
Catron County, Glenwood, NM
Coalition of AZ/NM Counties  
Lincoln County, Carrizozo, NM
Coalition of AZ/NM Counties  
Socorro County, Socorro, NM
Coalition of AZ/NM Counties  
Apache County, Eager, AZ
Coalition of AZ/NM Counties  
Greenlee County, Clifton, AZ
Coalition of AZ/NM Counties  
Sierra County, Truth or Consequences, NM
Coalition of AZ/NM Counties  
For Stable Economic Growth  
Glenwood, NM
Cochise-Graham Cattle Growers Ass’n  
Pearce, AZ
Committee of Wilderness Supporters Inc.  
Las Cruces, NM
Coronado Scenic Trail Association  
Clifton, AZ
Davis Mountains Trans-Pecos Heritage Association  
Alpine, TX
Defenders of Wildlife  
Northern Rockies Field Office  
Missoula, MT
Defenders of Wildlife, Southwest Field Office  
Tucson, AZ
Defenders of Wildlife  
Washington, D.C.
Dona Ana County Sportsman Association  
Las Cruces, NM
Eastern Counties Organization  
Clifton, AZ
Fundacion Chihuahuense de la Fauna Chihuahua, Chihuahua, Mexico
Gila Valley Natural Resources Conservation District  
Safford, AZ
Gila Watch  
Silver City, NM
Gila Archery Association  
Silver City, NM
Greenlee County Cattlegrowers  
Clifton, AZ
Hannagan Meadow Lodge  
Alpine, AZ
Holistic Management Institute  
Albuquerque, NM
Hotchkiss Sawmill & Lumber Co.  
Silver City, NM
Instituto de Ecología, Unidad Durango  
Durango, Durango, Mexico
International Wolf Center  
Ely, MN
Malpais - Borderlands Project  
Douglas, AZ
Maricopa Audubon Society  
Phoenix, AZ
Mexican Wolf Coalition of Texas  
Spring, TX
Mexican Wolf Coalition  
Albuquerque, NM
National Audubon Society  
Boulder, CO
National Audubon Society, New Mexico Office  
Santa Fe, NM
Native Ecosystems  
Tucson, AZ
New Mexico Wool Growers, Inc.  
Roswell, NM
New Mexico Wool Growers  
Yeso, NM
New Mexico Farm & Livestock Bureau  
Las Cruces, NM
New Mexico Cattle Growers Association  
Albuquerque, NM
New Mexico Land Use Alliance  
Silver City, NM
Northern Arizona Audubon Society  
Sedona, AZ
People for the West  
Sacramento Mountains Chapter  
Weed, NM
Precision Pine & Timber, Inc.  
Heber, AZ
Preservation of Caballo Mountains  
Truth or Consequences, NM
Preserve Arizona’s Wolves  
Phoenix, AZ
Protection de la Fauna  
Mexicana A.C.  
Centro Saltillo  
Coahuila, Mexico
Public Lands Action Network  
Santa Fe, NM
Reidhead Brothers Lumber Mill  
Nutrioso, AZ
Region 1 Guide Ass’n  
Alpine, AZ
Round River Conservation Studies  
College of Santa Fe  
Santa Fe, NM
Sierra Club  
Southwest Regional Office  
Phoenix, AZ
Sierra Club Rio Grande Chapter  
Las Cruces, NM
Sky Island Alliance  
Tucson, AZ
Southwest Center for Biodiversity  
Phoenix, AZ
Southwest Regional Director  
Native American Fish and Wildlife Society  
Albuquerque, NM
Stone Forest Industries  
Eagar, AZ
Sportsman’s Voice  
Springerville, AZ
Texas Sheep and Goat Raisers’ Ass’n  
San Angelo, TX
The Nature Conservancy  
Santa Fe, NM
The Wildlife Society  
Bethesda, MD
The Wildlife Society, AZ Chapter  
Phoenix, AZ
The Wildlife Society, NM Chapter  
Las Cruces, NM
The Wildlands Project  
Tucson, AZ
Trail Riders  
Magdalena, NM
Tucson Rod & Gun Club  
Tucson, AZ
Western States Public Land Coalition  
Safford, AZ
Western New Mexico Houndsman Ass’n  
Reserve, NM
White Mountain Chamber of Commerce  
Springerville, AZ

Public Libraries

Benson Public Library  
Benson, AZ
Cochise County Library  
Bisbee, AZ
Copper Queen Library  
Bisbee, AZ
Clifton-Greenlee County Public Library  
Clifton, AZ
Douglas Public Library  
Douglas, AZ
Duncan Public Library  
Duncan, AZ
Globe Public Library  
Globe, AZ
Hayden Public Library  
Hayden, AZ
Holbrook Public Library  
Holbrook, AZ
Huachuca City Public Library  
Huachuca City, AZ
Larson Memorial Public Library  
Lakeside, AZ
Miami Memorial-Gila County Library  
Miami, AZ
Nogales City-Santa Cruz County Library  
Nogales Public Library  
Nogales, AZ
Patagonia Public Library  
Patagonia, AZ
University of Phoenix Learning Resources Services Center  
Phoenix, AZ
Pima Public Library-Graham County  
Pima, AZ
Safford City-Graham County Library  
Safford, AZ
Apache County Library  
Saint Johns, AZ
San Carlos Public Library  
San Carlos, AZ
Show Low Public Library  
Show Low, AZ
Sierra Vista Public Library  
Sierra Vista, AZ
Snowflake Town Library  
Snowflake, AZ
Round Valley Public Library  
Springerville, AZ
Tempe Public Library  
Tempe, AZ
Tombstone Reading Station  
Tombstone, AZ
Arizona State Museum Library  
University of Arizona  
Tucson, AZ
Tucson-Pima Library  
Tucson, AZ
University of Arizona Library  
Tucson, AZ
Whiteriver Public Library  
Whiteriver, AZ
Elsie S. Hogan Community Library  
Willcox, AZ
Young Public Library  
Young, AZ
Alamogordo Public Library  
Alamogordo, NM
New Mexico State University at Alamogordo Library  
Learning Resource Center  
Alamogordo, NM
Albuquerque-Bernalillo County Public Library System  
Albuquerque, NM
Hatch Public Library  
Hatch, NM
Holloman Air Force Base Library  
Holloman AFB, NM
Thomas Branigan Memorial Library  
Las Cruces Public Library  
Las Cruces, NM
New Mexico State University Library  
Las Cruces, NM
Lordsburg-Hidalgo Library  
Lordsburg, NM
Village of Reserve Library  
Reserve, NM
Ruidoso Public Library  
Ruidoso, NM
College of Santa Fe  
Fogelson Library Center  
Santa Fe, NM
The Public Library  
Silver City, NM
Western New Mexico University  
Miller Library  
Silver City, NM
Socorro Public Library  
Socorro, NM
Truth or Consequences Public Library  
Truth or Consequences, NM
United States Army Post Library  
White Sands Missile Range, NM
Alpine Public Library  
Alpine, TX
Sul Ross State University  
Bryan Wildenthal Memorial Library  
Alpine, TX

List of Preparers

The draft and final EIS were prepared by the Center for Wildlife Law, University of New Mexico, under the supervision of the Mexican Wolf Recovery Program, Fish and Wildlife Service, Region 2. People who contributed substantially are listed below. Others too numerous to list provided information on various subjects.

Mexican Wolf EIS
Interdisciplinary Team

Larry &-Regional Mexican Wolf Coordinator, Coronado National Forest. B.S. in Forestry, Stephen F. Austin State University, 1960. Range, Watershed, Timber, and Ecosystems Staff Officer, Coronado National Forest, 1979-present. Extensive experience in wildlife, range, watershed, timber, and fire management on seven national forests in New Mexico and Arizona, including assignments as District Ranger and National Forest Staff Officer.
Jim Bailey—Assistant Division Chief, Conservation Services, New Mexico Department of Game and Fish. B.S. in Forestry, Michigan Technological University. M.S. and Ph.D. in Wildlife Biology, State University of New York College of Forestry. Past positions include Professor, Colorado State University, Instructor, University of Montana, and Research Biologist, Illinois Natural History Survey.


Greg Schmitt—Endangered Species Biologist, New Mexico Department of Game and Fish. B.S. in Wildlife Science, New Mexico State University, 1971: M.S. in Wildlife Science, New Mexico State University, 1973. New Mexico Department of Game and Fish, 1974 to present. Duties have included working with nongame wildlife, with emphasis on endangered species, throughout New Mexico (13 years) and working on waterfowl, sandhill cranes, and upland game species (7 years).


Consultants


John Duffield—Economist, Bioeconomics, Missoula, MT. Professor of Economics, University of Montana. Analyzed economic impacts.


Adile Girmendonk—Wildlife Biologist, Arizona Department of Game and Fish. Conducted research on wolves and Arizona wildlife.

Kathleen Grassel—Graphics Specialist, Institute of Public Law, University of New Mexico. Provided graphics assistance.


MaeJohnson—Veterinarian, Yellowstone National Park, WY. Veterinary review.

Patrick Morrow—Biologist, White Sands Missile Range. Provided game data and hunting information.

Chris Neber—Economist, Bioeconomics, Missoula, MT. Analyzed economic impacts.

Dan Pletscher—Associate Professor in Forestry, University of Montana. Provided information on wolves and prey impacts.

Miriam Wolok—Staff Attorney, University of New Mexico School of Law, Institute of Public Law. Research Analyst. Conducted research and wrote portions of the DEIS.

Mexican Wolf Recovery Team

Larry Allen—Regional Wolf Coordinator, Coronado National Forest.

Javier de la Maza—Direccion General, Aprovechamiento Ecologico de los Recursos Naturales, Instituto Nacional de Ecologia, Mexico.

Phil Hedrick—Department of Zoology, Arizona State University.

Terry Johnson—Nongame and Endangered Wildlife Coordinator, Arizona Department of Game and Fish.


Mike Phillips—Yellowstone National Park Wolf Recovery Coordinator, National Park Service.

Greg Schmitt—Endangered Species Biologist, New Mexico Department of Game and Fish.

Peter Siminski—Mexican Wolf Species Survival Plan Coordinator, Arizona-Sonora Desert Museum.

Technical Experts Surveyed

The FWS surveyed various experts on technical issues related to potential wolf impacts on livestock and wild prey. The respondents were:

Livestock Impacts

Larry Allen, U.S. Forest Service, Arizona
Paul Bouche, U.S. Forest Service, New Mexico
Cecil Brown, San Carlos Apache Tribe, Arizona
John Caid, White Mountain Apache Tribe, Arizona
Phil Clifton, Arizona Cattlegrowers Association
Gary Davis, U.S. Forest Service, Arizona
John Fowler, New Mexico State University
Steve Fritts, U.S. Fish and Wildlife Service, Montana
Mike Fusco, New Mexico Cattlegrowers Association
John Gunson, Fish and Wildlife Service, Alberta, Canada
Jerry Holocek, New Mexico State University
Mike Howard, Bureau of Land Management, New Mexico
John Mac&., National Park Service, Wyoming
Roy McBride, Ranchers Supply, Inc., Texas
David Mech, National Biological Survey, Minnesota
Curt Mullis, US DA Animal Damage Control, New Mexico
Carter Niemeyer, USDA Animal Damage Control, Montana
Gary Nunley, USDA Animal Damage Control, Texas

Wild Prey Impacts

Warren Ballard, University of New Brunswick, Canada
Lou Carbyn, Canadian Wildlife Service, Alberta, Canada
Todd Fuller, University of Massachusetts
David Mech, National Biological Survey, Minnesota
Francois Messier, University of Saskatchewan, Canada
Mike Nelson, National Biological Survey, Minnesota
Paul Paquet, University of Alberta, Canada
Rolf Peterson, Michigan Tech University
Dan Pletscher, University of Montana
Jon Rachael, Idaho Department of Game and Fish

Participants in DEIS Open Houses and Public Hearings

The following individuals participated in the open houses and public hearings held on the DEIS:

Arizona Game and Fish Department:

Dan Groebner, Terry Johnson
New Mexico Department of Game and Fish:

Jim Bailey, Eddie Bennett, Greg Schmitt
U.S.D.A. Animal Damage Control:

Richard Phillips
U.S. D.A. Forest Service:

Larry Allen, Frank Hayes, Sandy Knight, Andrea Martinez
U.S.D.I. Fish and Wildlife Service:

Charles Ault, Wendy Brown, Nick Chavez, Dom Cicone, George Divine, Yvonne Fernandez, Scott Heard, Mark Johnson, John Keeler, Ken Kessler, Mike McKenna, Kathy Granillo, Bill Myer, Bud Oliveira, David Parsons, Cindy Schroeder, Steve Spangle Greg Stover, Hans Stuart

University of New Mexico:

Peter Jenkins, Mimi Wolok
Comments on the DEIS and FWS Responses

Attached are the letters, with FWS responses, from agency, government, tribal, and legislative commenters on the DEIS. That is followed by a summary of comments on the DEIS received from the public, also with FWS responses.
Introduction

Below are the reproduced comment letters on the DEIS from federal, state, and tribal agencies, members of the United States Congress, state legislators, and local governments. The FWS responses are given in the right column. Generally, if a comment has already been raised and responded to in the Public Comment Summary, or in response to a previous official's letter, it is not responded to a second time. Issues that are legal or policy based, or are unrelated to the DEIS, are generally not responded to.

Federal Agencies

U.S. Department of Agriculture - Animal Damage Control:

1. The FWS has issued the Proposed Mexican Wolf Experimental Population Rule and intends to analyze public and agency comments on it prior to issuing the Record of Decision. It would be inappropriate to issue a final rule prior to the reintroduction decision. If the decision is to not reintroduce wolves or to reintroduce wolves with Full endangered status, there would be no need to issue a final rule.

2. Population goals for the reintroduction proposal that is set forth and analyzed in this EIS are based on the 1982 Mexican Wolf Recovery Plan and are considered appropriate by the FWS. If additional recovery actions are deemed appropriate based on an approved revision of the Recovery Plan, full compliance with NEPA would be required for any future proposed actions.
Agency et al. Comments and Responses

3. While the Mexican Wolf Recovery Team is revising the Recovery Plan, no approved draft plan exists (as of this writing). It would be inappropriate to conduct NEPA analysis on speculative, unapproved objectives. The goals presented in the ADC letter were merely an early suggestion that has not been approved. It should be noted, too, that a majority of the Mexican wolf's original range is in Mexico and recovery actions implemented there could contribute to overall recovery goals.

4. If a nonessential experimental population of Mexican wolves is established, the FWS foresees no reason to change the species status before the subspecies is removed from ESA protection (i.e., de-listed).

5. We agree. Full support of an ADC wolf specialist position by the FWS is a part of the Preferred Alternative. Appendix B has been revised to more clearly demonstrate this.

6. It is difficult to foresee all the future scenarios and what actions would be appropriate following the hypothetical “termination” of the reintroduction project. We believe this decision should be made by the official management group based upon then current data and input from the advisory group and/or the public.

7. This idea probably would not be legal as long as the Mexican wolf remains listed as a threatened or endangered species under the ESA.

8. We agree and intend to revise the final experimental population rule, if issued, as ADC has suggested.

9. We agree that the actual observation of a wolf attack on domestic livestock grazing on public lands will likely be rare. Endangered species conservation is also a legal use of public lands. By law, ESA section 10(j)(2)(A), the FWS must determine that the release of an experimental population will further the conservation of the animal. We believe the limitations imposed in the Proposed Rule on take of Mexican wolves on public lands are appropriate. Livestock owners are not precluded from protecting their stock on public lands through other, non-lethal means until the established criteria are reached.

10. A definition of “public lands” has been included in Appendix G – Glossary.
11. The FWS agrees that leghold traps are an essential tool for wolf management. We would place specific provisions for their use in the final experimental population rule which, if promulgated as a federal regulation, should preempt conflicts in state law.

12. The present definition requires that wolf presence be confirmed or corroborated by the FWS. This provides adequate protection against untrained or casual observers’ claims of wolf sightings. Specific wolf sighting confirmation criteria will be developed in consultation with ADC and others and will be a part of the interagency management plan for the reintroduced population.

13. The current definition requires evidence of consistent use of an area by wolves for at least one month to establish that an area is “occupied” by wolves, thus triggering restrictions on ADC activities. However, it does not provide criteria for determining when it would be appropriate to resume unrestricted ADC activities following abandonment of the area by wolves. We agree that the rule would be improved by the addition of such wording; and, following consultation with ADC and others, will include clarifying language in the final rule, if necessary.

14. The experimental population rule would restrict all use of M-44s and choking-type neck snares in areas occupied by Mexican wolves. The FWS would work to provide private users of these devices with the locations where the EPA label restrictions for M-44s apply and to advise private users of the rule provisions regarding take of wolves, with the goal of avoiding accidental or incidental take of wolves with potentially lethal devices. Clarifying language has been added to the FEIS.

15. Such an assessment would be highly speculative as the plan is to limit wolf recovery to the designated wolf recovery areas and capture and remove wolves that disperse into the larger experimental population area as soon as their presence is known. This management strategy should prevent wolf dispersal outside the experimental population area. We would expect the suggested impacts to be very minor.

16. See response number 12 to the Arizona Game and Fish Commission comments, below.
17. Current restrictions of ADC techniques in southwestern New Mexico imposed because of the potential occurrence of Mexican wolves are under review by the FWS.

18. This definition is applicable under the proposed experimental population rule only prior to and no longer than 6 months following the initiation of a reintroduction project. It would be impossible for reintroduced wolves to have reproduced successfully for 2 consecutive years during this time. In addition the definition, in Appendix G, of “Population” has been modified to more clearly apply only to “non-reintroduced wild wolves.”

U.S. Department of Agriculture - Forest Service:
Apache National Forest

1. Analyses in the EIS are based upon the best available data on ungulate populations in the BRWRA. While some uncertainty exists in these data, and in predicting future trends, we believe our conclusion is reasonable that the BRWRA will be suitable for wolf recovery for the foreseeable future.

2. The FWS does not agree that it would be necessary to mimic the historical level of effects from natural fire to sustain wolf populations over the long term.
Evidence of an overall decline in ungulate biomass is lacking. While deer appear to have decreased over the past several years, elk populations have increased over the same time period. Wolves will prey on both deer and the larger elk. Current estimates of combined deer and elk biomass levels indicate they are adequate to sustain a population of 100 wolves in the BRWRA.

Lack of universal acceptance of wolf recovery and its generally moderate or minor impacts has not precluded it in other areas and we do not expect it to preclude wolf recovery in the Southwest. We have addressed cumulative impacts with as much certainty as possible in the revised Cumulative Impacts section of the FEIS.

The FWS position is that wolf recovery can occur with no substantive changes to existing or anticipated future land uses or forest management practices. The Preferred Action does not require changes to Forest Plans. Even habitat modification by the USFS that was detrimental to the wolf would not constitute "take" of the wolf under the nonessential experimental approach. This does not mean the Forest Service could not modify Forest Plans, if deemed appropriate. We have added mention in Chap. 4, under Impacts on Agency, Tribal, and Local Government Policies and Plans, of the specific Plan topics the Forest Service might change.

Because reintroduced wolves would be members of a designated nonessential, experimental population, other non-experimental threatened or endangered species would receive management priority over Mexican wolves. Also, see response above regarding Forest Plans. The suggestion goes beyond the scope of the Preferred Alternative because the alternative does not affect management priorities for other species. These issues are addressed in the Cumulative Impacts section of Chap. 4, Alt. C, the full-endangered approach.

"Disturbance-causing land use activities" are now defined in Appendix G.
1. Such restrictions would not be imposed under Alternatives A, B, or D, and are conceivable, but highly unlikely, under Alternative C. The WSWRA has been dropped from Alternative C. It is conceivable, but not clearly foreseeable, that if wolves were reintroduced under Alternative C into the BRWRA and then dispersed to the WSWRA area that restrictions could be imposed to protect the full-endangered wolves. But this would only occur if WSMR or Holloman AFB activities were shown to negatively impact the wolves. Wolves have co-existed with military activities in other areas and apparently are not sensitive to overflights.
Mr. David R. Parsons
Mexican Wolf Recovery Coordinator
U.S. Fish and Wildlife Service
Post Office Box 1306
Albuquerque, New Mexico 87103

Dear Mr. Parsons,

Thank you for giving the Army the opportunity to comment on the Draft Environmental Impact Statement - Reintroduction of the Mexican Wolf Within Its Historic Range in the Southwestern United States. The extent to which you considered and limited the impacts of the proposed reintroduction to the accomplishment of the military mission at White Sands Missile Range (WSMR) and your willingness to include WSMR officials as members of the Interdisciplinary Team is greatly appreciated.

As the steward of Army land, the Army conscientiously conserves its natural resources, especially endangered species, while maintaining readiness. The Army endeavors to support listed species in harmony with its mission in a manner that will lead to the recovery of the species. Due to the Army’s limited resources and land inventory, if the White Sands report at best, the Army will award a restricted role toward the overall recovery of the Mexican Wolf. Army Regulation 200-3, Natural Resources, Land, Forest and Wildlife Management currently states the Army’s position toward the reintroduction of species on Army land.

The Army will support the reintroduction of Federal and State listed, processed and candidate species on Army lands unless reintroduction will have a significant impact on the present or future ability of the Army to meet its mission requirements. Proposals for reintroduction on Army lands will be approved or disapproved without a thorough assessment of the impact of the reintroductions on the environment and mission requirements and the potential benefits of reintroduction.

White Sands Missile Range provides a unique national asset and the continuation of realistic and deadly testing and training at WSMR is critical to military readiness and our national security. I propose the attached changes to the Environmental Impact Statement and the Proposed Rule in order to ensure that the Mexican Wolf’s reintroduction will not adversely impact the Army’s or other federal interests present or future ability to meet mission requirements.

Nothing in this letter should be construed as authorizing reintroduction of any Mexican wolf population at WSMR pending implementation of these changes and entrance into a programmatic agreement that would address the concerns identified here.

My point of contact for this action is Mr. Phil Huber, at (703) 614-9555.

Sincerely,

Raymond J. Flora
Acting Deputy Assistant Secretary of the Army (Environment, Safety and Occupational Health)
DAGD (LAE)

Attached

5-17
1. Suggested changes numbered 1 through 8 have been made in the FEIS, except suggested change number 4, which is considered unnecessary because the process and requirements are already set forth under NEPA regulations. Suggested changes 9 through 12 have not been made because they apply to Ah. C and WSMR has been dropped from this alternative in this FEIS.
2. We agree with these suggested changes and will incorporate them into the final rule, if one is issued.

3. This requested change would result in a total exemption written into law of all military activities from proposed limited, temporary restrictions near pens, dens, and rendezvous sites. The FWS finds this inconsistent with the ESA requirement that rules established for experimental populations must further the conservation of the animal. Release pens can be sited to avoid the need for use restrictions. We expect that most dens and rendezvous sites will be located in the San Andres Mountains where little military activity occurs. The need for restrictions around dens and rendezvous sites on WSWRA is anticipated to be rare. If restrictions were imposed within a 1-mile radius of all dens and rendezvous sites, less than 1% of the WSWRA land base would be affected for less than 4 months of the year. The management group, which would include a WSMR representative, would consider ways to avoid the need for use restrictions. For these reasons, we anticipate that impacts to military activities resulting from this provision will be negligible.

We disagree with the Army’s reasoning. The restrictions in question could be imposed only around release pens, dens, and rendezvous sites; and, under the Preferred Alternative, no formal consultation under Section 7 of the ESA is required for any military actions. Under former Alternative C, from which WSMR has now been dropped, formal consultation resulting in possible restrictions or modifications of proposed military actions, would have been required any time a proposed action could have affected wolves.

4. The use of lands within the national park or national wildlife refuge systems as safety buffer zones for military activities has been included as an exception to the definition of “disturbance-causing land use activity,” in Appendix G - Glossary and would be similarly included in the final rule, if issued.
Agency et al. Comments and Responses

5. The requested revisions have been made in Chapter 2, the Preferred Alternative, and would be made in the final rule, if issued.

Reasoning: There are many missile/weapon tests and training missions that use the national park system and the national refuge system for safety areas. The San Andreas National Wildlife Refuge and the White Sands National Monument are both located entirely within the boundaries of WSMDR. These areas are not intended to be used as any such impact area or target area but in the event of a mishap the safety parameters must include these areas. If these entities must continue to undertake formal consultation whenever these lands are used as safety areas, the consultation relief granted by the experimental/essential designation would be negated.

5 All p C-11 para (3)(xv) add "authorized WSMDR personnel when applicable in the WSMDR" and at (5) add "or endanger themselves by their presence in a military impact area."
Under Alternatives A and B, wolves reintroduced into the WSWRA would be recaptured if they dispersed outside the recovery areas. If they entered onto the Mescalero reservation, the FWS would seek permission from the tribe to enter the reservation and recapture the wolves, or cooperative arrangements would be made to assist the tribe in recapturing the wolves. The WSWRA has been dropped from Alt. C. It is conceivable, but not clearly foreseeable, that if wolves were reintroduced under Alt. C into the BRWRA, they could eventually disperse to the Mescalero area. Even with full-endangered status the wolf is unlikely to threaten many land management activities. The main restriction would be that the wolves not be killed.

Despite several requests, neither the Mescalero Apache tribe nor BIA provided information on the reservation. Nevertheless, some background information was available and was provided in the DEIS, but detailed impact analysis was not feasible. In the FEIS, the Mescalero reservation has been dropped from full consideration because reintroduction into the WSWRA has been dropped from Alt. C.

The Mescalero Apache Tribe has fought and worked hard to maintain its ability to manage its natural resources and will continue to do so into the future. At this time the Tribe sees no practicality in reimporting the Mexican wolf on to the proposed White Sands release site. It is therefore determined that the Mescalero Apache Tribe and the Bureau of Indian Affairs, Mescalero Agency wholeheartedly supports Alternative B, of the Draft Environmental Impact Statement. Under Alternative B, the 1999 wolf release is not sequenced with wolves or any other action to ensure Mexican Wolf recovery through experimental reintroduction. This is to ensure that the ESA will not designate an experimental population of wolves near the proximity of the Mescalero Apache Reservation.

We would like to thank the opportunity to comment on the Draft Environmental Impact Statement on the Reintroduction of the Mexican Wolf within its Noncore Range in the Southwestern United States.
United States Department of the Interior

National Park Service

November 2, 1995

United States Department of the Interior

U.S. Department of the Interior, National Park Service:

1. Thank you for your comment.

United States Fish and Wildlife Service
Mexican Wolf EIS Team
Post Office Box 1306
Albuquerque, New Mexico 87103

EIS Team,

Having reviewed the Mexican Wolf Draft Environmental Impact Statement, this office supports your efforts to reintroduce this species back into the wild. We would favor release under Alternative C into both designated release areas. However, we do not object to release under Alternative A. In addition, we would support releases in southern Arizona as well.

It is a great effort to return this missing link to the southwest ecosystems. The economic benefits for outweigh any projected losses. As has been seen with the Yellowstone wolf reintroduction, we would anticipate an increase in local tourism and related industries.

In closing, this office wishes to thank the U.S. Fish and Wildlife Service for their efforts in this manner. The draft EIS was found to be very professionally produced. It provides a thorough analysis of the alternatives. It was a pleasure to be able to review it.

T. Dwayne Collier
Superintendent
Agency et al. Comments and Responses

U.S. EPA:

1. Thank you for your comment.

In accordance with our responsibilities under Section 106 of the Clean Air Act, the National Environmental Policy Act (NEPA), and the Council on Environmental Quality (CEQ) Regulations for Implementing NEPA, the U.S. Environmental Protection Agency (EPA) Region 6 office in Dallas, Texas, has completed its review of the U.S. Fish and Wildlife Service's (FWS) Draft Environmental Impact Statement (DEIS) for the reintroduction of the Mexican Wolf into its historic range in Arizona and New Mexico. The proposed action (Alternative A) is to reintroduce a nonessential, experimental population of Mexican wolves (Canis lupus baileyi) and allow for dispersal into the White Sands Wolf Recovery Area in New Mexico, or the Blue Range Wolf Recovery Area in New Mexico and Arizona.

The EPA offers the following comments for your consideration in development of the Final Environmental Impact Statement (FEIS).

Overall, our review of the DEIS found the document to be well written and concise in the information presented about this proposal, particularly in discussions of the project alternatives and their environmental consequences. Most notable is the information and surveys conducted to assess potential effects on military activities, livestock, and hunting within the recovery areas. Alternative A is presented as the environmentally preferred alternative for this proposed action. We believe that, of the alternatives examined, Alternative A proposes the greatest potential for the successful reintroduction of the Mexican wolf into its historic range while minimizing impacts to the land uses presently utilized in the recovery areas.

The EPA classifies your DEIS and proposed action as "LO," i.e., EPA has "Lack of Objections." Our classification will be published in the Federal Register, according to our responsibility under Section 106 of the Clean Air Act, to inform the public of our views on proposed Federal actions.

I appreciate the opportunity to review the DEIS and request that you send our office two (2) copies of the FEIS at the same time that it is sent to the Office of Federal Activities, EPA, 401 M Street, S.W., Washington, D.C. 20460.

Sincerely yours,

[Signature]
Jane W. Bagshaw
Regional Administrator
State Agencies

Arizona Game and Fish Department:

1. The FWS has determined that the BRWRA is the most appropriate location for the initial reintroduction and that the WSWRA would be used as a secondary reintroduction area only if necessary and feasible.

2. The FWS plans to do this.

3. We are not certain what the Commission means by a "formal" Adaptive Management Program; however, the FWS is committed to the adaptive management concept, the establishment of a formal management group (which includes full participation by AGFD), and to the concept of an oversight or advisory group. See Chapter 2, Preferred Alternative, for more discussion on these topics.

4. The management group, using an adaptive management process, will assess the efficacy of the initial reintroduction effort, and use the results of that assessment and other relevant information as the basis of any determination to conduct an additional release or releases on another area.

5. The FWS agrees with all these goals, but does not commit to conducting the initial reintroduction on the WSWRA.
Specific ADF goals must at a minimum include:

a. Facilitating management response to monitoring and research information on affected resource conditions, trends, and processes.

b. Ensuring that the White Sands' project's conservation and management objectives are fulfilled in good faith and in full compliance with the Nonessential Experimental Population Rule, and without abnegation of any Federal, State, Tribal, or other legal obligation.

c. Providing a mechanism for resolving disputes among affected land and wildlife management agencies and private landowners (if any).

d. Providing a forum by which to transfer information derived from wolf and prey base monitoring or other pertinent management activities at White Sands to the interested and affected parties, and the general public.

Rationale as stated by Commissioner Goliath

1. The Adaptive Management approach recommended within the DEIS necessitates collection of empirical data for development of management guidelines. Information obtained in the more controlled setting of the White Sands area should provide knowledge necessary for wolf management in the larger and more complex Blue Range Area.

2. Reintroduction into White Sands initially will allow analysis of:

   a. adaptability of captive wolves to wild existence
   b. territory fidelity and stability
   c. effectiveness of nonessential experimental management plan
   d. potential for using wild born pups for reintroduction into the Blue Range Area, or elsewhere

3. The genetic diversity and size of the captive population will be allowed to increase to more optimum levels. If the two newly acclimated lines of Mexican wolves are allowed to interbreed with the currently acclimated population for three to five years, the captive stock will have a higher level of diversity. At present only small numbers of diverse, but genetically surplus, animals exist in the captive population.

This small number of available stock for reintroduction favors using White Sands because fewer animals are needed for that area.

The White Sands wolf population will always need active genetic management through managed dispersal and subsequent releases. This could take place as the captive population is being diversified and allowed to expand. If reintroduction occurs as proposed, wild-caught wolves from White Sands could be used as reintroduction stock for the Blue Range Area or another site, should one be forthcoming (perhaps even in Mexico).

4. Effects on Southwest game populations in a multi-predator system could be documented in the more controlled situation at White Sands. Study of the effects of wolves on other ungulate prey would be more complex in White Sands because more baseline information is available on lions and ungulates. Hunter harvest can be monitored more closely there, making biological data from harvested ungulates more available than in the Blue Range Area.

5. Effects on existing predator populations could be documented, to test theories about displacement and competition. A recent study of lions in White Sands provides considerable baseline data on existing predator populations and home ranges that is simply not available for the Blue Range Area.

6. The results of the truly experimental reintroduction of captive-bred Mexican wolves in the more controllable circumstances that I believe exists in White Sands would allow agencies and the public to better determine whether wolves should and could be reintroduced and effectively managed, in a more isolated and rugged environment such as exists in the Blue Range Area of eastern Arizona and western New Mexico.

7. I believe that only through opportunistic observation of Mexican wolves in the wild can we reasonably predict the behavior of wolves in the wild, and thus predict the true impacts and chances for success, of a reintroduction.

8. For these reasons, the Mexican wolf's sake, as well as for the best interests of the public, I believe that it would be most prudent to carry forward this experiment at White Sands, conduct all the appropriate management and research activities, and use the open public process of Adaptive Management to determine where to go from there. That would provide the best opportunity for sound science to lead to good management.
9  As a Game and Fish Commissioner representing the interests of the public, I offer this recommendation as a compromise that I believe is truly in everyone's best interests, whether wolf advocate or wolf opponent or neutral party, should any exist.

1 Elk and deer population numbers (minimum, maximum, and average) do not seem to be consistent within the DEIS. The Service must clarify whether these discrepancies arise from errors in mathematics or they reflect comparisons between population estimates at different points in time over the length of the proposed recovery and management effort. See DEIS comments: page 7 lines 21-24.

2 The DEIS proposes 1-mile radius temporary closures for acclimation pens, density sites, and rendezvous sites. The Service needs to affirm that impacts of these closures on big game, human wildlife conflict, and/or wolf densities within such closures will be minimized. Scouting often begins in August and actual hunts begin in September. See DEIS comments: page 5 lines 1-4.

The Service also needs to affirm that ranchers will be allowed to drive cattle through such closures. See DEIS comments: page 2 lines 4-5.

3 Back-country road: Please define this term, as opposed to a thoroughfare. Concern: closed off a back-country road may close an area far greater than 1-mile radius. The Service needs to affirm that temporary closures will not exceed an area 1 mile in radius. See DEIS comments: page 2 lines 7-10.

4 The draft nonessential experimental rule in the DEIS states that permission "may" be granted to private property owners to take wolves on public lands after certain conditions are met. The Service needs to provide more definitive wording that clarifies when a private landowner will or will not be granted such authority. The concern is that at an operational level Service employees may not provide the necessary approval if guidelines are not specific. See DEIS comments: page 2 lines 12-17.

5 Cooperating agencies must be able to use leghold traps to take wolves, whether for management purposes (including relocation and research), retention in captivity, or euthanasia, and regardless of land ownership. The concern is that if the 10(J) rule is not absolutely explicit and inclusive of this count, state law in Arizona may preclude such use. See DEIS comments: page 2 lines 24-30.

6 The DEIS establishes that restrictions may be placed on use of specific depredation control measures (e.g., M44s) through cooperative management agreements with Animal Damage Control and perhaps other agencies. The Service needs to affirm
natural agreements will be consistent across public lands and Tribal lands to the maximum extent feasible. See DEIS comments: page 14 lines 30-33.

7 Page 2-24 "The FWS does not guarantee the future existence of this private mitigation fund." Concern: FWS must guarantee compensation for livestock depredation losses and not leave this to the hands of a private organization. See DEIS comments: page 6 lines 1-2.

8 Page 4-16 The Service must clarify the distinction between economic benefits and expenditures. On what surveys were these conclusions based? FWS surveys may not have included children under age 16. Hunting benefits (values and expenditures) seem very low, but it also seems redundant to include actual expenditures and hypothetical (economic values) costs for the same event. See DEIS comments: page 15 lines 35-38.

9 Possible wolf depredation impacts to the bighorn sheep population in the Blue Range were not adequately addressed in the DEIS. These sheep are distinguishable from those occupied in other parts of the Rocky Mountains. Wolf depredation on bighorns is more likely in these areas of the Blue than in more rugged terrain. See DEIS comments: page 9 lines 16-19.

Commissioner Balman:
1 The proposed (06) rule should have been published before or with the DEIS, so the public could evaluate and comment on both at the same time. See DEIS comments: page 1 lines 35-36.

2 The DEIS must affirm more clearly that all wolves reintroduced (including pups who may be radio-tagged for monitoring) and their offspring will be left in the wild for monitoring. See DEIS comments: page 3 lines 37-38.

3 The Commission's response must include the Department's DEIS concerns, with modifications as necessary to reflect today's discussions. See DEIS comments: all.

Commissioner Johnson:
1 Tourism should not be used as justification for wolf reintroduction. The people in the Blue district want additional thousands of visitors. See DEIS comments: page 16 lines 1-2.

2 There were inadequate surveys of rural citizens of Arizona. The timing and publicity of the hearings were poor. Given that the surveys were poor, she feels the comments are not valid.

Arizona Game and Fish Commission
Concerns with Mexican Wolf DEIS
October 23, 1995
Page 3

Commissioner Quentner
1 There is too much wrangling between the opposing groups to move forward with wolf reintroduction at this time. We need to look further for middle ground, and create a more friendly environment for wolf reintroduction. It will be difficult, if not impossible, to promote successful reintroduction and recovery in an adversarial environment. See DEIS comments: page 2 lines 36-39.

2 The reintroduction of the Mexican wolf, while it may be desirable, is not a necessity for a functional ecosystem. See DEIS comments: page 2 lines 38-41.

3 It does not appear that local government have participated in this process at all, as would have been desirable. The Service needs to identify why that happened, if it did, and if possible resolve the problem. Local government participation is essential in decision making. It is unfair to reintroduce the wolf into an area where the majority of the people are against such reintroduction and their lives and livelihood may be impacted. See DEIS comments: page 1 lines 15-17.

4 The Service needs to find another vehicle for depredation compensation, other than the Proposals for an incentive program. We need to expand the proposal to make it truly an incentive based program. See DEIS comments: page 6 lines 1-2.

5 The effects of the recent voter approved trapping ban need to be clarified. Can agencies use lethal traps or not, and if so under what circumstances and with what limitations. Until we know the effects of the trapping ban we prejudice prey relations, it would be imprudent to add another predator to the equation. See DEIS comments: page 2 lines 24-30.
6. We need to reserve the right to revisit the proposal and, if necessary, amend the
Commission's position following the completion of the Final Environmental Impact
Statement and the publication of the final nonessential/experimental rule in the
Federal Register. See DEIS comments: page 3 lines 1-3.

Commissioner Gillis: (all comments included in the Commission motion)
1. The Adaptive Management approach recommended within the DEIS necessitates
collection of empirical data for development of management guidelines. Information
collected in the more controlled setting of the Blue Range area should
provide knowledge necessary for wolf management in the larger and more complex
Blue Range Area.

2. Reintroduction into White Sands initially will allow analysis of:
   a. adaptability of captive wolves to a wild existence
   b. territory fidelity and stability
   c. effectiveness of nonessential/experimental management plan
   d. potential for using wild born pups for reintroduction into the Blue Range
      Area, or elsewhere.

3. The genetic diversity and size of the captive population will be allowed to increase
to more optimal levels. If the newly certified line of Mexican wolves are
allowed to interbreed with the currently certified population for three to five years,
the captive stock will have a higher level of diversity. At present only small
numbers of dispersed, but genetically surplus animals exist in the captive population.
This small number of available stock for reintroduction favors using White Sands
(allowing fewer animals are needed for that area).

The White Sands wolf population will always need active genetic management
through managed dispersal and subsequent releases. This could take place as the
captive population is being diversified and allowed to expand. If reintroduction
occurs as proposed, wild-caught wolves from White Sands could be used at
reintroduction stock for the Blue Range Area or another site, should one be
forthcoming (perhaps even in Mexico).

4. Effects on Southwest game populations in a multi-predator system could be
documented in the more controlled situation in White Sands. Studies on the effects
of wolves on deer and elk populations would be more complete in White Sands because
more baseline information is available on lions and elk. Hunter harvest can
be monitored more closely there, making biological data from harvested ungulates
more available than in the Blue Range Area.

5. Effects on existing predator populations could be documented, to test theories about
   displacement and competition. A recent study in White Sands provides
   considerable baseline data on existing predator populations and home ranges that
   simply are not available for the Blue Range Area.

6. The results of the truly experimental reintroduction of captive-reared Mexican
   wolves in the more controlled circumstances in White Sands would allow
   agencies and the public to better determine whether wolves should and could be
   reintroduced and effectively managed, in a more isolated and rugged environment
   such as exists in the Blue Range Area of eastern Arizona and central New Mexico.

7. Only through actual, close observation of Mexican wolves in the wild can anyone
   reasonably predict the behavior of wolves in the wild, and thus predict the true
   effects and impacts of introductions.

8. For these reasons, for the Mexican wolf's sake, as well as for the best interest of
   the public, it would be most prudent to carry forward this experiment at White
   Sands, conduct all the appropriate management and research activities, and use the
   open public process of Adaptive Management to determine where to go from there.
   That would provide the best opportunity for sound science and lead to good
   management.
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The DEIS proposes 1-mile radius temporary closures for acclimation pens, staging sites, and rendezvous sites on page 6 and within the draft nonessential experimental population rule. The Service needs to affirm that impacts of these closures on big game hunts will be minimized, noting that the same sites will be used for future releases. The wolf will be allowed to move within a certain area, as determined by the Service. The Service also needs to affirm that the closures will not exceed an area that is necessary to maintain the wolf population.

The DEIS should include a back-country road, similar to the one described on page 6 for the proposed draft nonessential experimental population rule. The Service needs to ensure that the road design is not beyond the ability of the Service to construct and maintain it.

The Service needs to confirm that the study area is not greater than 1 mile in radius.

The draft nonessential experimental population rule in the DEIS states that permission may be granted to private property owners to take wolves on public lands if certain conditions are met on page 9. The FWS is committed to providing clarity on when and where these offers can be made.

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One Commission believes it needs to reserve the right to revisit the proposal and, if necessary, amend the Commission's position following the completion of the Final Environmental Impact Statement and the publication of the final nonessential experimental rule in the Federal Register.

The DEIS should identify the possibility of contracting universities to conduct independent research on all aspects of the proposed reintroduction, including human dimensions.

CHAPTER 2. ALTERNATIVES INCLUDING THE PROPOSED ACTION

Introduction

The "certification" of the Aravaipa and Ghost Ranch lineages needs to be updated in the Final Environmental Impact Statement (FEIS) Status of the Sevilleta facility should also be updated in the FEIS. The AGFD analysis of four candidate areas within Arizona should be cited as Johnson et al. (1992) in the first paragraph on page 2-3 and elsewhere. The complete citation is correctly listed in the Literature Cited section.

Alternative A

The AGFD's Mexican Wolf Reintroduction Proposal appears relatively intact in Alternative A. Boundaries for the Blue Range Wolf Recovery Area (BRWRA) are different because the USFWS included contiguous land within New Mexico in the BRWRA. The DEIS proposes to reintroduce three family groups each year for the first couple of years, whereas the AGFD proposal recommended reintroducing only two family groups. AGFD's preferred reintroduction of only two family groups would reduce initial management and monitoring costs. The DEIS assumes some wolves will quickly disperse into the secondary zones of New Mexico.

We agree with the nonessential experimental designation outlined in the proposed action and with the specific management protocol in the proposed rule. We believe that the nonessential experimental designation will not jeopardize wolf recovery, and we will protect wolves that are not causing conflicts, which we expect will be the majority of them.

The DEIS must affirm more clearly that all wolves reintroduced (including pups heeded or acclimated) will be radio tagged for monitoring, and that project biologists will make every reasonable effort to implant pups heeded in the wild for monitoring.

The DEIS recommends road closures if illegal killing of wolves threatens the recovery effort. Road closures, although based on limited data for other wildlife, may diminish overall damage to the wolf project through increased anonymity and consequently higher chances of illegal killing of wolves. Since wolf-essential areas overlap, any road closure program would need to close off large expanses of national forest to prevent human-wolf interactions. We do not believe this is desirable, necessary, or feasible. We recommend that much greater emphasis be placed on education and -

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14. The "agents" language already was in the draft Proposed Rule; it has been added to the text. Other suggested revisions have been made.

15. The final rule would be worded to specifically authorize the use of leghold traps by the FWS and any cooperating agencies for all approved management purposes on both public and private lands.

16. The FWS, in cooperation with established management and advisory groups, will identify research priorities and encourage appropriate research. The suggested research topic addresses a commonly expressed concern.

17. Wolves generate strong emotions in humans; no amount of mitigation is likely to eliminate all anger and hostility toward the wolf or between opposing groups. We believe the Preferred Alternative addresses the legitimate concerns of both those who support and oppose this proposal, while fulfilling the FWS's ESA responsibilities to recover the Mexican wolf.

18. Comment acknowledged.

19. These changes have been made.

20. The FWS is committed to placing radio collars or implants on any in all released wolves and to maintaining enough functioning radios in the re-established population to ensure adequate monitoring of its status. We anticipate that a higher percentage of the population will have radios during the first several years of the reintroduction effort than during later years. It would be impractical to commit to placing a radio transmitter on every wolf in the re-established population.

21. We agree; the road closure provision has been deleted.
enforcement to encounter and prevent illegal killing if specific areas are proposed for road closures, we assume that the appropriate land management agency (e.g., US Forest Service) would do so through normal practices that provide for notifying the public, placing appropriate signage, and enforcement.

Specific criteria for determining whether wolves occupy an area before any are released as nonessential experimental need to be defined. For example, how many miles of survey with wolf sign observed are needed to justify confidence that there are wolf populations in the area? What other criteria could be used to "clear" an area?

The Adaptive Management approach, which would include public participation, should be used to evaluate the success failure of the various elements of the proposal.

Criteria used for deciding where to begin, Blue Range or White Sands, should be quantified in the following areas:

- the number of surplus wolves available
- present only small numbers of diverse, but genetically surplus, animals exist in the captive population. The FEIS should reflect the number of surplus wolves available, and the number of wolves needed for reintroduction into each area.
- the amount funding available
- Currently, the DEIS appears to state that there is no difference in the cost of reintroduction programs between the Blue Range Area and the White Sands Area. We recommend that site-specific estimated budgets be included in the FEIS.
- the state of field staff available
- The DEIS does not give estimates of the required personnel to manage an adequate supply of surplus wolves. The field staff required to include the DEIS for each of the two proposed areas.
- the level of agency preparedness for addressing livestock depredation cases
- The "level of preparedness" needs to be more carefully defined. For example, how many personnel would be needed to be considered "prepared"?
- We strongly believe that USFWS and cooperating agencies should be prepared with a depredation control program in advance of a reintroduction attempt. The program should include identification of the responsible agency, budget costs, and the number of personnel required. It should be more clearly described in the FEIS.

Wolf population growth projections in the DEIS show a growth rate faster than has been documented in other areas such as Wisconsin and Montana. We would expect a slower growth rate, but...
31. The text has been revised to acknowledge the role of cooperating agencies.

32. We agree.

33. Estimates of staff size are now presented in Appendix B. The proposed staff could be comprised of any combination of federal, state, tribal, or other biologists depending on future management agreements. If reintroduction is authorized, estimated project costs will be included in FWS budget requests. This would include support for agreed-upon state wildlife agency participation.

34. The FWS is willing to consider any plausible proposal for depredation compensation.

35. For these reasons and others, the FWS supports the Preferred Alternative.
wolf populations have been found along the U.S.-Mexico borderlands in many years, despite surveys and follow-ups of sighting reports, it is still unlikely that this alternative would ever accomplish recovery objectives. As stated in the DEIS, natural recolonization occurred very slowly in the Northwest and the Great Lakes region, even though these areas are near a large, healthy source population of wolves.

Because of the reasons stated above, this alternative was not deemed "reasonable" as defined under NEPA.

In Table 2-9 on page 2-43, the heading labeled "Impacts on Recreation" should be changed to "Impacts on Non-hunting Recreation".

CHAPTER 3 AFFECTED ENVIRONMENTS

Blue Range Wolf Recovery Area
The citation AGFD (1992) should be replaced with Johnston et al. (1992) throughout this chapter.

The complex citation is listed in the Literature Cited section already.

Animals
Potential prey of wolves:
Elk and deer population numbers (minimum, maximum, and average) do not seem to be consistent within the DEIS. The Service must clarify whether these discrepancies arise from errors in the mathematics or whether the population estimates at different points in time over the length of the proposed recovery and management effort.

Species of special concern:
A status critical habitat designation for the spotted owl is needed in this section.

The section for designating waterbears and jumping mice as species of special concern in Arizona should be "Arizona Game and Fish Department. In five Wildlife of special concern.

Arizona Game and Fish Department publica (1994).

Potential prey of wolves:
"Coues" deer should be "Cousie," without the apostrophe, here and throughout the DEIS.

Hunting
There are no crossbow seasons for elk, except through special permits. Elk seasons occur in September, October, November, and December.

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36. All elk and deer population numbers have been rechecked; they accurately present the data provided by the state wildlife management agencies.

37. This has been clarified.
In the professional opinion of the Department's big game specialists, 41 percent compen-
satory mortality seemed unnecessarily optimistic. Projections of impacts on the wild ungulate popu-
lations should therefore be based on compensatory levels closer to the maximum estimate of 17 percent.

The DES states that wolves that severely impact big game populations could be monitored and moved
under the Mexico Wolf Experimental Population Rule. It would be very difficult to determine which
wolf (or wolves) was responsible for severely impacting a big game population. Therefore, USFWS
and cooperating agencies need to be prepared and have the authority to trap and move several
wolves, if not the entire pack, to mitigate the impact on the local big game population if this is
necessary.

In Box 4.2, the underlined word “necessarily” should be deleted in the 3rd paragraph. Arizona Game
and Fish will definitely put permit numbers just as wolves are introduced. Permits
numbers are based on populations and herd strategies.

The Department understands the difficulty and assumptions that are required in attempting to simulate
predation rates and impacts. We also realize that the ranges of projected impacts to deer and elk are
at best an educated guess.” Therefore, a more appropriate conclusion would be “Although
considerable uncertainty exists, wolves are not expected to severely impact prey populations in the
BRWA.”

Impacts on hunting
The sentence “All estimates are adjusted to 1994 dollars” should be moved to the paragraph where
dollar estimates appear. We assume that Wolf’s study, which found the average net value for big
game hunting per person per day of $54.47 was adjusted to $58.00 in 1994 dollars.

Values in Table 4-1 should be identified as impacts specific to Arizona and to New Mexico. The
following table provides estimates of impacts to each state in proportion to the wild ungulate
populations each state, based on the total impacts estimated by Duffield and Nebel (1994).

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38. The experts whose opinions were sought on this topic concluded that compensatory
mortality would probably be between 15% and 47%. We used a similar range of values in
our prey impact simulation models and predicted a range of estimated prey impact
levels, with the high side of the range reflecting low compensatory mortality and the low
side reflecting high compensatory mortality.

39. This language has been changed.

40. The discussion of potential impacts on bighorn sheep in the Blue Range has been
expanded based on new information received from AGFD.

41. Revised tables provided by AGFD have been included in the FEIS; some figures have
been rounded. The tables are not reproduced here to save space.

42. This change has been made.

43. See response number 34. We agree that the research suggested would contribute to
estimating the level of undetected livestock depredation by wolves, but cannot guarantee
funding for this research.
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44. This addition has been made.

45. In Box 4-2 and in the discussion under Impacts on Hunting we have added discussion along the lines suggested.

46. All values are based on recognized sources and expert economist advice; there is no redundancy between actual expenditures and the estimated value to the hunter (apart from expenditures) of the hunting experience.

47. The FWS has never used tourism as justification for wolf reintroduction. However, the potential impacts of wolf recovery on tourism and related industries are qualitatively discussed in Chap. 4 of the FEIS (see also Appendix J.)

48. This change has been made with slight revisions to the suggested language.

49. The phrase "may experience losses" is more conditional than our conclusion statement. We did not make this change.
Impacts on land use
We agree with the conclusion that land use restrictions under this alternative will be minor and any inconveniences will not result in major economic losses.

Impacts on recreation
We agree with the analysis of impacts on recreation except for the effect of road closures in response to illegal killing of wolves. Welfare costs associated with the potential presence of wolves would be much more detrimental to the recreation program than the added protection of road closures. Since wolf home ranges are estimated to be about 250 km², road closures would have to be extremely extensive to affect the wolves. A significant amount of protection from human access to private holdings within the forest may be restricted, raising the possibility of increased interaction. Aggressive enforcement and long-term educational efforts would be more effective methods of discouraging and preventing the illegal take of wolves.

Regional economic impacts
We disagree with the conclusion that the greatest negative economic effects will be in the lost value of hunting and reduced expenditures. Reason for our conclusion have been stated under Alternative A.

Alternative C:

Impacts on wild prey of wolves
We believe it is possible to predict impacts on the wild prey of wolves under this alternative. Since wolves would be allowed to disperse outside the designated wolf recovery area, the risk of potential dispersal areas impacts to the wild ungulates cannot be accurately predicted. Explanations of projections from within the BRWMA to areas outside the recovery area are due to obvious differences in habitat types and wild ungulate populations with other predators.

It could be argued that impacts would be much less because the wolf population probably would be more dispersed and less dense in any particular area. On the other hand, wolf populations would be likely to find new homes, and due to control measures, they would be lower. Wolf densities could be higher than predicted in areas with high predator densities. Too much uncertainty exists under this alternative to project with any confidence the potential impacts.

Impact on housing
Since we believe that accurate projections on the impact to wild ungulates is impossible, it is also impossible to predict the effect of wolves on housing. Wolves would probably distribute themselves widely under this alternative, so measuring impacts would be even more difficult to document.

Impacts on livestock
There will be only limited depredation control on livestock, as wolves taking livestock under this alternative could be killed. However, additional restrictions placed on their control activities. Therefore, livestock depredation will be higher than under Alternatives A & B. We believe that actual livestock depredation levels will be higher than projected in the DEIS because livestock killing will not be removed in all cases, and these wolves may use their offspring to kill cattle instead of wolves. We agree that the level of depredation likely to be seriously unmeasured as a whole, but some ranchers could experience significant losses.

Impacts on predator control programs
We agree that existence of a non-recovered wolf population could inhibit activities of ADC. With the adoption of the anti-trapping initiative, which already prohibits trapping on public lands in Arizona, this impact would occur on private land only. However, additional restrictions on predator control activities, especially on private lands, would meet significant local opposition.

Impact on agency, tribal, and local government policies and plans
Impacts on Department policies and plans could be significant under this alternative. Low wolf populations are expected on recovery, and the DEIS states that habitat management could be required to improve habitat for the wildlife. The USFWS could also recommend changes in predator harvest strategy for the increase of wild ungulate populations.

Direct USFWS involvement in state-coordinated hunting programs would meet with significant opposition, not only from private hunters, but also from the Department and Conservation. We agree.

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50. See response number 12 above. The FWS agrees that enhanced law enforcement and public education would be more effective than road closures.

51. Because of the uncertainties and data deficiencies AGFD has identified, quantitative impact analyses were confined to the BRWMA and WSWRA, for which data were available. Potential impacts in other areas into which wolves would likely disperse generally are addressed qualitatively.

52. Comments acknowledged.

53. We agree.

54. We agree with the approach presented. However, if wolves were mistakenly killed after implementation of these measures, the FWS might request limited coyote hunting season closures through cooperative agreements with the States, under Ah. C.
understand that USFWS involvement in the state's hunt strategy is not likely, but under this alternative it appears to be more than just a remote possibility.

We agree that a fully-protected wolf population could pose a potential management conflict between wolf recovery and habitat preservation for spotted owls and goshawks. Habitat management for wolves, if required to ensure recovery, would encourage the acquisition of large tracts of forest, which is higher quality habitats for the wolf's primary prey animals. Spotted owls and goshawks appear to require older forests with a more closed canopy.

An ecosystem management approach may prove successful in dealing with this potential conflict. However, no such approach is operational at this time, and the complexity of the multi-agency coordination that would be required to develop and implement it is beyond the scope of this alternative.

Consistently, we believe that ecosystem management approach needs to be operational before implementation of this alternative.

Impacts on land use
Considering the fact that wolves are considered considerably more human land use disturbance than previously thought, it is likely that current and planned activities in the wolf's reestablishment zone would increase the wolves significantly. Nevertheless, the fully-protected status of the wolves and the USFWS guidelines would ensure minimal impact. However, the scale of these activities could cause significant impacts, would be difficult to enforce, and may not be helpful to the wolves. Given the state's outdoor recreation participation in other areas of the United States, it appears that much greater numbers of wolves (e.g., Minnesota, Wisconsin), it seems very unlikely that concerns for personal safety would not be significantly diminished by human recreational use.

Impacts on recreation
We agree that wolf reestablishment on a significant increase in visitation to the wolf recovery area. Minor, temporary restrictions on access areas within a one-mile radius of active den sites and reservoirs sites to protect wolves should not cause major impacts to recreationists. However, large-scale closures could cause significant impacts, would be difficult to enforce, and may not be helpful to the wolves. Given the state's outdoor recreation participation in other areas of the United States, it appears that much greater numbers of wolves (e.g., Minnesota, Wisconsin), it seems very unlikely that concerns for personal safety would not be significantly diminished by human recreational use.

Regional economic impact
Considering the difficulty in estimating impacts to wild ungulate herds, it will be next to impossible to make predictions of the economic impacts to hunting. Wolves could cause considerable loss to livestock or high removal to wolf mortality. This would be difficult to predict and would be difficult to enforce, and may not be helpful to the wolves. Given the state's outdoor recreation participation in other areas of the United States, it appears that much greater numbers of wolves (e.g., Minnesota, Wisconsin), it seems very unlikely that concerns for personal safety would not be significantly diminished by human recreational use.

Alternative D:
We agree that the likelihood of natural recolonization occurring from suspected, but unproven, population reservoirs in Mexico is extremely remote. In addition, if natural recolonization were to occur, it would probably take place slowly and impacts would not be measurable in the foreseeable future (30-50 years). Even though Mexican wolves have been listed as an endangered species since 1976, the species has not been listed as an endangered species since 1976, this status has not allowed them to recolonize in the early 20 years they have been fully-protected. This alternative does not describe any specific methods that would ensure recolonization. In addition, the potential carrying capacity of the natural recolonization areas would not meet the Mexican Wolf Recovery Plan population goals.

Projected impacts on hunting, livestock, government policies and plans, recreation, and the local economy under this alternative are too vague to discuss.

CONSULTATION AND COORDINATION
This section is complete and well-organized.

APPENDICES
We suggest consecutive lettering of the appendices to avoid the appearance that Appendices H, I, J, K, etc are missing or were omitted.
Appendix A:
Complete

Appendix B:
Protection of costs are not detailed enough to make specific comments. However, it appears that field staff and administration could be reduced considerably. It is not clear if the amount of field staff salary includes a full-time ADC at a specific project. Adequate funding must be available for the duration of the project.

Monitoring and research functions could be conducted through a cooperative agreement with a private contractor or university, making outside sources of funding available.

Appendix C:
Complete, although past a draft

Appendix D:
Listed species included in "III. Permanent Species and Habitat" should be defined in those species being listed by USFWS for the area, many of which do not actually exist in the area.

Otherwise, this Appendix appears complete.

Appendix E:
Accurate

Appendix F:
Complete and accurate

Appendix G:
As stated above, "disturbance-causing landscape activities" should be defined in detail

Appendix L:
Literature should be cited in ascending chronological order for references by the same author.

TBD/1G

Arizona Office of the Governor:

1. We have reviewed Dr. Johnson's comment letter and we strongly disagree. See Appendix A on Mexican Gray Wolf Life History and Ecology, section on Pathogens and Parasites for a discussion of rabies. Some key points: the small numbers of wolves are very unlikely to affect the overall incidence of rabies in the Southwest since rabies is already found in other numerous animals, such as bats and skunks; under the Proposed Action wolves will not be allowed to travel to Mexico, rather they would be recaptured; and cases of wild wolves transmitting rabies to people are exceedingly rare in recorded North American history (only reported case in the Lower 48 was in 1833). Of course, if anyone was bitten by a wild wolf, which is very un-likely, they should be examined for possible rabies infection, as they would be if bitten by other wild mammals. Treatment to prevent rabies is commonplace and very successful.

2. We are unaware of any data that other predator populations have increased due to the trapping ban; detection of a broad one-year increase would be extremely difficult. In any event, the trapping ban would not apply to federal efforts pursuant to the experimental population rule which, if adopted as a final rule, will specifically allow for wolf trapping for control, research, and other needs. It would preempt conflicting state law.
The DES lists several potential costs of reintrooduction that concern me at a time when many communities in rural Arizona are under a great deal of economic pressure. Under alternative A, for example, the negative economic impact from reduced hunting activity would total more than $2 million per year. The DES also cites possible losses to cattle ranchers from wolf kills. Although the report generally downplays the impact on ranchers, annual losses of up to 34 cattle—considered a possibility under several of the alternatives—would have a meaningful impact on the cattle industry, in particular because such kills certainly would be concentrated in such a way that a small number of ranchers would have to cope with the losses. The DES and the Defenders of Wildlife have also been reluctant to guarantee by contract that adequate fund monies be available on a long-term and continuing basis.

While the risks and costs stemming from wolf reintroduction seem clear, the long-term prospects for the success of the proposal appear dim. The captive population to be released comes from a single female and just two males. Such a narrow genetic base makes the population vulnerable to elimination if it is hit with disease. As a result, there is a strong consensus in the scientific community that the population is not suitable for reintroduction aimed at establishing a thriving wild population.

I also have a number of concerns about the proposed reintroduction that stem from the history and requirements of the Endangered Species Act (ESA).

The FWS under the DES intends to establish a population of only 120 wolves in the Southwest, with 100 in Arizona and 20 in New Mexico. However, this population target could fail substantially, bringing additional risks and costs to environmentalists and judges. From the Department of the Interior, the FWS will not sufficiently ambitious. As happened recently with the wolf reintroduction program that the FWS had launched in Minnesota, similar outcomes could change the reintroduction from the "essential experimental" status deemed appropriate by the FWS to "nonessential experimental" or "endangered". Such changes would greatly impact land use in the Southwest.

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3. The $2 million per year "high scenario" figure applies to the whole BRWRA, about 2/3rds of which is in New Mexico. More than 50% of the figure is not actual lost expenditures, rather it is a lost intangible "value of hunting." In other words, it represents the lost "willingness-to-pay" of hunters who would not be able to hunt (most of whom would not be from the BRWRA region). Thus, actual lost expenditures in the Arizona portion of the BRWRA region are projected to be far less than the figure quoted. Most of those lost expenditures would be spent elsewhere in Arizona on hunting or other activities.

4. We strongly disagree that there is any scientific consensus against the suitability of the captive population; see Appendix K - Response to Mr. Dennis Parker, for evidence that the overwhelming weight of expert opinion supports the suitability of the captive population.

5. There has never been a wolf reintroduction program in Minnesota and no determination by a judge that we are aware of that the Eastern Timber Wolf Recovery Plan is "not sufficiently ambitious."

6. We believe we have used the best available scientific and commercial data relevant to wolf recovery. Appendix C does contain proposed findings that the reintroduced population would be considered "nonessential." A Federal regulation containing these findings and the special rule establishing the nonessential, experimental population will be issued prior to any releases.

5-40
New Mexico Department of Agriculture:

1. New information has been provided about these lineages, in Chap. 2 and Appendix K - Response to Mr. Dennis Parker, which addresses many of the same issues raised.

2. See response to USDA ADC, above.
3. No, these 3 and 5 year evaluations are not tied together. As far as program termination, see response to USDA ADC comment number 6, above.

4. The reintroduction goals are clear: 100 wolves distributed over at least 5,000 mi.². Meeting this goal alone would not allow de-listing; other populations would need to be reestablished elsewhere in accordance with criteria being developed in the revision of the Mexican Wolf Recovery Plan. There is no plan to ever change the designation of the reintroduced experimental population or to designate critical habitat.

5. See response #1 to New Mexico Governor Johnson, below. We have done the required assessments under NEPA and we do not project any significant impact on New Mexico's livestock industry.

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MEXICAN WOLF RECOVERY PROGRAM

Page 4

Although livestock owners may experience wolf-induced depredations, how compensation is provided in the private sector is discussed. We require the FWS to commit to compensation for livestock losses due to wolf predation. The mitigation for the impacts per regulation 40 CFR (1505.20) implementing the National Environmental Policy Act (NEPA). We encourage the FWS to permanently fund a wolf species program to be held by ADC to coordinate wolf ADC efforts in New Mexico. That person should be an experienced ADC professional able to provide wolf damage claims verification services.

Livestock managers in the form of annual permits, state permits, and state funds to purchase, maintain, and operate live release pens for injured livestock. These permits should be available to farmers whose losses exceed the state or federal threshold. If the animal is not released, the cost of replacement should be reduced.

3. The DEIS cannot be finalized until it is determined whether or not the five-year evaluation of the FWS's efforts to terminate the experimental population is satisfactory to terminate the population. The five-year evaluation will be conducted to determine whether the experimental population is self-sufficient.

4. The reintroduction goals are clearly stated: 100 wolves distributed over at least 5,000 mi.². Meeting this goal alone would not allow de-listing; other populations would need to be reestablished elsewhere in accordance with criteria being developed in the revision of the Mexican Wolf Recovery Plan. There is no plan to ever change the designation of the reintroduced experimental population or to designate critical habitat.

5. See response #1 to New Mexico Governor Johnson, below. We have done the required assessments under NEPA and we do not project any significant impact on New Mexico's livestock industry.
New Mexico Department of Game and Fish:

1. The FWS believes that a valid test of wolf behavior in the wild could be obtained on the BRWRA. Past and recent public opinion polls demonstrate substantial local support for wolf recovery. Nevertheless, the FWS believes that local support could be increased with local participation in management decisions.

2. Thank you.

3. We agree and have proposed in the Preferred Alternative a cautious approach to wolf reintroduction with periodic reviews of success and opportunities for mid-course corrections and project termination, if appropriate, through an adaptive management process.

4. The FWS generally agrees with these comments. The issues raised would be fully addressed prior to wolf reintroductions by established management and advisory groups.
6. The quoted statement has been deleted in the FEIS. There was no requirement that ID team members be supportive of wolf recovery. To keep the team to a manageable size not every state or other agency with a potential interest was invited to be a team member. Due to fairness, manageability, and legal considerations, ID team meetings were generally not open to non-members, except for invited consultants and officials.

7. We will hold consultation meetings on the proposed rule when it is published and your Department will be invited.
5. Comment acknowledged.

6. See response number 1. We agree that increased local support and participation would enhance the success of reintroduction efforts.

7. Ungulate population ecology, predator-prey relationships, predator-predator relationships, and other ecological factors relevant to wolf recovery are extremely complex and incompletely understood. The FWS believes it is an oversimplification to view wolf reintroduction as just an addition of another source of ungulate mortality. We believe the statement is not well supported by data from areas where wolf populations are recovering nor by expert opinion.

8. We acknowledge NMDGF's concern; however, our impact analyses and the experience in other states where wolf populations are recovering suggest that the added burden of livestock depredation cases should be manageable.
I. We have been unable to identify any requirement under New Mexico law that this federal proposal is subject to an economic impact analysis. Still, we believe the FEIS provides the most detailed economic impact projections that can reasonably be done. We did contract with an expert economics consultant. We are unaware of any credible information that wolf recovery will “devastate local economies.” As far as lack of information, see the previous comment from the Department of Game and Fish that the DEIS is based on the “best available information.”

2. NEPA guidelines were followed; see the previous comment from the New Mexico Department of Game and Fish, which participated in the EIS process, that commends the cooperative process used in preparing the EIS.

Texas Parks and Wildlife Department:

1. Thank you for your comment.
Texas Department of Agriculture:

1. There is no plan to introduce wolves in Texas. Please see letter from Texas Parks and Wildlife.
Indian Tribes

Mescalero Apache Tribe:

1. We acknowledge that some vegetation and animal composition shifts have occurred since wolf eradication. However, we do not believe that these shifts would limit wolf reintroduction in the areas proposed. On the WSWRA, the removal of grazing since the 1940s has likely enhanced the natural vegetation and plant communities of the San Andres and Ocuras. Similarly, in the BRWRA, the natural flora and fauna may be in better condition overall now than at the time wolves were exterminated, when severe overstocking of livestock and overharvesting of the native ungulates was occurring (see Ligon 1927).

2. We disagree that the wolf is equivalent to an exotic. The wolf has successfully returned in the northern Rockies and elsewhere after long absences. The wolf did not “move away”; it was deliberately exterminated.
If a wolf reintroduction project is approved, the FWS would enter into an agreement with the San Carlos Apache Tribe for wolf management, if the Tribe desired.
1. Wolf recovery has not been proposed for the San Carlos Apache Reservation, and wolves that disperse there could be captured and removed, with the Tribe's permission and cooperation. Because the Tribe has stated its opposition to wolf recovery, we assume the Tribe would take advantage of this provision of the proposed experimental population rule. Because wolves would not be allowed to recolonize the reservation under the Preferred Alternative, impacts to reservation resources are predicted to be minor. Input from the San Carlos Apache Tribe has been sought throughout the development of the EIS through the Tribe's representative on the Interdisciplinary Team.

2. The suggestion that livestock depredation would be higher than predicted on the reservation is speculative. Wolves would only occupy the reservation temporarily until they could be captured and removed. Wolves seen in the act of attacking livestock could be killed under the management provisions. It is our understanding that the Defenders of Wildlife compensation program would pay for livestock killed by wolves on the reservation.

3. The FWS lacks legislative authority to compensate for livestock or other animals killed by wolves.

4. The FWS believes that Tribal livestock associations will not be significantly affected by implementation of the Preferred Alternative. Nevertheless, we anticipate that one of the duties of project personnel, especially the animal damage control specialist, will be to help livestock owners improve management practices to reduce the potential for losses to predation.

5. The FWS supports the establishment of an agreement with the Tribe and has initiated efforts at the staff level to develop draft language for such an agreement.
7. See response number 6 above. Because of the number of variables and uncertainties involved, it would be extremely difficult to isolate the effects of a reintroduced wolf population on the populations of deer and elk that migrate between the Reservation and the BRWRA.

8. We agree that wolves might prey on wild turkeys. We lack clear information or data to suggest how much. Where wolves are recolonizing in wild turkey range in Wisconsin, little predation on turkeys has been observed (R. Thiel, Wisconsin DNR, pers. comm.).

9. Suggested changes have been made in the FEIS, except for part of the suggestion for p. 4-23. We have incorporated some of that information in Chap. 3 and Chap. 4, under Alt. C. We have pointed out in the Introduction of Chap. 4 that the impacts of Alts. A and B could affect the adjacent reservations if the wolves are not promptly controlled, referencing the types of impacts discussed under Alt. C. Information regarding migration on and off the reservation appears incomplete and the implications as far as hunting on the reservation are uncertain.

U.S. Congress Members:

Henry Bonilla:

1. Wolf reintroduction is not proposed in Texas and wolf reintroduction in Arizona and New Mexico is not projected to cause any impacts in Texas, particularly since the WSWRA has been dropped from Alt. C. Natural wolf recolonization from Mexico is considered very unlikely. If it did occur, the most foreseeable place in Texas is Big Bend National Park. The wolf likely would enhance tourism and would not likely to cause more than marginal impacts to ranchers in the area.
Brown:

1. The wolf does not pose a significant danger to humans or to the survival of any other species.

Baca:

1. Thank you for your comment.
world he wouldn't have created them."

He also remembered a time when the
I believe in this area and provided a necessary function to the land,
and he remembered that in the 1930s, 40s, and 1950s, the government
and the government gave allotment money to the ranchers to pay for them. He said if I were
distinctly. The lobos came first, not the cattle, therefore they are the native
to this land and play a very important function in the diversity of this land.

I am NOT a rancher by any means and I don't know a lot about all of the
issues presented here. But I do understand that it is an issue of economics
and that the Mexican wolf kills off a rancher's livestock. There ARE means of
compensating the rancher for the loss of the livestock that can be demonstrated
to be due to wolf predation.

The U.S. Fish & Wildlife Service describes the Mexican wolf as one of the
rarest land mammals in the world. Well, New Mexico is rare, our population
is diverse, our land is diverse and we pride ourselves on being people who are good
stewards of the land. I believe that part of that stewardship is to respect and protect
ALL the creatures and natural resources that God has gifted us with.

As a native New Mexican, with a family lineage tracing back to the original New
Mexico colonists, as a daughter of a former rancher/Tome Land Grant member,
and as an individual who respects and takes pride in our lands in New Mexico,
I DO sponsor an experimental reintroduction of the Mexican Gray Wolf in a way
that will minimize the impact on established livestock operations, and which will
provide full protection for wild wolves under the Endangered Species Act

Sincerely,

[Signature]

F. SHEFFY BECK

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**Vaughan:**

1. The Alamogordo Zoo wolf exhibit is only a small part of the captive breeding program, which includes an additional 23 zoos and wildlife sanctuaries throughout the United States. One important purpose of the Mexican wolf exhibit at the Alamogordo Zoo is to educate people about the native species of New Mexico.
Williams:

1. We disagree that the wolf disappeared naturally; it was deliberately exterminated.

Madla:

   Wolves are not proposed for release in Big Bend NP.

2. The FWS does not propose to “attract” wolves to Big Bend, but would take steps to protect any wolves that naturally recolonized that area to enhance their survival. In that sense, the FWS would “encourage” wolf recovery.
Agency et al. Comments and Responses

3. The FWS also held a public meeting in Alpine, Texas, which is potentially affected only by Ah. D, the "No Action" approach which considers natural recolonization. No one in Texas would be affected by the proposed wolf releases. Please see Texas Parks and Wildlife letter.

Black:

1. Wolf reintroduction into Big Bend is not planned. No one in Texas would be affected by the proposed wolf releases.
Agency et al. Comments and Responses

2. This right to manage wolves could come to landowners if the Mexican wolf is ever de-listed. But now, under the ESA, the FWS is required to work for recovery of the wolf. This duty would not be served by granting unlimited private management authority. Nevertheless, the experimental population rule does represent the FWS's granting of limited management flexibility to private landowners, including permission to harass wolves and, under certain circumstances, to kill them.

Gallego:

1. Thank you for your comment. See responses to previous legislator comments.
Agency et al. Comments and Responses

Sims:

1. Thank you for your comment. See responses to previous legislator comments.

2. The suitability of Big Bend National Park for wolf recolonization has not been demonstrated, and wolf reintroduction has not been proposed there.

Turner:

1. Wolves are not expected to prey on desert bighorn sheep to a significant degree.
Agency et al. Comments and Responses

Local Governments

Apache County:

1. These are primarily legal issues that are not the subject of the EIS process. The FWS disagrees with all of the assertions.
2. The EIS process is not required to fully address all of the topics mentioned, although the economic issues are covered. Where a clear inference as far as the sociocultural topics can be made from the environmental impact analysis, then it is made. There is no evidence that recovery of endangered wolves elsewhere has had significant sociocultural impacts.

3. We disagree, see Appendix K – Response to Mr. Dennis Parker’s Comment on the DEIS.

4. The New Mexico opinion survey was conducted last year (Duda and Young 1995).

5. Reported wolf sightings from the Blue area have been followed up, but none have been confirmed. Even if the occasional lone wolf existed in the area, the reintroduction effort could proceed so long as there was not a “population” (i.e., at least two successful breeding pairs for at least two years). If in fact a wild Mexican wolf existed in the area and interbred with the reintroduced Mexican wolf population, it would not destroy the genetic purity of the reintroduced wolves, but it could enhance their genetic diversity.

6. See rewritten Taxonomy and Historic Distribution sections of Chap. 1.

7. Wolves may be attracted to garbage the same way many other scavenging animals are. The EIS does discuss what will occur if wolves leave the recovery areas and does disclose potential impacts on domestic animals.

8. The Proposed Action allows ranchers to protect livestock on their land if wolves attack it and to harass wolves in the vicinity of their property.

9. We disagree; even under the full protection of Ahr. C, the likelihood of such severe consequences occurring is very low.

10. Investigation has produced new information that is cited in Chap. 3.
11. See response to Arizona Game and Fish Department on this issue.

12. We disagree; see Appendix K - Response to Mr. Dennis Parker's Comment on the DEIS.

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**Cochise County:**

1. That statement has been deleted from Chap. 5 of the FEIS.

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**Board of Supervisors**

**U.S. Fish and Wildlife Service**

Mexican Wolf Environmental Impact Statement

P.O. Box 1096

Albuquerque, New Mexico 87103-1096

Dear Sir,

Your comments are being submitted by two of the three members of the Board of Supervisors in Cochise County, representing the areas in which the wolf is most likely to appear.

We are also supporting the main taken by the Coalition of Arizona/New Mexico Counties for stable economic growth.

We have a very deep concern for the private citizens using federal lands for recreation. It is their safety and that of their children, pets and property that we submit these comments.

**INTRODUCTION**

Chapter 1 makes the statement that "opinions or strong concerns" was expressed by our organization and some of our member counties. As stated in our earlier hearings and correspondence, we neither support nor applaud the introduction of Mexican wolves. The objective of an environmental question is to elude to decision makers and the public what the environmental consequences can be expected from major federal actions.

History has produced many examples of people blindly carrying out agendas that have devastated entire nations because they believed in what they were doing, not enough or were enough. Following orders. The EWS has taken a series of actions in the past ten years which are absolutely contrary to our natural resources, abilities to meet our fiscal responsibilities. Even when the EWS has the opportunity to disclose this information outside the confines of the ESA, they fail to do so.

We realize that the Endangered Species and predates consideration of economic impacts; for instance, the protection and recovery of threatened or endangered species. However, the current Environmental Impact Statement (EIS) for the Mexican wolf reintroduction is governed by the NEPA and therefore the analysis must include an analysis of the social and economic impacts. In
2. We surveyed numerous experts before drawing the comparison between the northern wolf recovery areas and the Southwest as far as impacts on livestock (see Box 4-3 and Appendix F). No northern areas were directly considered to calculate wild ungulate impacts; these were estimated through a modelling effort with expert input. It is unlikely that the ability of wild ungulates to leap fences will allow them to escape pursuing wolves (who can also leap or go through fences) and extremely unlikely that wild ungulates would flee the huge designated wolf recovery areas.

3. We have added more discussion of the spotted owl in the “Cumulative Impacts” section.

4. We agree that uncertainty exists about the impacts; identifying this uncertainty is appropriate under NEPA. We disagree that positive impacts were exaggerated; in fact, the potential negative impacts are easier to quantify than the benefits. More discussion of benefits from wolf recovery in the Northern Rockies and the Great Lakes region is provided in Appendix J.

5. We do not foresee significant cumulative impacts on the prey base outside the areas where wolf recovery is proposed.

6. See responses to USDA ADC, Arizona Game and Fish Dep’t and Arizona Gov. Symington, above, on the trapping ban issue. ADC would still be able to use leg-hold traps.

7. Box 4-3 does discuss wounding and difficult-to-find losses. Defenders of Wildlife may pay for wounding and has paid a percentage in the Northern Rockies in some cases where wolves were in the area but could not be confirmed as the depredator. The Defenders’ compensation fund has paid out roughly $2,000 per year on average since 1987 in the Northern Rockies; the Minnesota state fund has paid $23,000 and $43,000 per year in the last 10 years in an area with approximately 1,500 to 2,000 wolves. During a few years, claims against the Minnesota fund exceeded the amount appropriated by the Legislature and claimants had to wait up to six months for payment, but all approved claims have been paid (B. Paul, USDA ADC, pers. comm.).
8. The plan is that the designation will end when the Mexican wolves are fully recovered and removed from the endangered species list, which will likely take several decades; this project is one part of the recovery effort. When recovery is achieved, and federal protection no longer necessary, the designation will be determined by state wildlife laws at the time.

9. Chaps. 3 and 4 include descriptions of relevant state, tribal, and local laws and impacts on them.

10. The sites were chosen because they are in the probable historic range and possess favorable characteristics for wolf recovery, as described in Chap. 2 – Selection of Potential Areas for Releasing Mexican Wolves. They were not chosen for wolf viewing.

11. No decision or regulatory action has been taken yet. Appendix C contains the Proposed Mexican wolf experimental population rule, the preamble of which contains a Required Determinations section addressing the points raised.

12. See Appendix K – Response to Mr. Parker’s Comments.

13. We have been and remain open to considering any information relevant to Mexican wolf recovery, no matter what the source. We did state we would not contribute FWS funding to support research by an individual we did not agree was an appropriate researcher, but we never have barred anyone from conducting research on behalf of the counties, or independently. We have not indicated that information provided by counties is tainted.

14. See response to similar comments in Public Comment Summary, under General Comments on the DEIS.
RESOLUTION 1995-17
October 16, 1995

A RESOLUTION BY THE BOARD OF SUPERVISORS OF THE COUNTY OF GRAHAM, ARIZONA RELATING TO THE DRAFT ENVIRONMENTAL IMPACT STATEMENT—PROPOSAL FOR REINTRODUCTION OF THE MEXICAN WOLF WITHIN ITS HISTORIC RANGE IN THE SOUTHWESTERN UNITED STATES

WHEREAS, the Board of Supervisors of the County of Graham, Arizona have genuine concerns with the proposed Alternative A and Alternatives B and C outlined in the above referenced document:

WHEREAS Graham County as a member of the Coalition of Arizona/New Mexico Counties for Stable Economic Growth and the Eastern Arizona Counties Organization, supports the goals and objectives of those organizations and thus support the desires, needs, concerns and overall goals and objectives of other member counties both in Arizona and New Mexico which represent some 945,000 citizens, and

WHEREAS Arizona law and Graham County’s Land Use and Resource Policy Plan, direct the governing body of the County to prepare for the future of the health safety, convenience and general welfare of the residents of Graham County and

WHEREAS Graham County being directly adjacent to the geographic areas proposed and potentially included in the proposal itself are directly interested in terms of economic and social, preservation of traditional customs and cultural heritage and outdoor recreation and sporting opportunities, and

WHEREAS, Section 500.2(f) of the National Environmental Policy Act (NEPA) states that the Federal Government in cooperation with State and local governments and other concerned and affected organizations that use all practicable means consistent with the requirements of the Act and other laws in determining the effect of Federal actions and to identify and avoid or minimize any possible adverse effects whether they be aesthetic, historic, cultural, economic, social or health, whether direct or indirect and the cumulative effects of their actions upon the quality of life and

WHEREAS Graham County finds the Draft Environmental Impact Statement to be inadequate under the conditions specified in NEPA and law which define the criteria of a “adequate and thorough document.” Further, the County considers the document to be internally contradictory and highly speculative in terms of data presented, scientifically indefensible, unsupported and contradictory in direct conflict with “A” to (right-of-way to and through public lands), lacking a sufficient scientific basis, fact and data base for the Southwestern United States and fails to analyze and disclose the impacts quantitatively and qualitatively, directly and indirectly, specifically and cumulatively.

THEREFORE BE IT RESOLVED, that in order to instill minimal impacts on the county’s specific relationship in adjoining Arizona and New Mexico counties in terms of customs, cultural economic well being, social welfare, the surrounding environment and wildlife species, the Board of Supervisors of Graham County, Arizona support and encourage Alternative “D,” the “no introduction alternative” as the only reasonable option when considering preservation of the species, the species within the document and its direct conflict with not only Graham County’s Land Use and Resource Policy Plan but also the goals and objectives of the other twenty-two (22) counties that are members of the Coalition of Arizona/New Mexico Counties for Stable Economic Growth.

BE IT FURTHER RESOLVED, that the United States Fish and Wildlife Service in developing the final Environmental Impact Statement in accordance with the National Environmental Policy Act must consider and analyze both the direct and cumulative impact of its decision upon the social customs and culture, and economic well being of the citizens of the Southwestern Region as well as Graham County. The analyses must include but not be limited to other published and recognized scientific data, direct and indirect “no introduction” alternatives for the existing wilderness designations, multiple uses of public lands habitat, both upland and riparian, species, whether listed or being considered for listing and other considerations required to be evaluated and weighed before reproduction of Mexican wolves occur in any region which includes Graham County and its neighboring counties.

APPROVED AT T O F ORM

GRAHAM COUNTY BOARD OF SUPERVISORS

Ann Williams, County Attorney

Debby Houser-Holmes, Chairman

Wendy McLain, Member

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Graham County:

1. With respect to the right-of-way issue, the FWS has deleted the provision in the Proposed Action for closing backcountry, Forest Service roads in the event of illegal wolf killing.

2. Mexican wolf recovery will have no affect on existing wilderness designations. We believe the FEIS satisfies the other requirements mentioned.

Passed and adopted this 16th day of October, 1995.
Agency et al. Comments and Responses

Gteenlee County:

October 30, 1995

Attn: David R. Petersen
Mexican Wolf Recovery Program
U.S. Fish and Wildlife Service
P.O. Box 1306
Albuquerque, NM 87103-1306

Dear Mr. Petersen,

These comments are submitted on behalf of Gteenlee County, Arizona, the exact county where the Blue Range potential recovery area is located. Gteenlee County appreciates the opportunity to address the Fish and Wildlife Service on this issue. However, Gteenlee County believes that it was inappropriate to hold the Service's formal public meetings in remote-local areas far removed from the area where the reintroduction will actually take place. Such propositions place an unreasonable burden on the local residents who will actually have their lives affected by this decision and it's decision-making process to not allow for adequate input of the directly affected population.

There are several concerns with the EIS which the county would like to address briefly. Because of these concerns, Gteenlee County urges Fish and Wildlife to pursue Alternative D, the no action alternative. As a second choice, the county supports Alternative B because of its less intrusive nature as opposed to the proposed action.

1. We have added discussion in Chap. 1 regarding historical accounts of wolf depredation. The wolf was also eradicated from the Northern Rockies because it depredated on livestock. Since its return in northern Montana, very little depredation has occurred, i.e., a fraction of 1% of the livestock available, and the wolves do prefer wild prey. Much of that region also is quite rugged. See response to the fence-jumping issue also raised (#2) by Cochise County.
2. The FEIS does not say there will be an overall economic benefit; instead, we do not provide a cost benefit ratio. We do say that the negative economic effects projected likely would be offset by economic benefits, but to an uncertain extent. The benefits are more problematic to quantify than the costs.

3. The hunting-related losses are entirely separate from the government’s Project Implementation Costs, as set out, and modified since the DEIS, in Appendix B of the FEIS. Much of the latter might be spent in ways that benefit local communities, e.g., living expenses paid into local economies by wolf management field staff, hiring local trapping assistants, local purchases, etc. We have not considered multiplier effects for either increases or losses of expenditures in the region for the reasons stated in response to the comment on indirect and multiplier effects in the Public Comment Summary, under Impacts on Regional Economies.

4. We actually state, in Chap. 4 - Impacts on Regional Economies, and under Cumulative Impacts, that ranch failures are conceivable but not expected. There is no evidence that cattle ranchers have been put out of business by wolf recovery in the Northern Rockies or Great Lakes regions. On the other issues, see the responses given in the Public Comment Summary sections on Impacts on the Livestock Industry, and Compensation for Livestock Depredation.
5. The Projected Wolf Population Growth tables in Chap. 2 do include reasonable mortality projections for wolves from both legal and illegal causes.

Throughout the DEIS, the concept of controlling the wolf population is discussed. In both alternatives A and B, F&W expects to be able to control where these wolves will grow at least to the extent of the primary or secondary recovery areas in the event that one or more wolves should wander. Arizona, now has a law that disallows the use of traditional trapping methods on public lands. This improvised wolf dispersal control has not been adequately addressed in the DEIS.

V

Yet another concern which has not been adequately evaluated is the fact that some of these wolves will die. Some will die at the hands of other man or it is conceivable that some will die at the hands of human hunters. There will be legitimate hunters who may take some as prey by accident and these may be some illegal hunting activities aimed at intentionally taking wolves. If wolves wander out of the primary recovery areas there will also be some wolves out by the mere interaction with the human environment. Such losses as wolves present a real threat to the legitimacy and efficiency of the reproduction process. And unfortunately, the remote nature of the recovery areas may prevent officials from ever conclusively determining who or what did the taking. Although the county desires that some losses will be investigated with the same vigor as wolf losses, of greater concern is whether releasing wolves into the wild will have such a limited captive breeding stock in reality the wild decision of this time. Perhaps Alternative D, the no active alternative is at this time, is the most common sense point of view. the best alternative for the wolf in spite of the selfish agenda of some conservation groups.

VII

The last concern Graveline County wishes to address is the DEIS's lack of regard for local customs, culture, and economics. If wolves are released into the Blue recovery area, it will undoubtedly severely impact the residents of the Blue Community. This a community of approximately 75 persons which relies almost exclusively on grazing as its main blood. In just the last three years, Blue has experienced devastating impacts due to endangered species management, threatened grazing miscalculations, timber and wildlife mismanagement. Food requirements to restore basic health and safety service on the only access road into Blue has been repeatedly slowed or stopped in favor of endangered fish. Over-browsing elk populations now threaten to destroy the pastures and land improvements that the ranchers have developed which directly benefit wildlife. Most recently the Forest Service has announced a 46% reduction in native grazing permits on the Blue. The losses that threaten these hard working
people on country to land and frequently that they spend so much time writing letters and submitting comments that they get behind on their jobs of raising cattle to earn a living. In other words, simple fighting to make adverse federal regulatory decisions will eventually drain all of the resources of time, labor, money and effort from these people such that they will eventually lose the battle for lack of resources. Although the initial wolf reintroduction seems innocuous, when considering the cumulative effects of this decision on wolf reintroduction places such a diverse suite burden on these people, that to continue the reintroduction effort is unreasonable.

Councilman

In the end, Gourde County believes that the best alternative for all parties is:

Alternative D: preserves precious resources, mitigates impacts on local customs, culture, and economies and in the end, provides the greatest protection for current captive wolf populations. It is the best alternative for our pocket books, our people, and the wolf.

Sincerely,

[Signature]

Dennis D. Badger
Wildlife Management Coordinator
Gourde County Board of Supervisors

cc: Gourde County Board of Supervisors
Members of Arizona's U.S. Congressional Delegation
Gov. Ducey
Ariz. Senate Pres. John Greene
Arizona House of Representatives, Speaker of the House, Mark Killian
Agency et al. Comments and Responses

Catron County:

October 18, 1995

Mr. David R. Parsons
Mexican Wolf Recovery Program
U.S. Fish and Wildlife Service
P.O. Box 1300
Albuquerque, NM 87103-1306

Dear Mr. Parsons:

These comments are to provide input by Catron County on the Reintroduction of the Mexican Wolf within its historic range in the southeastern United States. Draft Environmental Impact Statement (DEIS). The comments are divided into two categories: Legal/Procedural Considerations, and Technical Aspects.

Legal/Procedural Considerations

1. National Environmental Policy Act

The DEIS is not in compliance with the National Environmental Policy Act (NEPA), nor with the regulations for implementing its procedural provisions promulgated by the Council on Environmental Quality (CEQ). Significant departures from NEPA and the CEQ NEPA regulations are discussed below after first setting forth pertinent parts of the law and regulations to place these comments in context.

NEPA is the federal national charter requiring federal protection of the environment It established policies, set goals, and provided the means for carrying out policies and attaining goals. NEPA is extremely important to county governments and local communities. As the umbrella environmental law, NEPA (42 USC §4332) declares:


that it is the continuing policy of the Federal Government, in cooperation with State and local governments, . . . to use all practicable means, consistent with other essential considerations of national policy, to improve and coordinate Federal plans, functions, programs, and resources to the end that the Nation . . . assure for all Americans safe, healthful, productive, and aesthetically and culturally pleasing surroundings and . . . preserve

important historic, cultural, and natural aspects of our national heritage, and maintain, wherever possible, and environment which supports diversity and variety of individual choice.

NEPA not only requires the federal government to consider the impacts of its actions on the biological environment, but it also requires federal agencies to preserve culture and heritage. Significantly, Congress policy regarding NEPA states that cooperation and coordination will occur with local governments, and that the culturally pleasing surroundings and cultural aspects of community will be preserved so as to support diversity and variety of individual choice. Clearly, this policy can only be carried out at the county level—through county government that encompasses multiple communities all possessing a common heritage and culture, and similar planning surroundings that require protection.

NEPA (42 USC §4332) further states:

...all agencies of the Federal government shall... include in every recommendation or report on proposals for legislation and other major Federal actions significantly affecting the quality of the human environment, a detailed statement...

In this case, the "detailed statement" referred to in NEPA is the environment impact statement (EIS). When the U.S. Fish and Wildlife Service (USFWS) personnel made the decision to prepare an EIS, they determined that the intended action to reintroduce the Mexican Wolf (wolf) constituted a "major Federal action significantly affecting the quality of the human environment." We agree, the proposed wolf reintroduction is a major federal action significantly affecting individuals, the locality, and the heritage, customs, culture, and economy of Catron County.

Catron County has passed ordinance ordinances to ensure that the county has and opportunity to interact with federal agencies to protect its heritage, customs, culture, and economy. The DEIS refers to these ordinances, but incorrectly interprets their purpose as follows:

These ordinances seek to subject federal decisions regarding federal property within the county [Catron and Sierra] to a local approval process (DEIS, p. 3.14).

The Catron County and Sierra County land use ordinances that call for equal authority with federal agencies over decisions affecting federal lands within these counties would conflict with the Proposed Actions (DEIS, p. 4-12).

Page 2
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Parsons
This is a legal interpretation issue. Our basic interpretation, as stated in Chap. 4 - Impacts on Agency, Tribal and Local Government Policies and Plans, is that, to the extent inconsistencies or conflicts exist between local ordinances and the federal ESA, together with the Mexican Wolf Experimental Population Rule (if it is adopted as a federal regulation), the local ordinances would be preempted. We have pointed out where we saw areas of inconsistency or conflict, particularly for those counties with ordinances that attempt to ban wolf reintroduction outright.

We agree that the NEPA CEQ regulations define federal requirements as far as cooperation in planning with local governments and we have complied with those regulations. While we have attempted to cooperate with the counties, we have not agreed to submit to county approval processes under their various planning ordinances. We have stated to Catron and other counties in several letters that we believe we retain some discretion in deciding what constitutes cooperation to the “fullest extent possible,” given budget, staffing, and time constraints. We have offered to cooperate with counties in their own environmental analyses on wolf recovery; offered to make background information available; attempted to conduct joint research and studies; considered research and studies provided to us by county officials and others; had several meetings about preparation of the DEIS with county officials and representatives; held open house meetings in virtually all of the counties affected; and held a joint public comment meeting on the DEIS with one county that requested to do so. Because of the large area involved in the DEIS analysis (3 states, 3 tribes, 17 counties, and the jurisdictions of numerous state and federal agencies), it was not practically possible to involve all the local governments as joint or co-lead agencies or for the FWS to participate in many detailed local planning processes (which require numerous formal meetings) on top of the NEPA requirements. We believe this FEIS fully addresses local impacts to the extent the transitory impacts of wolf recovery can be identified to a particular county; we have discussed potential impacts in Catron County in several parts of Chap. 4. When we have received information from the counties that was appropriate to include in the FEIS, we have included it. We have offered to assist in local planning efforts and remain open to that as well as to other avenues of cooperation.
We have identified all of the effects of the alternatives that are reasonably foreseeable and required under NEPA. No clear information has been provided to us that impacts—direct, indirect, or cumulative—will occur beyond those we have described in the FEIS. The cumulative impacts discussion in the FEIS is more detailed than the DEIS. Gray wolf recovery in recent years in other parts of the country has not had significant negative effects, beyond the type of effects we have described, on "free enterprise and a market economy," on local "heritage, customs, culture, and economy," or on the other criteria listed later in the comment.

We do not project that any ranchers will go out of business because of Mexican wolf re-introduction. Therefore, it would be inappropriate to do the suggested analysis.
4. The Proposed Action includes the full extent of mitigation measures that the FWS believes appropriate and consistent with achieving wolf recovery. The private compensation fund has worked very well to mitigate for wolf depredation in the Northern Rockies. It is not clear that an additional federal fund at this time would provide an additional measure of mitigation, because it would be subject to the uncertainty of the federal appropriation process. The livestock losses in the BRWRA would, of course, not all occur in Catron County. We lack a reasonable way to estimate unconfirmed predation losses (see Box 4-3).

5. Under the ESA, critical habitat cannot be designated for an experimental population, 16 USC sec. 1539(j)(2)(C)(ii). Critical habitat has never been designated for wolves and would make little sense for these wide-ranging habitat generalists.
II. It is recognized that wolf-dog hybrids are often aggressive, vicious animals. Many wolf-dog hybrids are reported to be the cause of attacks on livestock, at least in the past. Also, the name of the laboratory and its credentials that conducted the tests.

III. In the absence of verified reports of wolf-dog hybrids causing damage to livestock or property, it is not proposed to extend the recovery area to include De Baca County.

IV. The DEIS is clear that the proposed recovery area for the Mexican wolf would not include De Baca County.

V. The DEIS also states that the proposed recovery area for the Mexican wolf would not include De Baca County.

Sincerely,

Hugh B. McKee, Chairman

De Baca County:

1. Thank you for your comment. Wolf recovery is not proposed for De Baca County.
Eddy County:

1. No road closures were anticipated in or near Eddy County under the former Proposed Action. However, now the back-country road closure provision has been removed entirely.
Grant County:

1. We believe our impact estimates are reasonable and well-supported. We are unaware of any studies made by wildlife biologists stating that the Gila Nat'l Forest is not suitable for wolf recovery.

Otero County:

We understand that the White Sands Wolf Recovery Area in Otero County is federal managed land and that the wolves would not be allowed to disperse off this recovery zone.

The County is in the position that it would be extremely hard to keep the wolf out of one area, especially since the wolf is already here and there is no buffer on this land. We also know that the wolf is listed as an endangered species under the Federal Endangered Species Act and under the State Wildlife Conservation Act. We have strong concerns in this area. Endangered species have stopped economic growth in the Western States for the past 10 years; even taking into account the impact it had on human life or economic impact. Everything from access to Grizzly Bears have drawn the scrutiny of the public. This is not only small in a large area, but a large, populated area. Otero County, has not seen in the Federal Government, that this wolf's reintroduction will not destroy most of our economy and quality of life.

Case after case, after horror story, has proven that the Endangered Species Act does not work.
According to newspaper accounts, the coyote incident referred to near Los Alamos involved a boy who was bitten, not taken out of his backyard, after the family had been unwisely feeding the coyote.

Wolves could contribute to reducing the horse and oryx populations. Wolves will not have any significant impact on the water.

The compensation fund is private, not federal. A human mortality would be unprecedented and is extremely unlikely to happen.
Sierra County:

1. See previous response to similar comments by Catron County.
Introduction

Chapter 5 makes the statement that "opposition or strong concern" was expressed by our organization and some of our member counties. As stated in our earlier meetings, we continue to explore our options and support the introduction of Mexican wolves. The other states of other environmental documents to disclose to decision makers and the public what the environmental consequences can be expected from major federal actions. J ust as the responsible officials must wait for the production of the final Environmental Impact Statement, read the document to determine its adequacy and make a decision to proceed or not proceed with the proposed action, we must do the same.

As communicated to you in the beginning of the ES process, we are committed to assisting you in gathering and processing the necessary information to accomplish the above-stated objectives for this National Environmental Policy (NEPA) document.

History has produced many examples of inadequate or biased statements about policies or programs that have adverse effects on the environment. Therefore, we have included a summary of the evidence. Also, the modeling does not take into account the fact that wildlifeOfs will be able to test the boundaries of the primary and secondary forests and leave the domestic livestock secure and vulnerable inside of the future forests.

The stated objective is to minimize adverse impacts on the reforestation and current livestock. The NPS and the MUSEC's recent listing on protection for the Mexican wolf could require that an extensive analysis of cumulative impacts be done on the environment which includes the social and economic impacts.

The subject of a cumulative impact statement (CIS) is to provide sufficient information upon which to make an informed decision. The CIS contains much information but must be specific and detailed to ensure compliance.

The information on the part is only confined to the primary and secondary zones. It requires a short-term and long-term cumulative impact analysis for the entire experimental population area.

The model has been refined in Arizona. Animal Damage Control (ADC) will have a more thorough and long-term impact study to capture wolf impacts. The DES does not address this data.

The presence of protected wolves will affect the efforts by ADC to control other predators. Therefore, the CARPA list of hazing wolves is essentially a list, not a list of actions.

While there is a proposal for a depredation compensation fund, there is no mention of damaged livestock or animals. The DES should parallel the difficulty in identifying kills, even isolating the evidence of a kill. The DES should also contain the actual payments made.

For Montana and Minnesota, the fact that there have been numerous complaints about late response and being paid late. It should parallel that the Minnesota fund has twice the amount of funds before further appropriations could be made from the state legislature.

It is not unreasonable to ask when the non-experimental designation will end and when will the startup of the Wolf Center begin. The DES does not include the certainty of a clear cut in the future. The CARPA list is essentially a list. The CARPA list must be reviewed and updated with any new information.

The decision is a significant regulatory action subject to the review of the Office of Management and Budget pursuant to Executive Order 12866. Additionally, this decision has a significant impact on the following number of small entities which makes it subject to the Regulatory Flexibility Act (5 U.S.C. 603 et seq.).

Coalition Of Counties

Specific comments:

- The geographic areas, from which the data in the report is derived, are derived.
- The DES is silent about the potential impacts on the livestock industry.
- There is no mention of damaged livestock or animals. The DES should parallel the difficulty in identifying kills, even isolating the evidence of a kill. The DES should also contain the actual payments made.
- The DES does not address the data.
- The CARPA list is essentially a list. The CARPA list must be reviewed and updated with any new information.
We cannot locate any reference in the DEIS to a regulatory impact analysis having been completed pursuant to Executive Order (EO) 12866 or the Regulatory Flexibility Act. We hereby request that you include the information in this EIS and forward a copy of the information set forth in EO 12866 in subsections (a)(3)(B) & (C) and pursuant to 6(a) (3)(C)(ii)(a) of the same EO. An identification for the public, those changes in the regulatory action that were made at the suggestion of GFWA:

- we have attached and hereby incorporate the comments of Dennis Parker bridges.

Conclusion

Our entire effort, for several years, has been to provide you data and information about the potential for direct, indirect, and cumulative impacts on our economic, social, cultural, and natural biological environments. Because we have, we will suffer the loss or enjoyment of the benefit of your proposed action. For this reason, our counties have a special interest in the above environmental and should have been included at a minimum, cooperating agency status.

We have outlined in our comments that you offer in your written comment. Dealing with social and cultural issues and standards in multiple sites for long-term impacts, the Natural Environment Policy Act (NEPA) and its implementing regulations and standards for sea and remote areas have been employed in this area.

III. Implementation of alternative action

We have suggested that you incorporate the principles you have outlined in your comments and comments to your proposed action. If you incorporate the principles, we are not aware that the Environmental Protection Agency has no authority to delegate some of these responsibilities.

IV. Subsequent action

We are not aware that the Federal Government, Pursuant to NEPA, would be responsible for taking any subsequent action, PA (FWS) is, systematically destroying the two economies and cultural

V. Environmental impact statement

We are not aware that the Environmental Protection, Federal concerns, and/distinguish to gather information, and draft an environmental impact statement that will be responsible for conducting the monitoring.

1. Be responsible for conducting the monitoring.
2. Be the authorizing and discontinue for mitigation payments for domestic livestock displacement.
3. Be responsible for acquiring and returning wolves to the release areas.

Agency et al. Comments and Responses

1. Up to the end of this paragraph, the text of the comment is the same as the comment submitted by Cochise County. See above letter and FWS responses.

2. The FWS is willing to cooperate with counties on implementation of re-introduction and is exploring ways to enhance citizen involvement in wolf management. The FWS has no authority to delegate some of these responsibilities as suggested.

Eagar:

1. Experience from other wolf recovery areas, such as Yellowstone National Park, has indicated positive, rather than negative, impacts on recreation and tourism.

Lava Soil and Water Conservation District:

1. Thank you for your comment.
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Introduction

The draft environmental impact statement (DEIS) on the U.S. Fish and Wildlife Service’s (FWS) proposal to reintroduce the Mexican wolf was released for public review on June 27, 1995. The public comment period ended more than four months later, on October 3. Public review was extensive, with participation by almost 18,000 people or organizations, in a variety of ways (see Table 5-1). Fourteen public open house meetings were held throughout the potentially affected areas; total registered attendance was 1,186. Three formal public hearings were held in Austin, Texas; Phoenix, Arizona; and Socorro, New Mexico; total registered attendance was 95. Each written and transcribed oral comment has been reviewed and considered in the preparation of the Final EIS (FEIS). All public comments are on file and available for inspection at the FWS Regional Office in Albuquerque, New Mexico.

Publication and Response to Comments

Due to space and cost considerations, not all of the thousands of comments received on the Mexican wolf DEIS can be re-printed and responded to individually in the FEIS (see Council on Environmental Quality regulations regarding keeping EISs to reasonable size, 40 CFR 1500.4, and responding to comments, 40 CFR 1503.4). Those comments, and FWS responses, that are re-printed separately in Chap. 5 of the FEIS are the comments of federal, state, local, and tribal agencies, members of the United States Congress, and state legislators. Those re-printed comments and their responses are not summarized in this document.

This document summarizes the comments received from the general public, corporations, and non-governmental organizations (see list below). All of these comments were carefully screened for major topics. These major topics are summarized, categorized, and responded to here.

The first section below, “Comments on Alternatives,” includes topics specific to Alternatives A, B, C, or D, and comments that propose new alternatives. Comments on topics that go beyond the alternatives are treated separately under “Comments on Issues.” Some representative quotes from comment letters are also provided. Where this is done the quote is followed by a number in parentheses indicating the FWS filing number for the comment.


Comments on the Alternatives in the DEIS

DEIS Alternative A: Based on specific decision criteria, the U.S. Fish and Wildlife Service proposes to reintroduce Mexican wolves, classified as nonessential experimental, into the White Sands Wolf Recovery Area or the Blue Range Wolf Recovery Area, followed by a second reintroduction into the other area if necessary and feasible. Wolves will be released into primary recovery zones and allowed to disperse into secondary recovery zones.

Comments Favoring Alternative A

Comment: This provides: important management flexibility, a lot of territory for the wolves to expand, and the greatest chance of survival for the wolves and achieves the best over all balance of conflicting issues.

Response: We agree.
### Table 5-1. How people commented.

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Grand Total: 17,874
Comment: “So far this type of plan has worked well in both Yellowstone and the Great Smoky Mountains.” (592)

Response: The Yellowstone (and Central Idaho) wild gray wolf reintroductions have succeeded to date and the reintroduction plans have proved workable. The same is true of the red wolf reintroduction project in North Carolina and Tennessee. The Mexican wolf program is patterned after these previous FWS efforts and has the benefit of learning from these efforts.

Comment: This alternative allows a reasonable population density of wolves “while at the same time confining the wolves enough to minimize their contact with humans and livestock.” (697)

Response: We agree.

Comment: “The Blue Range and Gila National Forest combined represent the best and largest intact ecosystem left that is capable of housing and nurturing the Mexican grey wolves.” (712)

Response: We generally agree with this comment in regard to the U.S. portion of the Mexican wolf’s range. Additional suitable areas may exist within the subspecies’ entire historic range, but these have yet to be fully analyzed.

Criticisms of Alternative A

Comment: It is too expensive.

Response: We acknowledge that over seven million dollars is a lot of money, but we believe that the Endangered Species Act (ESA) allows incurring substantial costs to restore a subspecies like the Mexican wolf that appears to be virtually extinct in the wild.

Comment: It takes too long.

Response: We believe the deliberate approach of Alternative A is the most reasonable way to achieve successful wolf recovery in the long run.

Comment: The wolf recovery area boundaries are objectionable and the areas are too small; the plan to return dispersing wolves means that they will only be allowed to rehabit a small fraction of historic wolf habitat in the Southwest within the experimental population area.

Response: The boundaries represent the areas most likely to successfully support wolf recovery, consisting predominately of public land that has rated high for wolf recovery attributes. This would be the first phase of Mexican wolf recovery; additional recovery areas would be needed in the future to achieve the goal of removing the Mexican wolf from the endangered species list. Such additional areas could be within the designated experimental population area or, possibly, outside this area, including in Mexico if inter-governmental cooperation is achieved. No decisions have been made yet as far as future areas.

Comment: The primary release areas should be more central to the Blue Range Wolf Recovery Area, i.e., more towards the Gila National Forest, to allow for dispersal in all directions, i.e., the secondary zone should surround the primary zone.

Response: The proposed release areas were selected from recommendations provided by the Arizona Game and Fish Department (AGFD) and the New Mexico Department of Game and Fish (NMDGF). Delineation of the BRWRA (including the Gila National Forest in New Mexico) represents an expansion by the FWS of a recommendation by the AGFD for consideration of the Blue Range area in eastern Arizona as a potential wolf reintroduction area. The NMGFD did not recommend a release area in the Gila National Forest. In order to provide a recovery zone buffer around actual release sites, the FWS has changed the proposed action. Under the Preferred Alternative, wolf releases would be conducted in the eastern part of the BRWRA primary recovery zone.

Comment: The wolf should stay on the “endangered” list; there is potential confusion if experimental non-essential is used and wild wolves recolonize the same areas; further, the plan to relocate any wild wolves from Mexico that disperse into the experimental population area (outside the recovery areas) defeats the ESA goal of protecting such wild endangered animals.

Response: Substantial evidence is lacking that a wild Mexican wolf population exists or will exist in the
future in the United States. The likelihood of natural recolonization of a breeding population appears so low in the proposed wolf recovery areas that reintroduction of experimental non-essential animals is justified. If recolonization were to occur, those wolves, if captured, could contribute important genetic diversity to the captive population and could conceivably be released within the designated recovery areas. It would be confusing and impractical to have two different protection classifications for wolves within the vicinity of the recovery areas; people cannot be expected to determine classification of an animal before taking management action.

Comment: If wild Mexican wolves were to naturally recolonize in areas where the FWS proposes to reintroduce captive-raised animals, this should not be grounds for postponing the reintroduction; instead it should be considered a plus that would increase the chances of success of the reintroduction.

Response: If a wild “population” (i.e. at least two pairs that breed successfully for two years, see definition in Appendix G - Glossary) was detected in the recovery areas prior to the reintroductions, then the reintroduction of “experimental nonessential” wolves would potentially violate the ESA. Such a population may recover more successfully than captive-raised wolves. The FWS does not anticipate this outcome.

Comment: The low numbers of the Mexican wolf mean that it is essential; experimental nonessential is the wrong classification.

Response: See response below under Additional Alternative Suggestions.

Comment: The possibility of using only one area means that this project will not necessarily establish even a minimally viable population; more than one area and greater numbers are critical under conservation biology principles, to recover the wolf.

Response: Preliminary population viability assessments, using the simulation model VORTEX, predict that a population of 100 Mexican wolves in the BRWRA would have a high probability of surviving for 100 years. Modern principles of conservation biology suggest that multiple populations of the same species provide greater survival assurance than single populations. The original Mexican Wolf Recovery Team recognized that the re-establishment of one population of 100 wolves in the wild would not be sufficient to remove the subspecies from ESA protection. The current Mexican Wolf Recovery Team is revising the population objectives for achieving recovery through the application of conservation biology principles. This EIS covers only the initial reintroduction of Mexican wolves to the wild; future reintroductions are neither assured nor foreclosed. However, any future reintroductions would require separate analysis under the National Environmental Policy Act (NEPA).

Comment: The listed criteria for deciding which recovery area to use and in what order “appear to leave a lot of loopholes available for not reintroducing the wolf. Is reintroduction of wolves a FWS commitment or not?” (1,821)

Response: We have clarified our proposal in the Preferred Alternative of the FEIS. The initial reintroduction would be conducted on the BRWRA. A subsequent reintroduction on the WSWRA would occur only if necessary to the objective of reestablishing a population of 100 wolves in the wild and if determined to be feasible. The criteria appearing on page 2-16 of the DEIS have been deleted.

Comment: “Drop that ‘up to’ [100 wolves for the BRWRA and 20 wolves for the WSWRA] business and go for the maximum number of individuals that you are confident the release areas (both of them) can accommodate. The inevitable mortalities associated with this program will soon make up for any overshoot and meanwhile, more wolves will be gaining the experience necessary to function fully in the wild.” (1,034)

Response: We believe the recovery area goals are reasonably based on the areas’ projected carrying capacities, while the actual populations will fluctuate above and below these levels over time. If our projections are far off - too high or too low - then the goals could be revised under the adaptive management approach of the Proposed Action.

Comment: The level of legal protection is too low.
Response: The legal protections afforded under the proposed experimental population rule are considered adequate. Except for narrowly defined exceptions, killing of the wolves would be a violation of the ESA and subject the offenders to severe penalties.

Comment: The land use restrictions are inadequate to protect the wolves.

Response: In other areas of gray wolf recovery, e.g., Montana, Minnesota, and Wisconsin, land use restrictions have proven almost entirely unnecessary for wolf recovery and such restrictions are counterproductive unless they are clearly needed.

Comment: Too much emphasis is given to conflicts with ranchers and not enough to the biological needs of the wolf.

Response: Potential conflicts with the livestock industry represent a major obstacle to successful wolf recovery; the emphasis on avoiding or mitigating these conflicts is for the purpose of reducing illegal killing of wolves (and increasing tolerance of wolves recovery by the livestock industry), thereby enhancing the ability of the wolf population to grow and sustain itself over time.

Comment: Allowing grazing in the wolf recovery areas will lead to wolf/rancher conflicts.

Response: Wolves and livestock grazing can co-exist; cooperation between the wolf management agencies and the livestock industry will minimize wolf/rancher conflicts.

Comment: The provisions to kill and harass wolves for protection of humans and livestock will be abused; the numbers of breeding pairs required before this could be allowed is too low.

Response: We anticipate some level of abuse of provisions for taking wolves, but believe that extensive public education and information efforts, as well as strong law enforcement, will keep the abuse levels low. The provisions on allowable take and harassment of wolves are narrowly drawn so that they are only to be used in ways that enhance wolf recovery, i.e., by removing depredating wolves and by conditioning wolves to generally avoid humans and livestock. On the question of the numbers of breeding pairs needed before allowing harassment or killing, we should point out that there is no minimum number before non-lethal harassment is allowed. Non-lethal harassment can benefit wolf recovery by negatively conditioning wolves to humans and livestock. As far as the numbers before allowing private killing of livestock on public lands, under narrow conditions, we believe three breeding pairs on the WSWRA and six pairs on the BRWRA represent substantial progress toward recovery objectives for the areas. Furthermore, the number of wolves killed under this provision is expected to be very few, if any, and of minor consequence to the progress of wolf recovery once the prescribed number of pairs has been reached.

Comment: The allowance of unavoidable or unintentional take is unenforceable.

Response: We disagree. Notice of wolf locations will be publicized. Hunters are responsible to identify their targets before shooting so, with information and education efforts, illegal hunting take should be low. Information on how to avoid unintentional trapping will be made available. The few trappers in these areas will be on notice if they do trap a wolf that it likely would not be considered “unavoidable or unintentional.” The other area of expected unintended killing of wolves is through roadkilling and we see little point in making the unintended hitting of a wolf illegal.

Comment: Harassing or killing wolves on public lands should not be allowed.

Response: Public lands are multiple use lands and the limited harassment and killing of wolves allowed is considered appropriate to protect the other uses and to lead to successful wolf recovery in the long run.

Comment: Public lands ranchers will be put out of business by the unacceptably high level of livestock depredation, unless they are given more freedom to kill wolves.

Response: Although it is possible that some ranchers could be seriously affected in a given year, evidence from other areas where wolves and ranching co-exist does not support the idea that ranchers on these multiple-use public lands will be driven out of business without greater ability to kill wolves.
Comment: Better definitions are needed of how wolves impact game populations and how wolves would conflict with a major land use.

Response: The definition in the proposed experimental population rule and Appendix G of the EIS of “Impact on game populations in ways which may further inhibit wolf recovery” is considered adequate and was developed in cooperation with state game management agencies. There was no definition of “major land use conflict” and we have decided to drop that from the Preferred Alternative and the final experimental population rule, if one is needed. It is vague and adequate management flexibility exists under other Proposed Rule provisions.

Comment: It is not feasible to recapture and return wolves. Wolves will disperse to where they are categorized as endangered under the ESA.

Response: We disagree. In Minnesota and other areas, the FWS and other agencies have many years experience in trapping and translocating wolves. Wolves that left the large Mexican wolf experimental population area, and were known to have been part of the experimental population, would not lose their experimental status.

Suggested Alternative A Modifications

Comment: The Blue Range Wolf Recovery Area should be definitely identified as the first area to be used.

Response: Alternative A (the preferred alternative) now identifies the BRWRA as the initial reintroduction location.

Comment: White Sands reintroduction should occur first, followed by the Blue Range if the wolves are doing well. Lessons about wolf dispersal and depredation control could be learned in a less volatile setting; also, wild-adapted wolves from the WSWRA could be used as reintroduction stock in the BRWRA, perhaps paired up with wolves directly from the captive population.

Response: All these points were considered in deciding which area to use for the initial reintroduc-

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Suggested Alternative A Modifications

Comment: The Blue Range Wolf Recovery Area should be definitely identified as the first area to be used.

Response: Alternative A (the preferred alternative) now identifies the BRWRA as the initial reintroduction location.

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Comment: White Sands reintroduction should occur first, followed by the Blue Range if the wolves are doing well. Lessons about wolf dispersal and depredation control could be learned in a less volatile setting; also, wild-adapted wolves from the WSWRA could be used as reintroduction stock in the BRWRA, perhaps paired up with wolves directly from the captive population.

Response: All these points were considered in deciding which area to use for the initial reintroduc-
experimental population rule to establish release sites elsewhere in the designated wolf recovery areas.

**Comment:** All BLM and State public lands around the BRWRA should be added as part of the wolf recovery area.

Response: The FWS established definite boundaries around proposed wolf recovery areas as a mitigation measure, primarily to reduce potential adverse effects of wolf reintroduction on the livestock industry. Furthermore, we believe that lands surrounding the BRWRA, which are managed by the Bureau of Land Management (BLM) or the States, provide generally unsuitable habitat for wolf recovery. BLM and State lands could be part of the unbounded recovery area for wolves under Alternative C, if wolves found suitable habitat there.

**Comment:** Big Bend National Park should be added to Alternative A.

Response: The capacity of this area to support wolves is unknown, but it is apparent that it, alone, could not support a viable population of wolves. It is close to Mexico where the wolves could disperse beyond U.S. protections. We consider Big Bend National Park; and it is close to large private ranch holdings in the U.S. to be an inappropriate place to try to reintroduce a viable population without first securing the cooperation of Mexico, consulting with private U.S. land-owners, and then conducting a detailed feasibility study.

**Comment:** Experimental status should not continue indefinitely but should be evaluated and possibly upgraded.

Response: This approach is theoretically possible, but the FWS believes it would be counterproductive to wolf recovery and has committed in the proposed experimental population rule that it has no intention of changing the designation.

**Comment:** Back roads should be closed in the areas regardless of illegal wolf killing to avoid conflicts.

Response: This would create unnecessary bad will toward the wolf without adding a conservation benefit.

**Comment:** For wolves that establish territories on public lands outside the designated recovery areas, the management approach should not be automatic removal; instead, consultation should be entered into with the land managers, similar to that provided for private and tribal lands outside the designated recovery areas. Also, allow for changes to the recovery areas boundaries.

Response: A limited and defined area is considered necessary to allow the wolf the highest degree of acceptance and recovery and to allow the FWS and cooperating agencies to plan for wolf management. Allowing the recovery areas to expand out continually would defeat this purpose. However, if we thought it was important to survival and recovery of the reintroduced population, it is possible that after thorough evaluation we could recommend changes to the recovery area boundaries. These would have to be proposed as an amendment to the experimental population rule and be subject to formal agency and public review under rulemaking procedures and the National Environmental Policy Act.

**Comment:** Long range management plans are needed, including dispersal corridors to other recovery areas.

Response: The present proposal was developed to achieve the current recovery objective, minimize potential adverse effects of reintroducing Mexican wolves, and enhance public acceptance of wolf recovery. The establishment of corridors would require acquisition of lands and/or easements and is considered outside the scope of this proposal. The Mexican Wolf Recovery Team is currently developing long range recovery objectives for inclusion in the revision of the Mexican Wolf Recovery Plan.

**Comment:** “Permission for private parties to ‘take’ [wolves] should be on an ‘unacceptable’ level of livestock loss - not simply previous loss or injury.” (550)

Response: After the initial population goals are achieved (3 breeding pairs for WSWRA; 6 breeding pairs for the BRWRA), any livestock depredation by
wolves should be cause for taking the offending animals out of the population because depredation is a learned behavior that wolves pass on to their young and it is a very counterproductive behavior for wolf recovery.

**Comment:** The point should be made that the occurrence of natural recolonization would not necessarily eliminate the need for any reintroduction at all.

**Response:** Acknowledged, see additional language in Alternative A under “Actions Associated with the Alternative.”

**Comment:** A wider radius of public access restrictions around release pens should be used - two to four miles; the radius should be on a case by case basis, not specified in the rule.

**Response:** No basis for the larger area suggestion is evident now, but if such a change proved necessary the FWS could propose to amend the experimental population rule to increase the radius.

**Other Comments on Alternative A**

**Comment:** While Alternative C is preferable, Alternative A is more realistic.

**Response:** Comment acknowledged.

**Comment:** Reintroduction into the second recovery area is necessary and feasible.

**Response:** The term “necessary” is used in the context of achieving the reestablishment objective of 100 wolves; and the term “feasible” relates to potential future management and biological constraints. Therefore, it is premature to determine if the use of a second recovery area is necessary or feasible.

**Comment:** How long would the population be managed as experimental?

**Response:** Until the Mexican wolf is taken off the endangered species list and management authority is returned to the states.

**Comment:** On the criteria to be used to decide whether to use both areas, the amount of funding and size of the staff are the most important. “What would occur if the project was not fully funded before and during the reintroduction? Are all funds government funds?” (44)

**Response:** The reintroduction project would not commence without adequate funding. The use of non-federal funds to supplement federal appropriations would be consistent with the current Administration’s policies regarding partnership approaches to achieving conservation objectives. Such an approach was used to partially fund the second reintroduction of wolves into Central Idaho and Yellowstone National Park. It is impossible to predict the FWS’s response to a funding shortfall sometime during the reintroduction project. It would depend upon the magnitude of the fund shortfall and the degree of progress made toward the wolf re-establishment objective. The responses could range from terminating the project and recapturing all reintroduced wolves to allowing wolves to remain in the recovery areas with some degree of monitoring.

**Comment:** Feral dogs present a depredation problem, especially near Whiteriver, AZ.

**Response:** Acknowledged; however, the Whiteriver area is not within the designated BRWRA.

**DEIS Alternative B:** Based on specific decision criteria, reintroduction of wolves, classified as nonessential experimental, into the White Sands Wolf Recovery Area or the Blue Range Wolf Recovery Area, followed by a second reintroduction into the other area if necessary and feasible. Wolf dispersal from the primary recovery zones will be prevented.

**Comments Favoring Alternative B**

**Comment:** “I would prefer to see the Mexican wolf confined to remote areas for at least 10-15 years before being allowed to range into areas of active hunting and recreation” (3).

**Response:** No areas exist where hunting and recreational activities are totally absent. The WSWRA
primary recovery zone does have limited hunting activity and the BRWRA primary recovery zone has both hunting and recreation.

**Comment:** This alternative is preferable because it is least costly and has the lowest overall impact on livestock and wild prey.

**Response:** We agree Alt. B has the lowest impact of the reintroduction alternatives. It is least costly overall, but on a per-wolf recovered basis it is more expensive than Alternatives A and C and it does not achieve the Recovery Plan goals.

**Comment:** “The intensity of wolf management required by the FWS is highest which would provide greater knowledge to the agency on issues evolving from wolf reintroduction.” (3,556)

**Response:** We understand the point but believe that the high level of wolf recapturing and translocation under this alternative would be disruptive to the wolves and the intensity of management would probably not provide much information that would serve the Mexican Wolf Recovery Plan goal of re-establishing an independently viable population.

**Comment:** “This plan seems to be the most viable for the next five years.” (116) This alternative allows evaluation to determine whether additional expansion of the wolf population is appropriate.

**Response:** Comment acknowledged. Alternative A also includes annual evaluation with a full review after three and five years.

**Criticisms of Alternative B**

**Comment:** The limited wolf recovery area boundaries are objectionable and the areas are too small. “The prevention of natural expansion goes against the notion of establishing natural populations.” (6)

**Response:** Comments acknowledged.

**Comment:** The projected wolf numbers are too low and don’t meet the 1982 Recovery Plan goals; the low population could be easily extirpated. The high projected mortality rate is objectionable.

**Response:** Comment acknowledged.

**Comment:** It will be impossible to confine the wolves to the primary recovery zones. It is not feasible to recapture and return wolves and it is too costly.

**Response:** We believe this could be accomplished with adequate staffing and resources, but there would be many instances of wolves ranging beyond the primary recovery zones for a period of time until they were recaptured.

**Comment:** The wolf should stay or the “endangered” list.

**Response:** The legal protections afforded under the proposed experimental population rule are considered adequate. Except for narrowly defined exceptions, killing of the wolves would be a violation of the ESA and subject the offenders to severe penalties.

**Comment:** The land use restrictions are inadequate.

**Response:** In other areas of gray wolf recovery, e.g., Montana, Minnesota, and Wisconsin, land use restrictions have proven almost entirely unnecessary for wolf recovery and such restrictions are counterproductive unless they are clearly needed.

**Comment:** “It represents a job half done and will contribute to long term conflict in our communities as these issues remain unsettled.” (18)

**Response:** Comment acknowledged.

**Suggested Alternative B Modifications**

**Comment:** Blue Range reintroduction should occur first, followed by the White Sands if the wolves are doing well.

**Response:** We believe that reintroduction must occur on both areas for this alternative to contribute substantially to Mexican wolf recovery. Reintroductions could occur on both areas simultaneously. However, this is not the Preferred Alternative.

**Comment:** White Sands is too barren and inadequate to support many wolves and should not be presented as a stand alone option.
Response: Large areas within the WSWRA, especially in the San Andres and Oscura Mountains, are not barren. Studies have determined that habitats on WSMR could support about 20 wolves. We are not presenting the WSWRA as a stand alone option in any of the alternatives.

Comment: If Alternative B is successful, then expand it to Alternative A.

Response: Opportunities to assess the success of Mexican wolf reintroduction are similar between Alternatives A and B. If the reintroduction is initiated under Alternative A, there would be no need to expand the effort. In addition, opportunities to terminate the project are similar between the two alternatives, if the initial reintroduction is unsuccessful. We see no clear advantage to phasing the project as suggested.

DEIS Alternative C: Based on specific decision criteria, reintroduction of wolves, classified as endangered, into the White Sands Wolf Recovery Area or the Blue Range Wolf Recovery Area, followed by a second reintroduction into the other area if necessary and feasible. Wolves will receive full protection under the Endangered Species Act.

Comments Favoring Alternative C

Comment: The low level of control and allowing natural dispersal are good. Limiting the amount of management and handling of wolves will be good for the social structure and wildness of the wolves; their propensity to depredate may be less with this more natural approach.

Response: Management and handling are considered necessary for successful wolf recovery and have not been shown in other areas to substantially affect social structure, “wildness,” or depredation rates.

Comment: The wolf numbers and the speed of recovery are good.

Response: Comment acknowledged.

Comment: The grazing restrictions will reduce wolf/rancher conflicts.

Response: We believe that restrictions on grazing under the full-endangered alternative could increase rather than reduce such conflicts. Rather than imposing such restrictions, wolf recovery can be accomplished through extensive information and education efforts and effective response to reports of depredation.

Comment: The potential land use restrictions under Alternative C as far as reducing grazing if it conflicts with wolf recovery are good measures in themselves and should be supported regardless of whether wolf recovery occurs.

Response: We do not see the Mexican wolf recovery program as an appropriate vehicle for imposing grazing reductions or other land use restrictions that are not strictly necessary to accomplish wolf recovery.

Comment: Wolves are the best judges of what is suitable wolf habitat. It is not feasible to recapture and return wolves under Alternatives A and B.

Response: Humans have to play a major role in deciding what is suitable wolf habitat from a human perspective because some areas the wolves may choose, e.g. next to a private sheep operation, are likely to increase conflicts with humans. We believe it is appropriate to trap and translocate wolves in these sorts of circumstances.

Comment: These captive-raised wolves will need full protection as they re-adjust to the wild.

Response: The first animals reintroduced from captivity would most likely show some “un-wild” behaviors and therefore would be most in need of management, rather than a mostly hands-off approach as required under full-ESA protection.

Comment: This is the most cost-effective alternative.

Response: Comment acknowledged.

Comment: Full ESA protection is important in view of state/local legislation against reintroduction.

Response: Under the experimental nonessential approach, the FWS would adopt a federal regulation...
known as the Mexican Wolf Experimental Population Rule (Appendix C). This regulation and the other applicable provisions of the ESA would preempt conflicting local/state legislation.

Comment: The federal government should keep this level of “endangered” protection.

Response: As with the Yellowstone and central Idaho reintroductions, we believe full-endangered status reduces management flexibility compared to experimental nonessential

Comment: This alternative means less illegal killing will result.

Response: This is very difficult to predict, but more illegal killing may result if greater resentment against the wolf results from the higher level of protection.

Comment: C is better than A and B because it will not be possible to distinguish “nonessential experimental” wolves from wild wolves; this alternative will facilitate natural recolonization as well as reintroduction with the least harassment of the wolves.

Response: Under Alt.s A and B, any wolf that is found within the large experimental population area will be subject to management under the experimental population rule, i.e., there will not be two types of wolves in that area. The likelihood of breeding populations of wild wolves appearing in the designated recovery areas appears extremely low, but the FWS likely would continue to research and support this possibility regardless of which alternative is chosen.

Criticisms of Alternative C

Comment: This alternative is not politically feasible. “I do not believe this plan will work because I believe it will receive too much opposition from ranchers and land owners who live nearby.....it is important to appease their views as much as possible while still ensuring the successful release of wolves into the wild.” (14)

Response: Comment acknowledged.

Comment: This alternative allows the FWS much less management flexibility, for example, in addressing wolf impacts on its prey species.

Response: We agree.

Comment: This alternative could be the most expensive in the long run because the FWS may need to do a lot more to protect wolves from rural people who don’t have recourse to protect their livestock.

Response: We recognize this possibility; the cost estimates are approximations and we feel the lack of flexibility under Alt. C could drive costs higher eventually.

Comment: “Wolves that leave the dispersal areas would likely get killed.” (397)

Response: We agree that this could occur, but are not sure whether there would be more illegal killing under this alternative, in or out of the designated recovery areas.

Suggested Alternative C Modifications

Comment: Both recovery areas should be used.

Response: Wolf dispersal would be unrestricted under this alternative. Wolves would eventually discover and occupy suitable habitats in the region. Additional reintroductions would significantly increase project costs.

Comment: The Blue Range Wolf Recovery Area should be definitely identified as the first area to be used.

Response: Alternative C has been revised and the BRWRA has been identified as the only area for wolf reintroduction.

Comment: The recovery areas should be expanded in the future.

Response: This would not be necessary under Alternative C because there would be no definite boundaries on where the wolves could disperse to under this alternative. The main significance of the recovery areas
under this alternative is just to designate where the wolves would be initially released.

Comment: Wolves should also be reintroduced under this alternative into Big Bend National Park.

Response: The capacity of this area to support wolves is unknown, but it is apparent that it, alone, could not support a viable population of wolves. It is close to Mexico where the wolves could disperse beyond U.S. protections. We consider Big Bend National Park to be an inappropriate place to try to reintroduce a viable population without first securing the cooperation of Mexico and then conducting a detailed feasibility study.

Comment: It should include recapture and return to recovery areas.

Response: Then the alternative would be much more like Alternative A. The problem is that, except for cases of depredation or threats to human safety, the routine recapture and return of the animals would be inconsistent with their full-endangered status.

Comment: The alternative needs to more clearly call for land use restrictions and elimination of predator control devices in the wolf recovery areas.

Response: We believe that under this alternative these sorts of restriction would more likely be imposed, but the actual imposition would be pursuant to consultations under section 7 of the ESA and cannot be predetermined exactly here.

Comment: “Could some hybrid ruling/alternative be proposed, i.e., wolves are endangered within the primary recovery zones and nonessential/experimental beyond?” (46)

Response: This is an interesting idea but seems to conflict with the guidelines for establishing experimental populations and would be confusing in implementation.

Comment: This alternative should be implemented first and then a transition made to experimental nonessential if the population becomes established.

Response: We believe that the success or failure of efforts to recover the Mexican wolf depends more on the level of rural public acceptance than the classification (experimental vs. endangered) of the re-established population. It is not clear that recovery would be more successful if wolves were reintroduced with endangered species status.

Comment: This alternative should be used but with allowance for ranchers to shoot wolves in the act of killing livestock.

Response: This would conflict with ESA full endangered status.

Comment: This alternative should be used if taking of wolves becomes too much of a problem under Alt. A.

Response: Law enforcement against illegal killing would be expected to be just as vigorous under Ah. A as under Alt. C. The main difference in terms of legal killing of wolves by private parties under Alt. A is for cases of actual observed depredation by wolves on livestock. If legal killing of livestock-taking wolves is so excessive as to prevent wolf recovery, then it may not be feasible to recover Mexican wolves in areas that have livestock.

Other Comments on Alternative C

Comment: On page 4-39, what is meant by “limited control of wolves that kill livestock” under full ESA protection?

Response: As stated on page 2-34 of the DEIS under Mitigation Measures for Alternative C, individual depredating full-endangered wolves could be controlled only pursuant to a permit so long as the action enhanced the subspecies’ survival, 16 USC sec. 1539(a)(1)(A).

Comment: “If history is any indication, the potential for man-wolf conflicts will be no greater under this option versus options A and B.” (94)
Response: We believe the nonessential experimental approach does offer more flexibility to address and reduce these conflicts.

DEIS Alternative D: No action/natural recolonization.

Comments Favoring Alternative D

Comment: Reintroduction will not work and is not justified, so No Action is the best approach.

Response: Comment acknowledged.

Comment: “I believe this is the best plan because: a. The wolves would truly be wild, b. These wolves already know how to survive, c. This is less interference with the wolves, d. The cost is less, e. The wolves’ fear of man is already instilled.” (41)

Response: We generally agree that these are favorable attributes to have in wolves; the problem is the lack of evidence that Mexican wolves still exist in any numbers and could actually come back on their own.

Comment: Money would be better spent researching the wolves’ continued existence in Mexico rather than reintroducing them.

Response: Field surveys to determine the status of Mexican wolves in the wild in Mexico were conducted in 1994 and 1995. No confirmed evidence of the existence of wild wolves was found. Similar surveys will continue in 1996. If populations of wild Mexican wolves large enough to cause the recolonization of historic wolf habitats in the United States existed in Mexico, we believe that considerably more evidence of their existence would be apparent.

Criticisms of Alternative D

Comment: Even if it does occur, natural recolonization will be too slow to ensure Mexican wolf recovery. There is no confirmation that a wild population exists, let alone evidence of recolonization; this approach ignores the FWS’s duty to recover the subspecies. “It is critical to proceed with reintroduction now.” (18)

Response: We generally agree.

Comment: Choosing this alternative increases the likelihood of illegal wolf releases by radical pro wolf activists.

Response: Comment acknowledged.

Comment: “The captive breeding program is largely wasted if wolves can’t be reintroduced.” (550)

Response: If reintroduction did not occur, the program would preserve the Mexican wolf for public viewing and education in zoos and wildlife parks.

Comment: Big Bend National Park lacks prey to support a wolf population.

Response: Our preliminary, somewhat cursory, analysis indicates the Park could probably only support about one family group of wolves, or about five animals, which would not be independently viable.

Comment: “I don’t really like the threat of land use control proposed in Alternative D.” (683)

Response: We believe that if wolves recovered naturally these sorts of restrictions would more likely be imposed, but the actual imposition would be pursuant to consultations under section 7 of the ESA and cannot be predetermined exactly here.

Comment: This Alternative poses many threats to ranchers, including that they may not be able to tell an “endangered” wolf from a free-ranging hybrid wolf.

Response: If Mexican wolves recolonize areas in the U.S. naturally, thus retaining their endangered status, the commenter’s concern may become a problem. However, we believe it is very unlikely that natural recolonization of Mexican wolf populations will occur.

Comment: How can doing no releases be so expensive?

Response: We agree that this is confusing. Of course, if the Mexican Wolf Recovery Program was terminated...
nated entirely, there would be no program costs. In response to public concern, we have revised Alternative D to more clearly separate the natural colonization scenario from the status quo scenario. Project costs are presented both with and without the occurrence of natural recolonization. See changes in Appendix B and Table 2-8.

**Comment:** This is a waste of tax dollars, to have a Mexican Wolf Recovery Program that does not reintroduce wolves.

**Response:** Comment acknowledged.

**Comment:** “If the wolves didn’t come back on their own, then you would need to start the reintroduction meetings again and how long would that take?” (26)

**Response:** If, say, we were to wait five years and then re-propose a reintroduction, we would need to re-initiate the NEPA scoping and EIS process, which would probably take at least another two years to get to a Record of Decision.

**Suggested Alternative D Modifications**

**Comment:** The alternative needs to more clearly call for land use restrictions and elimination of predator control devices and other steps should be taken in order to facilitate natural recolonization.

**Response:** Restrictions on USDA Animal Damage Control (ADC) activities must be based on reported presence of wolves in the area. Based upon past sighting reports (which remain unconfirmed) and historically heavy wolf use, such restrictions are in place only for Hidalgo County, NM, south of State Route 9. These restrictions are under review by the FWS. Given the lack of evidence of wolf presence, the FWS considers additional restrictions inappropriate.

Comment: This alternative should more clearly call for “No Action” and not encourage natural recolonization.

**Response:** The no action alternative means no change from the status quo which has been to monitor and support the idea of natural recolonization. However, in recognition of the lack of clarity about the no action/natural recolonization alternative we have dropped “natural recolonization” from the name and tried to clarify the description in Chap. 2.

**Other Comments on Alternative D**

**Comment:** The sighting of wolves does not mean the establishment of packs.

**Response:** Agreed. Before the FWS considered an area to have “population” of wolves, there would have to be at least two breeding pairs of wild wolves successfully raising young each year for two consecutive years (see definition under Appendix G.)

**Comment:** Natural recolonization should be supported in the identified areas even if reintroduction takes place in the other areas designated for reintroduction.

**Response:** We agree and likely would continue to research and support possible natural recolonization even if reintroductions are underway elsewhere.

**Additional Alternative Suggestions**

**Comment:** Wolves should be released as experimental essential.

**Response:** This is not addressed because the FWS determined that the nonessential experimental classification fits the Mexican wolf’s status. Only wolves surplus to the captive breeding program will be released. (See Appendix C - Proposed Mexican Wolf Experimental Population Rule, section on Findings Regarding Reintroduction, and Appendix D - Section 7 Consultation on Proposed Action, section on Effects on Mexican Gray Wolf, regarding definition of “surplus” wolves and significance of their removal from the captive population.) Their loss would not jeopardize the continued survival of the subspecies. Further, the nonessential experimental classification allows for management flexibility deemed vital to successful wolf recovery (USFWS 1993a). We disagree with the argument that experiment essential status is legally required for the Mexican wolf. This is essentially an argument that any reintroduction of a captive population, when no wild population already exists, must be
essential rather than nonessential. This is not required by ESA section 1 O(j) or the implementing regulations and it accords neither with past reintroduction practice in the case of the red wolf and black-footed ferret, nor with currently proposed reintroductions of captive animals.

**Comment:** “At least a third recovery area needs to be established (Animas/Peloncillo area?) to insure viability of the species.” (28)

**Response:** It is possible that additional recovery areas could be identified in future phases of Mexican Wolf recovery efforts but no other areas are under consideration now.

**Comment:** Wolves should be released in: Big Bend National Park; Utah; Colorado; northern New Mexico; the bottom of the Grand Canyon; western Arizona; the Buenos Aires National Wildlife Refuge; Albuquerque; Joshua Tree National Park.

**Response:** These are outside Mexican wolf historic range or otherwise unsuitable.

**Comment:** “We support the No Action/Stop Wolf Welfare Alternative. This Alternative is defined as follows: 1. There will be no release of captive-raised (or wild) wolves. 2. No action shall be taken to ensure Mexican wolf recovery. 3. Terminate immediately all public (taxpayer) funding of the captive Mexican wolf program, all associated studies and or/other expenditures” (152 et al., form letter)

**Response:** Alternative D incorporates points 1. and 2. Additional analysis of point 3. appears unnecessary. The only additional impact of point 3. beyond Alternative D would be to eliminate all program costs, which have been revised and reduced for Alternative D in the FEIS. Also, the captive breeding program could be harmed by the lack of federal involvement and support.

**Comment:** “Wolves, if they are to be introduced at all, should only be established in remote areas out of range of domestic herds and flocks.” (584)

**Response:** Other than the WSWRA, no large livestock-free areas exist in the wolf’s historic range in the Southwest that are suitable for reintroduction.

**Comment:** “Ship all the wolves to Mexico for re-establishment in Durango and Chihuahua, whence their ancestors came. Let the Mexicans worry about the re-establishment program and any conflicts or problems which may arise. If the program is successful, by the time the wolves migrate back to the U.S. they will no longer be an endangered species, and we will be able to take appropriate action to control them again.” (62 1)

**Response:** If Mexico expressed interest in reintroducing wolves surplus wolves might be made available. The rest of the suggestion is beyond the authority of U.S. agencies. In the long run, though, full recovery of the subspecies likely will require recovery efforts in Mexico.

**Comment:** They should only be released in fully fenced and carefully monitored areas.

**Response:** This is impractical, extremely expensive, and would not achieve the goal of restoring viable wild populations.

**Comment:** “On April 15, 1994, a reasonable alternative was submitted...by [Applied Ecosystem Management] to the FWS for consideration as part of this DEIS. To date, there has been no mention whatsoever of this alternative in any FWS documents nor was any explanation given as to why this alternative has been dropped from consideration.” (3,263)

**Response:** The suggested alternative was not “dropped”; it was treated as one firm’s suggestion well after the alternatives scoping period was over. We did fully consider the AEM suggestion, which was in some ways comparable to Alternative C. In addition to a lengthy meeting between AEM and Mexican wolf recovery staff, the FWS Regional Director, John Rogers, explained the FWS’s response to the AEM suggestion by letter dated Aug. 18, 1994 to Pete Shumway, Chair of the Eastern Arizona Counties Organization (cc’d to AEM).
Comments on Issues

The NEPA Process and Public Involvement

Comment: The decisions about wolf recovery should be based on science and not politics or emotion.

Response: We think this is what the NEPA process is largely designed to achieve.

Comment: “[Wolf hearings] are held as lip service to the ruse that there is public input into the fish and wildlife issues. That way, if something goes wrong it can be blamed on the public.” (547)

Response: The meetings and hearings are an important part of the public comment process, which is critical under NEPA and has resulted in many changes to the DEIS.

Comment: Because the captive management facility is already under construction at the Sevilleta National Wildlife Refuge, the hearing and public comment process is a waste. “This is a strong indicator that the plan will be implemented regardless of hearings and/or comments.” (590)

Response: The facility at Sevilleta NWR is necessary to provide additional space for captive Mexican wolves, not currently available in zoos and wildlife parks. Building the facility is not a commitment to reintroduction. Even if the decision is not to reintroduce animals at this time, the facility would house a valuable population of Mexican wolves that is not subjected to the stresses and selective pressures of a human-dominated environment.

Comment: The stipulated settlement agreement in the Wolf Action Group lawsuit legally committed the FWS to reintroducing wolves, so the entire public comment process has been a sham.

Response: The settlement agreement did not commit the FWS to reintroducing wolves; it committed the FWS to completing the planning and environmental impact assessment processes, which may or may not result in a final decision to reintroduce.

Comment: Formal hearings should not have been held in Phoenix and Austin, but in smaller towns closer to the areas and people affected.

Response: A total of 17 meetings and hearings were held to receive public comment on the draft EIS. Eleven of the meetings and one hearing were held near proposed wolf recovery or potential natural recolonization areas. Hearings are expensive. We chose to hold only one per state in a centrally located city. Rural interests were well represented at all the hearings. We believe the distribution of meetings and hearings provided all concerned individuals and interest groups sufficient opportunity to obtain information and comment on the draft EIS.

Comment: There should be public meetings in all parts of the United States.

Response: To save expense and to keep the issues focussed, the FWS decided to only hold meetings in the affected areas. However, written comments were received from all over the country.

Comment: The open house meeting format was very helpful; organization was competent and impressive. “You have done a great job of letting all sides have their say.” (877)

Response: Thank you.

Comment: The open house meeting format was poorly organized.

Response: Comment acknowledged.

Comment: The public notice to affected members of the public about the availability of the DEIS was inadequate.
Response: We held four scoping meetings in 1991 and 1992, held 14 public open houses and 3 formal hearings in the affected areas, published notices in local newspapers as well as the federal register, issued press releases, maintained a 5,000 plus person mailing list to which regular status reports as well as DEIS summaries have been sent, met with various county commissions, met with private organizations and individuals, sent DEIS’s to hundreds of agencies, elected officials, organizations, and individuals, distributed DEIS copies in public libraries, and took other steps to communicate about the Mexican wolf reintroduction proposal. We have exceeded NEPA’s public notice requirements and we plan to continue to provide public notice through the final decision and beyond.

General Comments on the DEIS

Comment: The DEIS was done well. It is comprehensive, informative, and readable. Adequate and fair consideration has been given to the ecological, economic and social impacts of the Proposed Action.

Response: Thank you.

Comment: The DEIS is conclusory; contradictory; speculative; scientifically indefensible; unsupported; thoroughly pro-wolf. “There are many portions of the DEIS that lack the detailed information necessary to make an intelligent decision concerning wolf reintroduction that will be subject to political or value judgments and not scientific evaluation..... Such ‘uncertainty’, ‘incomplete information’, and ‘uncertain future trends’ falls short of the requirements in the ESA.” (906)

Response: We believe the DEIS, with the changes and corrections made as a result of the comments received, will lead to a sufficiently detailed, and analytical, FEIS to allow a rational decision. The FEIS is based on the best available information. At the same time, we believe good analysis includes pointing out uncertainties and information gaps where they exist. Projecting future impacts obviously involves uncertainty; we doubt that any wild animal recovery project could proceed under the ESA if complete certainty was required.

Comment: “The review of existing literature in compiling the DEIS was inadequate...the DEIS is a product of selective research aimed at justifying a pre-ordained conclusion.” (2,996)

Response: We reviewed every piece of literature that appeared relevant to Mexican wolf recovery and its impacts, not all of which was deemed useful for projecting impacts and not all of which is cited in the Literature Cited Appendix. The FEIS does include more discussion of the historical literature than the DEIS. The conclusion of the NEPA process is not pre-ordained.

Comment: “The draft environmental statement is calculated to minimize the effect of wolf reintroduction by emphasizing the experimental designation of the initial introduction. Once the introduction has succeeded, the experimental classification will be dropped and the full impact of the cost of protecting this species will be felt by the ranchers, hunters, rural communities, the State of New Mexico, and the taxpayers of the United States in general.” (3,400A)

Response: There is no plan to drop the experimental classification until the Mexican wolf subspecies is removed from ESA protection and management reverts to the states; this likely would not occur for several decades.

Comment: Impacts on humans should be considered when considering impacts on the environment.

Response: Socio-economic impacts and impacts on the built environment are required to be considered under NEPA and are considered in the EIS.

Comment: The first pages of Chap. 1 give the mis-impression that wolves will be recovered throughout the entire historic range.

Response: This has been corrected to clearly state that this proposal will only occur in a portion of the animal’s historic range in the United States.

Comment: Chapter 4 will be misleading to decisionmakers and the public because it over-emphasizes negative economic impacts. This favors preservation of the status quo.
**Response:** We acknowledge the DEIS focuses more on the quantified adverse impacts, such as lost hunting days due to reduced herd size, than on potential positive impacts like increased recreation that are very difficult to project quantitatively. We believe we have adequately pointed out the potential positive impacts. The EIS is not intended as a cost-benefit analysis. Key qualitative issues are to be considered by FWS and the Department of Interior, including the goals of the ESA.

**Comment:** “Chapter 4, though technical, provides a wealth of good information as to the sources of the predictions for the impacts that reintroduced wolves will have on the prey and predator populations...The assumptions were quite generous when calculating worst case scenarios. Thus, my confidence in this document for presenting the full range of impact possibilities is quite high.” (3,2 17)

**Response:** The “high range” scenarios for the impacts are not technically “worst case scenarios.” Similarly, the “low range” projections are not technically “best case.” The ranges are the most reasonable estimates of the bounds on the actual impacts that will occur based on a variety of sources, including actual observations of impacts from other areas where wolves occur, expert surveys, and computer modelling.

**Comment:** The livestock impact focus is too much on cattle and not enough on other large and small livestock.

**Response:** The EIS does mention the potential for wolves to take other livestock, but we lack the means to make a quantitative projection. Only one sheep allotment exists within the BRWRA and no privately-owned sheep are in the WSWRA. Thus, while some sheep may be taken by wolves, the numbers should be small. Poultry and smaller livestock may be taken opportunistically by wolves, but the numbers should not be high due to the normal care taken to protect them from all kinds of predators.

**Comment:** “We are also concerned about the direct conflict of interest of those writing the DEIS. The conflict of interest arises from the fact that those who write the EIS’s for endangered species, choose the alternatives, conduct and edit the science, edit the comments and make all the decisions, are the same ones who benefit directly from their own contrived determinations.” (2,000)

**Response:** We acknowledge there may be some appearance of conflict inherent in the process. That is why we have extensive public and agency review and opportunities for judicial review.

**Comments on Policy and Laws**

**Comment:** The discussion of the Convention on Biological Diversity in Chap. 1 does not support wolf reintroduction because the U.S. is not a party to the Convention in that the Senate has not ratified it.

**Response:** We did point out that the U.S. is not a party to the Convention. We think this international law does help put the restoration of endangered species into a global perspective.

**Comment:** “The Mexican wolf reintroduction demonstrates the viability of [the ESA and other environmental laws] and their capacity to be fairly and effectively implemented.” (39)

**Response:** Comment acknowledged.

**Comment:** Reintroducing the Mexican wolf will just give the anti-ESA people more ammunition and put the Arizona Game and Fish Department in a more difficult position with its conservative legislature. Wildlife protection will be hurt in the long run.

**Response:** These political concerns are beyond the scope of this EIS process.

**Endangered Species Act, the Mexican Wolf Recovery Plan, Endangered Status, and Experimental Nonessential Designation**

**Comment:** Wolves should be released as experimental essential.

**Response:** See response to this comment above under Additional Alternatives Suggestions.

**Comment:** “The finding of whether the wolf experimental population is, or is not, essential to the
continued existence of the species in the wild must be made by rule making and not by an EIS.” (3,263)

Response: We have determined that the Mexican wolf, if released, should be classified as experimental nonessential. (See response to previous comment.) This determination appears in the Proposed Mexican Wolf Experimental Population Rule (Appendix C), which would be formalized and finalized in a final rule prior to experimental reintroduction of wolves.

Comment: Designation of the Mexican wolf as nonessential means that it is not endangered, therefore there is no reason to reintroduce it.

Response: The “experimental nonessential” terminology in section 10(j) of the ESA is confusing. It does not mean that the animal is not near extinction and it does not mean the reintroduction is just an experiment. It is a classification designed to make the reintroduction of endangered species more flexible and responsive to public concerns to improve the likelihood of success.

Comment: The experimental nonessential designation cannot legally be used because the reintroduced population would not be “wholly separate geographically from nonexperimental populations of the same populations.”

Response: We disagree; see comments and responses under Continuing Existence of Wild Mexican Wolves, below.

Comment: “The Mexican wolf is clearly a subspecies and hence does not qualify for listing, let alone reintroduction.” (34)

Response: The ESA allows the listing and recovery of subspecies.

Comment: The gray wolf is not endangered or near extinction, it is doing fine in zoos as well as in Canada and Alaska; there are no gray wolf subspecies; the gray wolf should be de-listed, and not reintroduced.

Response: This approach would conflict with scientific information on North American Canis lupus subspecies and with the FWS’s obligations under the ESA.

Comment: The DEIS is unclear on what number of wolves is necessary for de-listing and on what the FWS’s long-range plans for wolf recovery are. The recovery area goals are clearly inadequate to establish viable populations. “If it is anticipated that another population will need to be established for recovery purposes, this should be stated, along with an explanation as to why establishment of such a population was not addressed in this plan.” (3,368)

Response: Preliminary population viability assessments, using the simulation model VORTEX, predict that a population of 100 Mexican wolves in the BRWRA would have a high probability of surviving for 100 years. Modern principles of conservation biology suggest that multiple populations of the same species provide greater survival assurance than single populations. The original Mexican Wolf Recovery Team recognized that the re-establishment of one population of 100 wolves in the wild would not be sufficient to remove the subspecies from ESA protection. The current Mexican Wolf Recovery Team is revising the population objectives for achieving recovery through the application of conservation biology principles. This EIS covers only the initial reintroduction of Mexican wolves to the wild; future reintroductions are neither assured nor foreclosed. However, any future reintroductions would require separate analysis under the National Environmental Policy Act (NEPA).

Comment: “At least five populations with a minimum total population of 500 wolves should be the criteria for genetic and population sustainability before delisting.” (28)

Response: See above response.

Comment: “Since the FWS is mandated by the ESA to protect all threatened or endangered species, how can the agency state that the re-introduction of the Mexican Gray Wolf will not force the agency to enforce sections 7 & 9 of the ESA once populations begin to increase?” (906)

Response: A nonessential, experimental population of a threatened or endangered species, established under provisions of section 10(j) of the ESA is granted limited exceptions to the provisions of sections 7 and 9 of the ESA. For example, formal
consultation with the FWS is not required for Federal actions that may affect such populations occurring outside the National Wildlife Refuge System or the National Park System. An informal “conference” is required. However, section 7(a)(1) remains in full effect, requiring all Federal agencies to further the purposes of the ESA. Limited exceptions for allowable take of members of the nonessential, experimental population are defined in a special rule for the population. The FWS must find that the level of take allowed will not preclude the conservation of the species. Any take that is not authorized by the special rule is in violation of section 9, and the violator is subject to prosecution for taking an endangered species. Thus, nonessential, experimental populations retain substantial protection under the ESA. This fact is commonly misunderstood.

**Mexican Wolf Taxonomy and Historic Range**

**Comment:** The ESA requires the FWS to use the best science available, yet the FWS dismisses the disagreement among wolf taxonomists and the conclusions of experts that the Mexican wolf is indistinct from two other subspecies. The 1982 Mexican Wolf Recovery Plan taxonomic discussion is clearly not the best science available.

**Response:** The EIS acknowledges the disagreements among wolf taxonomists and the conclusion of some experts that the Mexican wolf is indistinct from two other formerly recognized subspecies. The discussion on taxonomy in chapter 1 incorporates new information that has come to light since publication of the 1982 Mexican Wolf Recovery Plan and it incorporates current expert thought on the taxonomic status of the Mexican wolf.

**Comment:** If the extent of the range is uncertain this should be indicated on the range maps with dashed lines.

**Response:** We agree. See the revised discussion of historic distribution of Mexican wolves and the revised range map in chapter 1 of the FEIS.

**Continuing Existence of Wild Mexican Wolves**

**NOTE:** See extensive separate FWS response to comment submitted by Mr. Dennis Parker on this topic in Appendix K.

**Comment:** The FWS has large numbers of wolf sightings from in or near the proposed wolf recovery areas (e.g., Wolok 1994), thus the requirements of geographical separation of experimental and nonexperimental populations would be violated.

**Response:** Neither Wolok nor any other researcher has confirmed the existence of wild Mexican wolves anywhere. The FWS has undertaken directly, or financially supported, investigation into this issue, without any confirmed reports. “Probable” reports in Wolok and other research are not confirmed, could well be released hybrids or other animals, are very sporadic, generally do not come from the proposed recovery areas, and offer no support for the idea that wolves are in the process of naturally recolonizing these areas. Even if there were confirmed wolf reports in these areas, there would have to be a “population” of wolves in the area before the FWS would consider an experimental introduction to be barred. See definition of population in the Glossary, Appendix G.

**Comment:** What efforts are being undertaken to find remaining wolves in Mexico? Doesn’t trying to conserve wild wolves there make more sense than reintroducing captive-raised animals?

**Response:** Surveys are underway to determine the status of the Mexican wolf in the wild in Mexico. The existence of wild wolves has not been confirmed. Surveys will continue for at least one more year. While protected by law, wild wolves in Mexico, if they exist, receive little actual protection. If a viable population of wild wolves were discovered in Mexico, it would make good sense to make strong efforts to protect that population. Even if this scenario occurs, it may still make good sense to further secure wolf recovery by reintroducing captive raised Mexican wolves in the U.S.

**Comment:** The fact the FWS failed to cite Dr. Julio Carrera’s 1994 report on his wolf investigations in Mexico is evidence the FWS is covering up the fact that he has found wolves there.
Response: Carrera has not confirmed wolves to exist in Mexico. His report was not cited as it was not in hand when the pertinent sections of the DEIS, Chap. 1 (Status) and Chap. 3 (Alternative D), were drafted; he was cited in those sections by personal communication. His written report is cited in the FEIS.

Comment: “What would happen if the reintroduction efforts were underway and natural wolf recolonization was determined to have occurred in SW New Mexico or SE Arizona? Would this halt the reintroduction process? This does not seem to be explicitly addressed in the DEIS?” (46)

Response: It would not necessarily halt the reintroduction process. As stated on pages 2-15 and 2-16 of the DEIS in the description of the Proposed Action, if natural recolonization of Mexican wolves were to occur anywhere in the U.S., this would be an important factor in deciding whether future reintroductions would be necessary to achieve the recovery goal of 100 animals ranging across 5,000 mi².

Comment: “The possible existence of wolves already living in the wild in Mexico would mean that a reintroduced captive, genetically different population would possibly be mingled with wild wolves, which is contrary to the prescribed process.” (584)

Response: They would not be mingled if they are so far separated as to have no interaction. If there are wolves in Mexico, it does not conflict with the ESA if this sort of co-mingling occurs; in fact, it would probably add favorable genetic diversity to both populations. The ESA’s concern with mingling is basically that experimental populations not be reintroduced in an area where a known wild, full-endangered, population exists. This is not the case here.

Comment: “Fish and Wildlife [should] negotiate for a travel corridor through the Peloncillos, allowing safe passage of potential recolonizing wolves from Mexico into the Gila along historic wolf runways.” (Soc. p. 144)

Response: This is outside the scope of the proposal being considered in this EIS. Furthermore, the existence of a source population in Mexico has not been documented.

Comment: Wild Mexican wolves already live in the: Sacramento Mountains, Burro Mountains, Blue Range, West Texas, and other areas.

Response: Evidence of this is lacking.

Captive Population

NOTE: see extensive separate FWS response to comment submitted by Dennis Parker on this topic in Appendix K.

Comment: The captive breeding program is a waste of taxpayers’ money and should be terminated; the wolves should be sterilized.

Response: This approach would conflict with the FWS’s obligations under the ESA.

Comment: The wolves in captivity are not genetically pure Mexican wolves, they are inbred, hybrid, and they are unlikely to be viable in the wild, thus unlikely to further the conservation of the subspecies; there has been inadequate peer review of these issues.

Response: On all of these issues, the FWS has endeavored to obtain the best expert opinion available; we disagree with the comment. See Appendix K.

Comment: The Aragon and Ghost Ranch lineages are pure Mexican wolves and the EIS should reflect this.

Response: Agreed. The discussion in Chapter 1, Status has been modified to reflect the FWS’s recent determinations regarding these lineages.

Comment: “The Mexican wolf should not become a domesticated ‘dog’.” (880)

Response: Comment acknowledged; there is a concern that gradual domestication could occur if the animals remain in captivity for many generations.

Comment: “Since its confinement to captivity, the Mexican gray wolf has made a biologically remarkable recovery. Now the most endangered wolf in the world is at the doorstep to a long awaited future.” (1,074)
Response: Comment acknowledged; the captive population has grown steadily and is healthy overall.

Comment: “Make sure you do not deplete the breeding stock now in captivity.” (1,148) “The term ‘surplus’ is misleading and should be changed to avoid confusion.....The death of one Mexican wolf would represent the loss of one percent of the entire population... [This] does indeed represent a serious blow to the survival of the species.” (1,543)

Response: The pertinent text in Chapter 2 has been revised to further clarify that “surplus” wolves are surplus to the captive population, which may be the source of confusion. Surplus wolves have enough close relatives in the captive population to render them unimportant as future breeders and, therefore, potential candidates for reintroduction. Until reintroduction proves successful, the survival of the subspecies is ensured entirely by the maintenance of a genetically and demographically healthy captive population. Surplus wolves have no significant role to play in that regard.

Comment: Captive wolves are adapted to people and will seek them out if they are released and their behavior will be abnormal and cause the program to fail.

Response: Wild Mexican wolves would be preferable, but none are available. The wolves taken from the Sevilleta National Wildlife Refuge Captive Management Facility and other remote facilities will not be adapted to people in the way the zoo animals may be. Based on the red wolf reintroduction experience, we do expect some abnormal behavior in the animals released from captivity and are prepared to address it under the experimental population rule. Pups that are born in the wild should display more typical behaviors of wild wolves.

Comment: Part of the scientific justification of the reintroduction is to determine whether there has, in fact, been any deleterious effect on the wolves from years of captive existence.

Response: We agree that this will be an important question to study as part of the research and monitoring efforts, as it was in the similar red wolf case.

Mexican Wolf Life History, Ecology, and Disease Concerns

Comment: “Appendix A (and its referenced source in FWS 1994) (1) omits reference to the scientific literature, (2) draws inferences from northern populations which would better be represented as hypotheses regarding southern populations and (3) restates generalizations from the popular literature which do not clarify the existing scientific evidence regarding behavioral variation within wolf populations.” (3,656)

Response: Appendix A is an outline of Mexican wolf life history, ecology, and disease concerns and is not meant to be a comprehensive treatise on the subject. We have qualified the Introduction to emphasize the point that the wild Mexican wolf was not well-studied prior to its extirpation and that many of the assertions in Appendix A are based on studies of northern populations. There is little, if any, reliance on “popular literature” in Appendix A; while not all the references are to peer-reviewed literature, all of the references are to recognized experts or experienced investigators in the field.

Comment: “I can tell you that the larger wolves [in the Sierra Madre Mountains] in those days considerably exceeded the 90 lbs. top limit given in your report.” (373)

Response: It may be true that wild Mexican wolves grow larger than the weights indicated, but clear evidence is lacking.

Comment: “The Mexican wolf is a dangerous animal which kills just to be killing and does not stop until he kills all available.” (620)

Response: While surplus killing is occasionally documented in wolves it is considered rare. It has been found with very vulnerable domestic animals, like turkeys or sheep, and occasionally with yarded-up deer in snow conditions where the deer are unable to run quickly but enough crust exists to allow the wolves to run over the top of the snow.

Comment: Is hybridization of wolves with coyotes or dogs a risk as happened with the red wolf?
**Response:** In general, gray wolves demonstrate less evidence of past cross-breeding with coyotes than do red wolves. Hybridization between Mexican wolves and coyotes or dogs is biologically possible, but evidence suggesting that such cross-breeding frequently occurred in the wild is lacking. We consider this possibility a slight risk, but do not believe it will jeopardize recovery of the Mexican wolf. Monitoring of reintroduced wolves should detect situations where a wolf appears to be in a breeding situation with another canine species. If such a situation were to occur, efforts would be made to prevent the production of hybrid offspring.

**Comment:** “The wolf is a known carrier of rabies and could easily make a tremendous impact on the conditions of the ecosystem.” (ALA-5)

**Response:** As stated in Appendix A, the presence of a relatively small number of wolves should not significantly affect the incidence of rabies or other diseases in the recovery areas. Further, reports from the Lower 48 states of human death due to getting rabies from wolves have been exceedingly rare in recorded history (one case in Wyoming in 1833) (Johnson 1992).

**Release Techniques**

**Comment:** The suggested aversive conditioning techniques lack a record of success on wolves elsewhere.

**Response:** We are aware of the mixed results of various aversive conditioning techniques. The FWS will conduct an extensive review of the literature and obtain the opinions of appropriate experts before aversive conditioning techniques, if any, are attempted.

**Comment:** Explain what the typical battery life is for a telemetry collar, on p. 2-2.

**Response:** Battery life of standard telemetry collars used on wolves is typically 3 years or longer.

**Comment:** “If possible it may be wise to have a balanced representation of wolves from the several producing facilities in both the BRWRA and WSWRA . . . . since it may become obvious later on that wolves from some facilities have better survivability than do those from other facilities.” (845)

**Response:** To the maximum extent possible, wolves that are candidates for reintroduction would be moved to the FWS’s wolf management facility, or other designated facilities, at a young age to begin the acclimation process and selection for a future life in the wild. The suggested approach would be complicated by the fact that few wolves in the captive population spend their entire lives in one facility. Nevertheless, the idea merits consideration.

**Comment:** Your release locations and times should go unannounced, to give the wolves the best protection.

**Response:** The FWS will consider this suggestion when detailed release protocols are developed.

**Comment:** The FWS is proposing to release too many wolves in the early years. “If introduction is to be successful and the side effects be controlled you should slow the initial release so as to gain knowledge of the process and provide sufficient mitigation for the problems.” (1,787)

**Response:** Generally, the likelihood of success in animal reintroduction efforts is positively correlated with the number of animals released. Larger releases increase the chances of reproduction in the wild and provide a buffer against inevitable mortalities. Our numbers are comparable to the numbers the FWS released successfully in Yellowstone and Central Idaho.

**Wolf Recovery Areas**

**Comment:** The areas are too large and will tie up too much land.

**Response:** The largest area, the BRWRA, is estimated to be an appropriate size to support a sustainable wolf population of 100 animals. The WSWRA is too small to do so without active human management of the population. The designation of the areas carries no land use restrictions with it.

**Comment:** White Sands never was and never will be wolf habitat; it is subject to drought.
Response: The Animals section in the Chap. 3 description of the WSWRA includes historical documentation of wolves in the area. In Chap. 2, the section on Selection of Potential Areas for Releasing Mexican Wolves describes the favorable attributes the area possesses as future wolf habitat. Scattered natural springs are available in the area; however, we recognize that severe drought conditions could reduce the deer herd and water availability. In that case, wolf impacts on the deer population could be significant (see Chap. 4).

Comment: White Sands was chosen for political, rather than biological, reasons, which is in violation of the ESA.

Response: Biological assessments have documented its suitability to support wolves. These assessments are based upon the best available information. Of course, an aspect of the area that is attractive for biological, management, and political reasons is the fact that it is federal land with an absence of livestock.

Comment: “It is likely that the rugged eastern canyonlands of the San Andres Mountains [of the WSWRA] will be avoided by Mexican wolves. This means, contrary to what the DEIS indicates, that not all of the San Andres Mountains may be suitable wolf habitat. One ecologist suggested that free water sources in the desert may be a limiting factor, especially to lactating females.” (2,030)

Response: We recognize that not all of the San Andres will be suitable habitat. While there is little doubt that at some point slope, alone, would limit the suitability of a specific area for wolves, anecdotal evidence suggests wolves can hunt on terrain that would be considered by humans to be quite rugged. Whether this ability will be shown by Mexican wolves is unknown. Our estimates of the number of wolves that could be supported on the WSWRA were based to a large extent on estimates of mule deer populations. Generally, our evaluations incorporated the assumption that wolves would be limited by the availability of water indirectly through the availability of prey, which is limited somewhat by the availability of water. We do not expect extensive use of the desert areas, based on historical accounts.

Comment: “If the reintroductions are to occur, the White Sands area seems best because of the tighter control and lower cost of cattle killed.” (4) Also, fewer wolves would be illegally killed.

Response: White Sands would involve fewer conflicts and provide learning opportunities for both wolves and wolf managers. The chief concerns with this area are the potentially major impacts on the deer population and the fact that the area probably will not support an independently sustainable wolf population.

Comment: The wolves are not going to respect the BRWRA western boundary and will immediately disperse onto the San Carlos and White Mountain reservations.

Response: We recognize that this could occur. We would conduct the initial releases on the east side of the primary recovery zone and would seek to have a cooperative management agreement in place to allow removal of the wolves from tribal lands if the tribes desire their removal.

Comment: The primary recovery zone of the BRWRA should include the Gila and Aldo Leopold Wilderness areas.

Response: Primary recovery zones were established largely on the basis of recommendations received from the States. The ultimate objective of the proposal is for wolves to colonize areas they determine to be suitable throughout the designated wolf recovery areas. At that point, the location of initial releases becomes unimportant. Another consideration is the operational difficulties of conducting soft releases (with wolves in pens for long periods) in wilderness areas, where the use of motorized equipment is prohibited.

Comment: The ranking system used to select the Blue Range area lacked adequate investigation.

Response: This ranking was largely based on a detailed 1992 investigation and report by the Arizona Game and Fish Department (AGFD 1992). While such a ranking is inherently rough, we are confident that the Blue Range area is superior to the other three Arizona candidate areas.
Comment: The ranking system should have included “weighting factors that note an emphasis on the more important attributes.” (3,217)

Response: The use of weighting factors was considered, but found to be inappropriate because of difficulties in assigning weights and the desire to avoid a false sense of precision in the analysis. We believe that the method used resulted in an appropriate ranking of the areas.

Comment: The idea behind the Proposed Action as stated by the FWS in its 1992 Notice of Intent to Issue the EIS was to analyze the various classification alternatives with respect to all five areas then under consideration; this should have occurred.

Response: The FWS stated in the 1992 Notice that the five sites would be evaluated and considered in the scoping process and the results explained in the EIS as far as how the five were narrowed down. This is explained in summary in the section of Chap. 2 entitled Selection of Potential Areas for Releasing Mexican Wolves and in more detail in a separate paper (USFWS 1993e). The FWS did not commit to carrying all five through the EIS.

Comment: “There is no historical evidence that these areas was part of the wolf habitat prior to the settlement of these areas.” (562)

Response: The Chap. 3 discussion under “Animals – History of wolves” for each area includes historical documentation of wolves in the areas.

Comment: “Monitoring and protecting reintroduced wolves which roamed back and forth across the [Mexican] border would probably be impossibly difficult.” (584)

Response: This is one of the reasons that the designated wolf recovery areas are far north of the border. Under the Proposed Rule, wolves would likely be captured before they could disperse to Mexico.

Comment: The potential natural recolonization areas would be the best places for reintroduction.

Response: Not according to our analysis (see Table 2-1). These areas are generally too small to support a viable population. Also, see response to previous question.

The Affected Environments

Comment: On p. 3-15, it mistakenly says that the Apache and Gila National Forests are managed for even-aged stands; in fact, uneven-aged management is now practiced.

Response: We have changed this in the FEIS to reflect that management has moved toward emphasis on uneven-aged stands. This change has been driven by recent guidelines and analysis of alternatives for Forest Plan amendments to include protection of Mexican spotted owl and northern goshawk habitats.

Comment: On p. 3-18, under Apache County, there are at least three wood processing plants.

Response: Comment acknowledged; language has been changed.

Comment: How much trapping occurs in the area?

Response: Little in the BRWRA in recent years due to low pelt prices and the trapping ban in Arizona. None in the WSWRA.

Management Strategies

Comment: The lack of definition of “problem wolves” gives too much management flexibility. “Harassment” must be more clearly defined. “Rendezvous sites” needs definition.

Response: With the addition of a definition of “rendezvous site,” all these terms are now defined in Appendix G. We believe management flexibility is positive. Refinement of the definition of “problem wolves” would occur under the FWS-approved interagency management plan that would be developed (see provision (3)(vii) of the proposed experimental population rule, Appendix C).
Comment: “Sub-populations, demes, corridors, inbreeding, etc., these are all concepts that should be present in this DEIS.” (3,356)

Response: We believe that appropriate concepts relating to conservation biology have been incorporated into the EIS.

Comment: Long term population goals are unclear; will they be capped at the numbers indicated?

Response: No, they will not be artificially “capped.” The overall goal is 100 wolves distributed across 5,000 mi². If both areas are used, the BRWRA is expected to be suitable for approximately 100 wolves and the WSWRA for 20 wolves. The actual numbers should not greatly exceed those numbers, through a combination of natural mortality and management actions. Further refinement of the goals may be needed depending on actual territorial requirements of the wolves observed after they are released.

Comment: If they are reintroduced in Arizona and New Mexico they will disperse to Texas in a relatively short time; their dispersal cannot be prevented.

Response: We believe they can be retrieved before they reached Texas.

Comment: A citizen advisory committee should be assembled to advise on management.

Response: We agree. See revisions in the description of the Preferred Alternative (Chap. 2, Alt. A).

Comment: “The adaptive management approach seems reasonable and practical. It should allow for the necessary flexibility to successfully deal with the many challenges, foreseen and unforeseen, that will surely arise during the program’s implementation.” (3,340)

Response: We agree.

Comment: “There is a distinction between informal and formal adaptive management. To provide formal channels of communication with grazers and hunters, I would encourage expansion of the concept to a formal procedure of long term management of predator, deer, elk and livestock populations.” (3,656)

Response: This suggestion goes beyond the scope of the less formal adaptive management approach we envision. However, it appears worthy of consideration by the management group after it is formed.

The Draft Experimental Population Rule

Comment: The Proposed Action in the DEIS emphasizes using BRWRA and/or WSWRA while the draft Proposed Experimental Population Rule emphasizes both areas being used; why the difference?

Response: The draft Proposed Mexican Wolf Experimental Population Rule was written to cover the Proposed Action in its fullest application, that is, as if both areas are ultimately used. It should not be interpreted as a statement that both areas actually will be used.

Comment: Concerning the provisions allowing take of wolves that attack livestock: they are too broad, the time limit for the private permit should be drastically reduced from up to 45 days, and take should not be allowed unless depredation exceeds a certain percentage of the herd present, e.g. 1 or 2%. Also, the allowance for taking nuisance wolves and for using lethal methods are too vague.

Response: We believe the provisions are reasonable and will not impede wolf recovery. It would be very difficult, if not impossible, to accurately monitor livestock depredation rates attributable exclusively to wolves. Protocols for various management measures, such as the taking of nuisance wolves and the use of lethal methods, will be defined in greater detail in the FWS-approved management plan referenced in the Proposed Rule. This gives us the flexibility to adapt to situations that may be difficult to perceive prior to the reintroduction of wolves.

Comment: The Mexican Wolf Experimental Population Area is about twice as large as needed to administer the rule.

Response: We disagree. No naturally occurring populations of Mexican wolves exist in or anywhere near the proposed Experimental Population Area (EPA). The most likely natural recolonization areas have been excluded from the EPA (see Alt. D). A
smaller EPA would have the potential of artificially creating “endangered” Mexican wolves by allowing experimental wolves to disperse outside the EPA more quickly. We believe the proposed EPA provides the management flexibility necessary.

**Comment:** The statement on p. 2-22 and in ( ) (9) of the proposed experimental population rule that the FWS would terminate the reintroductions, if a court ordered the FWS to change the designation from nonessential experimental to a higher degree of protection, is illegal and has another major flaw. If the court required the FWS to proceed with the changed status then the FWS would have to proceed regardless of that statement.

**Response:** The purpose of the statement is to commit the FWS as much as legally possible to its Proposed Action, if it is chosen in the Record of Decision. There has been public and agency concern that the FWS would later change the nonessential experimental designation to endangered. Of course, the FWS cannot commit itself to violating a valid court order. Nevertheless, the FWS believes the statement is valid legally and is good policy.

**Comment:** The DEIS fails to demonstrate that the FWS has consulted with affected landowners and agencies on the Mexican Wolf Experimental Population Rule.

**Response:** The DEIS review process itself has provided some of this opportunity on the draft proposed rule; further, more focused consultations are to occur upon publication of the proposed rule in the Federal Register.

**Research and Monitoring**

**Comment:** The use of capture collars should be minimized; they cause stress and potential injuries and have other shortcomings.

**Response:** We agree, and do not plan to use these devices; references to them in Chap. 2 have been deleted. In fact, they are no longer manufactured.

**Comment:** The scientific research aspects of the reintroduction should not be cut back; if inadequate funding is available for monitoring and research the project should not be undertaken; research should include impacts of the wolf and the factors contributing to success or failure of the reintroductions. “We suggest research needs include: (1) factors influencing movements, reproductive success, hunting success and mortality of reintroduced individuals and their progeny, (2) factors influencing predator/prey dynamics in the proposed reintroduction sites, and (3) regional landscape analysis of habitat fragments . . . surrounding the proposed reintroduction sites, the potential recolonization sites on the border and the potential remnant sites in the Sierra Madre Occidental.” (3,052)

**Response:** We agree that research is an important part of this effort, but it is not the purpose. However, monitoring the wolves is fundamental and we would not support releasing wolves if we did not believe we could adequately monitor them. We would work cooperatively with appropriate non-governmental (e.g. academic) researchers to implement essential monitoring and research efforts. The reintroductions should provide outstanding research opportunities on biological, ecological, and socio-economic aspects of wolf recovery.

**Comment:** Reintroduced wolves should not be trapped for scientific study purposes.

**Response:** The primary purpose of this proposal is to re-establish a wild population of Mexican wolves to prevent their extinction and promote their recovery to a more secure status. Research conducted on reintroduced animals or reestablished populations must be compatible with that purpose. Intrusive research cannot be legally conducted without permission from the FWS.

**Comment:** “Any thought of keeping track of wolf movements after the second generation is laughable. It will be impossible to find the dens and cubs in the densely forested wilderness areas.” (1,075)

**Response:** Wolf managers and researchers in other remote and densely forested areas have been very effective in finding, capturing, and radio-collaring wild-born wolves.
Comment: What will the FWS do when collars fail or fall off? When will it stop radio-collaring wolves that it captures and will it remove collars from collared wolves after a certain period?

Response: We plan to monitor reintroduced populations throughout the population growth phase and for 5 years beyond attainment of the established population objective. This does not necessarily mean that every wolf will be radio-collared during this period. Specific answers to these questions will be addressed by the management group through the informal adaptive management process.

Comment: How will the FWS keep people from tracking and killing wolves by following their radio collar signals?

Response: This has not been a problem in other areas with radio-collared wolves. The FWS does not publicly release radio frequencies. Even if someone had access to the frequencies, it would take considerable time, expense, and effort to locate a radio-collared wolf and get close enough to kill it.

Comment: Aerial overflights will disturb both wolves and other animals; other approaches should be used.

Response: Decades of wolf research using aerial monitoring of radio-collared wolves reveals no indication that wolves are disturbed. We plan to use both ground and aerial tracking.

Comment: Incentives for the local public to monitor and report wolf activity should be used; this will not only provide information but will help build local support.

Response: This approach will be considered.

Strategies to Control Wolves

Comment: Given the known historic difficulty of trapping Mexican wolves, why is the FWS confident that it will be able to control them through trapping?

Response: We disagree with the commenter’s interpretation of history regarding this issue. Trapping was one of many very effective techniques used to totally eradicate the Mexican wolf from the United States. Trapping has been used effectively in other wolf management programs. However, we do anticipate that some wolves will be more difficult to capture than others. In some cases other techniques may have to be used, such as firing tranquilizer darts from aircraft.

Comment: Wolves that eat livestock should not be killed, but removed from the area.

Response: Non-lethal control methods will be preferred and encouraged. Depredating wolves taken alive would generally be translocated to an area where they are less likely to depredate or put back into the captive population. Euthanasia is a last resort.

Comment: The FWS is too willing to kill or move wolves that threaten livestock or leave the recovery areas.

Response: We disagree; most of the management strategy has proved successful for wolf recovery elsewhere and we believe it is appropriate.

Comment: Killing wolves that kill livestock will disrupt the packs and the social learning necessary for wolf survival in the wild, thus will hurt wolf recovery without necessarily reducing the depredation rate. Young wolves from disrupted packs are more likely to depredate on easier-to-catch livestock.

Response: The comment is speculative. Another point to consider is that young wolves learn to hunt and recognize prey from their parents and will pass similar behaviors to their offspring. Thus, if livestock depredating wolves are allowed to remain in the population, the rate of livestock depredation may increase over time. In other areas where wolves are recovering either naturally or through reintroductions, ongoing control of livestock depredating wolves has not prevented wolf population growth.

Comment: ‘What is the time frame for ‘recapturing wolves that ‘drift’ outside the recovery areas?’ (906) What will the FWS do if the wolves repeatedly demonstrate a preference for public land that is outside the recovery area boundaries? More flexibility
is needed to reduce the costs and negative impacts of repeated trapping and moving of the wolves.

**Response:** As soon as we know that a wolf has relocated on public land outside the recovery area, capture efforts will begin. Wolves that “drift” out and back will not be considered for recapture until it is clear that they have relocated from the recovery area.

**Public Take and Harassment of Wolves**

**Comment:** Killing of wolves to protect livestock should be prohibited; instead ranchers should be compensated for the cows killed in the attack.

**Response:** A private group, Defenders of Wildlife, has a depredation compensation fund. We believe that, under narrow circumstances, allowing ranchers to kill wolves with evidence that wolves were actually attacking their livestock probably will reduce the level of illegal killing, increase public acceptance of wolf recovery, help to remove non-adaptive behaviors from the wolf population, and benefit wolf recovery in the long run.

**Comment:** Public take of wolves on private lands is acceptable but not on public lands.

**Response:** We agree that it is less acceptable on public lands, but do provide for the granting of permits to private individuals, who have public land grazing allotments, to take wolves actually attacking cattle, under narrow circumstances where federal depredation control efforts in the area have not succeeded.

**Comment:** The provision for granting permits to ranchers to take wolves that kill livestock on public lands should not be construed as an entitlement by the ranchers.

**Response:** There are several conditions that must be met before such a permit would be granted, as spelled out in the proposed experimental population rule at sec. (3)(v)(B), and the operative word is that the FWS “may” grant the permit, rather than “shall.”

**Comment:** The disallowance of rancher take of wolves killing their livestock on public lands shows that the FWS intends to drive ranchers off public lands. What will the Service do if ranchers pull all their cattle onto private lands to lure the wolves?

**Response:** As stated in the previous response, we will permit some private taking of wolves on public lands. We do not intend to drive ranchers off and have tried to tailor the proposal to minimize conflict with ranchers, where possible and consistent with wolf recovery. Thus, harassment of wolves on public lands near livestock is allowed. The hypothetical situation appears very unlikely because the vast majority of the grazing land in these areas is public. Also, the wolves would not likely be “lured.”

**Comment:** Livestock owners are very unlikely to actually see wolves in the act of attacking livestock, thus giving them permission to kill wolves if they are seen in the act is meaningless.

**Response:** We agree that in open range grazing situations this is unlikely. The provision should provide some protection to livestock that are bunched and observed regularly by the rancher.

**Illegal Killing of Wolves**

**Comment:** “Hunters and trappers are notorious liars and could quite conceivably kill all the wolves” (2).

**Response:** We disagree with the comment and note that this has not happened elsewhere where wolf recovery has occurred.

**Comment:** This program will make criminals out of common people who act to defend their livestock.

**Response:** Legal killing of wolves is allowed under narrow circumstances; we do not expect that many people will kill wolves illegally.

**Comment:** The Yellowstone and Central Idaho reintroductions demonstrate that the compensation fund alone will not prevent illegal killing of wolves.

**Response:** Agreed; at least three illegal killings have occurred in those areas. Yet, the funds’ existence, including payment already to at least one sheep
rancher, may have helped reduce the level of illegal killing.

**Comment:** Drivers on public highways should be excused from accidental hitting of wolves, but off-road drivers in wolf habitat should not be excused.

**Response:** It is hard to conceive that an off-road vehicle could be moving fast enough to hit a wolf by accident before the wolf could move out of the way. If this proves to be a problem, which we do not expect, the rule could be amended.

**Comment:** On p. 2-22 and in the proposed rule, prosecution for illegal killings should be mandatory, instead of the “may” be prosecuted language used.

**Response:** We disagree; prosecutorial discretion is important for successful prosecutions. As indicated in the following response, we are committed to vigorous enforcement in appropriate cases.

**Law Enforcement**

**Comment:** Illegal killing of wolves should be vigorously prosecuted.

**Response:** We agree and intend to support this when there is evidence that illegal killing occurred.

**Comment:** More is needed in the EIS about penalties for violation of the taking provisions of the ESA and the experimental rule, and about the proposed enforcement measures and budget.

**Response:** The potential criminal penalties under Section 11 (b)(1) of the ESA are a fine of not more than $50,000 and/or imprisonment for not more than one year. Depending on the violation other penalties could apply. Enforcement of violations would fall to the Law Enforcement Division of the FWS, which would be aided by the Mexican Wolf Recovery Program staff and cooperating agencies. No separate Law Enforcement Division budget is proposed.

**Comment:** “U.S. Fish & Wildlife Service must be required to fully cooperate with local law enforcement agencies allowing local agencies to take a lead role in how enforcement actions are to be initiated.” (S-23)

**Response:** Cooperation between federal, state, and local law enforcement agencies regarding violations of the ESA or the experimental population rule would be generally the same for the Mexican wolf as it is for other violations of the ESA.

**Private Property Rights**

**Comment:** Wolf recovery and associated encroachment by government personnel and increased regulation are an infringement of private property rights.

**Response:** Under the Proposed Action there would be no trespassing, wolf management, or land use restrictions imposed on private (or tribal) property without the owner’s consent. Appendix C, the proposed Mexican Wolf Experimental Population Rule, includes a specific Required Determination that the proposal has been reviewed and found not to constitute a taking of private property under the 5th Amendment. If enforcement against illegal killing of wolves is necessary on private lands it would only be undertaken pursuant to established federal law enforcement procedures.

**Comment:** The reduction of property rights resulting from depredation and federal regulation of use of private land will make lenders less likely to extend credit, with the land as collateral, to ranchers in or near the wolf recovery areas.

**Response:** We have no evidence that this has occurred in other areas where wolves have recovered. The Proposed Action includes no regulation of private land or restrictions of private land use. Further, the expected depredation rates are unlikely to reduce the creditworthiness of ranchers.

**Human Safety**

**Comment:** “The USFWS has set up its documentation standards to exclude most if not all legitimate wolf attacks.” (TC-6)
Response: The FWS has no formal standards to include or exclude wild wolf attack reports, but we do look for evidence of the reliability of the reports received. We do not consider attacks by captive wolf-dog hybrids very relevant to the issue of human safety from wolf attacks in the wild. We recognize that a very few documented wild wolf attacks have occurred in North America. We generally rely on the opinions of wolf experts on this subject (see Mech 1992, USFWS 1987).

Comment: “There may not be a verified record of wolves attacking humans, but, it is only a matter of time and you will have one or more.” (601)

Response: This is possible but considered extremely unlikely by wolf experts.

Comment: The slight risk to humans can be dealt with through minor precautions.

Response: We agree; these would include the same sorts of precautions as one would take when in black bear or mountain lion country.

Comment: Who will be legally responsible if the wolf does attack and injure a person?

Response: This is considered extremely unlikely to occur. The FWS position is that reintroduced native wildlife are wild animals. Nothing in this proposal is designed to affect the law of legal liability or to prevent a person from suing the federal government if they think they have a valid case.

Comment: “Even though it is highly unlikely that wolves will ever threaten human life, they should not be prevented from recovering wild populations even if they do occasionally threaten human life.” (1,543)

Response: The recovery provisions of the ESA make no distinction between life-threatening and non-life-threatening species. We do not believe this will be a significant issue for wolf recovery.

Comment: “There is a real [human safety] problem if the wolves should cross with domestic dogs.” (590)

Response: Wolf-dog hybrids are unpredictable and potentially dangerous pets; they often lack the fear of humans that wild wolves exhibit. The FWS discourages possession of them. It is rare for wolves and dogs to interbreed except where caged together by humans. It has never been shown to our knowledge that a wolf/dog hybrid has resulted from wild wolves being in a human-settled area that has then gone on to attack people.

Impacts on Wild Prey of Wolves

Comment: Wolves will kill old and sick prey that would die soon anyway and this will benefit the herd overall; also, wolves will keep deer and elk from overpopulating and exceeding the carrying capacity of their habitats. The EIS should discuss these points more.

Response: Potential positive impacts of wolf predation on its prey were mentioned on page 4-5 of the DEIS. It should be pointed out that wolves will not only kill old and sick prey.

Comment: Wolves will not be selective for old or sick prey and will take as many or more healthy wildlife.

Response: See answer to previous question. The modelling of wolf impacts on prey populations did assume certain rates of wolf predation on different age classes of deer and elk, based on knowledge of gray wolf predation (see Green-Hammond 1994 and Parsons 1994).

Comment: The Blue Range deer population is already depleted and cannot handle increased depredation. The herd should be replenished before wolf reintroduction.

Response: Our modelling included increasing, decreasing, and stable deer herd scenarios developed with input from state game managers. Even under the decreasing scenario for BRWRA deer, the effects on the herd are not catastrophic.

Comment: The Blue Range elk herd has expanded and the range conditions and herd health have deteriorated.
Response: Comment acknowledged, although the FWS has found no clear information that elk herd health has declined.

Comment: “Record populations of elk and deer in the Blue Range Recovery Area attest to the lack of a predator to control populations.” (36) “Much biological research supports the thesis that deer and elk are much more numerous now than at any time previous to European settlement; predation by wolves and by Native Americans kept large mammal populations low.” (2,976)

Response: Comments acknowledged, although it does not appear that the BRWRA or WSWRA deer are at record high populations.

Comment: “I hunted New Mexico all 48 years of my life. For the past three years I have hunted the Gila Wilderness. The game management practices of the Dep’t of Game and of New Mexico of the past 40 years have resulted in the most healthy, flourishing heard of’elk in the country. The mule deer and other wildlife are producing more abundant number and healthier animals than ever before. Why would we consider interrupting the current successes with the reintroduction of the wolf is totally beyond me.” (710)

Response: Our projections are that these populations can withstand a resumption of the natural predation they experienced from wolves without catastrophic effects.

Comment: “The 1993 mule deer composition data for the San Andres Mountains that is used in the Assessment of Impacts to Populations and Human Harvests of Deer and Elk Caused by the Reintroduction of Mexican Wolves ([Green-Hammond] 1994), which was done for the DEIS, does not match any of the available deer composition data. The assessment uses a buck:doe:fawn ratio of 47:100:43; but the actual empirical data from a helicopter survey conducted on 1/23/93 was 45:100:37 and from ground surveys conducted during 12/1/93-1/24/94 was 30:100:27. Those surveys indicate lower buck and fawn ratios than what was used in the assessment. Our mule deer composition data showed that a considerable deer population decline occurred during the 1994 droughtth year-the buck:doe:fawn ratio was 40:100:7. Consequently, the results of the assessment above may not pertain to the conditions of the deer population at the time of the wolf reintroduction planned for 1997. Before wolves are released on the San Andres Mountains, the deer population should be reassessed using empirical data in order to insure that wolves are not being released into a prey poor environment.” (2,030)

Response: The differences pointed out between the empirical data on buck:doe:fawn ratios from January and December 1993 and January 1994 and the initial ratio used in our model would not likely broaden the range of effects predicted, because fawn:doe ratios varied in our model simulations and the limits of the range of effects result from the inclusion of increasing and decreasing herd scenarios. However, like the commenter, we are concerned about the effects of recent drought conditions on WSWRA deer herds; and the data provided reinforces that concern. The predicted marginal capability of the WSWRA deer herd to withstand the predation effects of wolf reintroduction, disregarding possible effects of current drought conditions, was one of the reasons for recommending the BRWRA as the initial reintroduction location in the Preferred Alternative. Also, a provision has been added that would require a reassessment of prey populations on the WSWRA before wolf reintroduction could occur there.

Comment: Wolves would help reduce the too-high WSWRA oryx population.

Response: This is possible, but wolf predation experts we polled predicted that wolf impacts on the non-native African oryx population, while uncertain, likely would be light.

Comment: Wolves would probably affect the prey less on White Sands, where hunting is limited, than in the Blue Range Area.

Response: While hunting is less, the deer population is much smaller on White Sands. There are no elk and we are unsure of the rate that wolves will take oryx. Thus, our projections show that wolf predation could cause a major deer decline under the decreasing deer herd scenario.
Comment: The DEIS contains inadequate discussion of wolf impacts on pronghorn and management that will result if significant impacts occur.

Response: We lack sufficient data to quantitatively project wolf predation impacts on pronghorn. We expect it to be relatively light because pronghorn prefer more open, lower elevation areas than wolves are expected to prefer and their speed facilitates escape.

Comment: “Fig. 4-1, page 4-4: this schematic graph suggests a declining trend in prey numbers for the ‘stable with wolves’ case. Shouldn’t the trend become parallel to the “stable without wolves” trend after some time as an equilibrium is established between the wolf-prey populations?” (46)

Response: That figure is a very generalized illustration. The commenter’s suggestion is valid; that is, if the hypothetical population trend lines were extended further into the future they would become horizontal, suggesting that an “equilibrium” condition had been reached. Of course, true equilibrium rarely, if ever, occurs in natural systems; and future prey numbers would fluctuate up and down in response to a variety of factors such as predator numbers, climate, human hunter harvest, management of predator and prey populations, competition for food, habitat condition, etc.

Comment: The impact numbers on the prey as given in the summary and Chap. 2 tables are confusing, the time reference is unclear.

Response: The “net impact” on prey is a picture of the prey population five years after the wolf recovery goal is achieved. See note 1, added to Table 2 in the Summary, and Table 2-8 in Chap. 2. It is not the annual impact. The reader should refer to the full text of Chap.4, under Alt. A, Impacts on Wild Prey, for a more complete understanding of prey impacts.

Comment: Inadequate data are available to predict the wolf/prey trends.

Response: We used data and expert opinions from the Arizona and New Mexico big game managers, which they use in setting hunts. We asked them to predict reasonable high and low population scenarios, as well as a stable scenario. We also examined data on game impacts from other areas where wolves have recovered.

Comment: The estimates used for the amount of prey taken by wolves are too high; wolves need not have a negative impact on prey populations.

Response: The estimate for prey taken after the recovery goals are achieved is based on approximate requirements of six lbs. of meat per wolf per day, which is based on studies of gray wolves in other areas and some assumptions about how Mexican wolves will behave in comparison (see Appendix A - Prey section and Parsons 1994). Our model runs generally project that wolves would gradually reduce prey populations over a period of years such that the reductions may not be readily observable. We do recognize that culling and other potential wolf impacts on the prey herds are considered beneficial.

Comment: Wolves will devastate the recently replanted Rocky Mountain Bighorn sheep herds in Eastern Arizona.

Response: We have added more discussion on bighorn sheep and impacts on them in the BRWRA to Chap.s 3 and 4, with the assistance of the Arizona Game and Fish Department.

Comment: Wolves will devastate ungulate populations and hunting as they have in parts of Alaska, Minnesota, Alberta, and elsewhere; the DEIS estimates are too low.

Response: Many factors affect ungulate populations. Rarely can a change in ungulate populations be attributed to one single factor, such as predation by wolves. Experts generally agree that once suppressed, by whatever cause, the recovery of ungulate populations to higher levels can sometimes be significantly prolonged, and theoretically precluded, by continued predation. However, most experts agree that in healthy ecosystems the effects of predators on their prey is beneficial to the overall health and fitness of prey populations. Notably, the deer population in northern Minnesota has reached historically high levels, as has hunter take, while the wolf population has increased steadily at the same time (M. Nelson, Nat’l Biol. Survey, pers. comm.). The Proposed Rule contains a provision that would allow wolf popula-
tions to be reduced if ungulate populations are substantially reduced due to predation by wolves.

**Comment:** The provision to capture and move wolves if they “impact on game populations in ways which may inhibit further recovery” is unclear and that event is unlikely to occur.

**Response:** The quoted phrase is defined precisely in the Glossary (Appendix G). We agree that such a reduction in game populations caused by wolves is unlikely to occur.

**Comment:** The DEIS is inadequate for failing to model impacts on species other than deer and elk and on hunting on these other species.

**Response:** Adequate data for constructing models for these species is not available; and impacts to these species are expected to be minimal. Impacts to large ungulate species other than deer and elk are discussed in qualitative terms.

**Comment:** More consideration needs to be given to other factors, such as disease, weather, and habitat loss, that will impact prey populations.

**Response:** The modelling effort for wolf impacts did include consideration of these sorts of factors. Generally, we agree that factors other than wolf predation, particularly weather, will have a greater influence on prey numbers.

**Comment:** “Research also indicates predation is additive and not compensatory which will definitely have negative effects on ungulate populations..... Ungulate populations suffer because wolves destroy the replacement segment of a wildlife population.” (906)

**Response:** We found the published research to be inconclusive as to whether wolf predation is additive, partially compensatory, or full compensatory. Several experts were polled on this issue; and their collective opinion was that from 15% to 47% of wolf-caused mortality would be compensated by reduced mortality from other sources. Model simulations included both ends of this range, which is reflected in the range of projected impacts to deer and elk populations.

**Comment:** Wolf predation may stimulate higher birth and twinning rates; also, deer in wolf territory are larger and fitter than in areas where wolves are not present.

**Response:** These phenomena could be expected, based on generally accepted ecological principles.

**Comment:** Wolf prey a lot on mice and other rodents; this will reduce the threat of rodent-born diseases.

**Response:** Small mammals are estimated to make up only a small percentage by weight of the wolf’s diet and the wolves are expected to displace coyotes to some extent, which depend on small prey more than wolves. We lack evidence that wolf recovery has the effect suggested.

**Comment:** Wolves displacing of coyotes, which prey on many deer fawns, may mean that the deer herds increase.

**Response:** This is possible, but we lack sufficient data to make such a prediction.

**Impacts on Hunting**

**Comment:** Wolf reintroduction may bring more hunters on the chance they could kill a wolf (illegally).

**Response:** We lack evidence to support this. Poaching of wolves could be a problem, but it is unlikely to attract many more hunters.

**Comment:** The decline in hunting is overstated.

**Response:** We admit uncertainty in predicting the impacts on hunting. In other parts of the country where wolves have come back there have not been hunting reductions, but our modelling efforts suggests there should be such reductions in the Southwest if the deer and elk herds are appreciably reduced. If the game managers don’t reduce the level of hunting, then hunter success should drop.

**Comment:** The FWS should impose hunting restrictions in the wolf recovery areas to provide more prey for wolves.
Response: Regulation of hunting is a state, not a federal, role.

Comment: The DEIS overemphasizes impacts on hunting in the BRWRA in relation to non-consumptive uses. Hunting only represents about 10% of the recreational visitor days.

Response: We acknowledge that the DEIS focuses more on quantified adverse impacts, such as lost hunting days due to reduced herd size, than on potential positive impacts like increased recreation that are difficult to project quantitatively.

Comment: “It won’t take a rocket scientist to see your cutting off a large part of your income from hunters.” (470)

Response: The projected reduction in hunting should mean that the state game agencies receive less in license fees than they would otherwise. This would not directly affect the federal FWS or its Mexican Wolf Recovery Program.

Comment: The reductions of game and hunting will hurt “private land owners who depend a great deal on deer as a source of revenue.” (55)

Response: This private land deer hunting is primarily an issue in Texas, where no impacts on hunting are projected to occur.

Comment: If there are too many elk or deer it is better to give more hunting permits to sportsmen.

Response: The purpose of wolf reintroduction is not to reduce the deer and elk herds, rather this is a projected effect.

Comment: Wolf predation could force game managers to ban or greatly reduce hunting; the DEIS doesn’t recognize that this could occur.

Response: To our knowledge, this has not occurred in other areas where wolf populations have re-established; and game managers in Arizona and New Mexico do not anticipate reductions in permitted hunting effort as a result of wolf reintroduction. A provision in the proposed rule would allow control of wolf populations if game populations significantly decline as a result of wolf predation. Our analyses do predict a decline in game populations compared to what they would be without wolves, and some reduction in hunting opportunity in wolf recovery areas could occur 10-15 years after initial wolf reintroductions. These reductions are not projected to be drastic, as the commenter has suggested.

Comment: The projected herd reductions will mean fewer permits will ultimately be given out and it is already too hard to get hunting licenses. “The comment on p. 11 of the summary to the effect that hunters may not actually hunt less overall because of fewer deer and elk in the recovery areas but instead turn their attention to substitute areas or species is clearly erroneous.” (10)

Response: We agree that it is likely that the presence of wolves will ultimately mean fewer licenses will be given out than if there were no wolves. The numbers we present for hunting losses in the DEIS assume no effort by hunters to substitute for these lost opportunities by pursuing other hunting opportunities elsewhere (including, perhaps, in other states or on Indian reservations or for less popular species than deer and elk.). We believe there would be some substitution, though we lack information to project it quantitatively.

Comment: Hunters kill prime animals while wolves kill old, young, diseased, and other non-prime animals.

Response: Generally this is true, but wolves may take some prime animals as well, just as hunters may take some old or diseased animals.

Comment: The reduction in deer and elk should be compensated for as livestock depredation is.

Response: The livestock depredation fund is a private effort designed to offset losses of privately owned livestock. The taking of wild deer or elk by wolves does not affect anyone’s private property and is part of the natural predator-prey relationship, which has never been compensated for financially anywhere else, to our knowledge.
Impacts on the Livestock Industry

Comment: It is clear that in order to restore viable wolf populations in the Southwest they will eventually have to be put where there are livestock, so the fact that no livestock are on the WSWRA should not make that area more preferable than the BRWRA, which has livestock.

Response: The New Mexico Department of Game and Fish has cited the absence of livestock on WSWRA as one of the reasons it is opposed to wolf reintroduction in that area. The BRWRA, which contains livestock, has been selected as the preferred reintroduction area for various biological reasons beyond just the presence or absence of livestock.

Comment: Historically, cattle losses to wolves were higher than those projected; the livestock depredation estimates are too low.

Response: It is likely true that historic livestock losses were higher than projected losses in the EIS because cattle were more plentiful and native prey were less plentiful around the turn of the century. However, data on historic livestock losses, wolf abundance, and native prey abundance are incomplete and unreliable in some cases, but we have added more discussion of the historic data in Chap. I, under Reasons for Listing.

Comment: The reasons for high historic depredation rates were depletion of the wolves’ native prey and overstocking of cattle within the wolf range.

Response: See response to previous comment.

Comment: Gray wolves prefer cattle as prey because of their similarity to bison, their preferred prey.

Response: This interesting idea lacks historical support for the Mexican wolf. Most of the historic Mexican wolf range was not in the historic bison range.

Comment: The rates of depredation from Simonette River, Alberta, (Appendix F) were quite high and if rates that high occurred in the Southwest the livestock industry would be decimated.

Response: The Simonette River case showed the highest documented wolf depredation rates during a few years (1975-1978) when control of depredating wolves was experimentally withheld. It was a relatively small area with a high wolf to cattle ratio. This sort of “worst case scenario” could be observed in portions of the southwestern wolf recovery areas, but, as in Alberta, would not likely be duplicated over a large area. Active control of depredating wolves under the Proposed Action would help prevent such worst case scenarios from occurring. The Simonette River livestock industry was not decimated.

Comment: Wolves will prefer easy-to-get calves to deer or elk.

Response: Observations of gray wolf behavior elsewhere indicate that wolves prefer wild prey, although they would be expected to take some calves. Under the proposal, wolves that do so will be controlled.

Comment: The livestock depredation estimates are totally speculative.

Response: They are based on the best evidence available regarding rates of wolf depredation on livestock in Minnesota, Montana, and Alberta. Observations from those areas were adjusted for differences in the Southwest, with the aid of an expert survey on these issues (see Appendix F - Summary of Livestock Depredation Survey Responses).

Comment: The livestock losses are projected as small, such as 1% of the livestock, but this is misleading. The percentage of total livestock in the state lost to depredation is not relevant, but the percentage should be based on the number of livestock in the wolf recovery areas.

Response: Our depredation projections are not percentages of livestock in the whole state. Rather, like the comparison studies our projections are based on, they are percentages of the total livestock in the wolf territories, i.e., the livestock available in the designated wolf recovery areas.

Comment: How can you have a fraction of a cow killed per year, such as .01 for the WSWRA?
Response: This means that on average one cow would be killed every ten years.

Comment: More explanation is needed in the livestock loss projections about how the average value of cattle and calves was arrived at.

Response: Additional clarification has been added to the notes of Table 4-4, pointing out that this value is based on state agriculture department figures as to the average value of all cattle in the state including everything from bulls to calves and high value cattle to culls.

Comment: Using depredation rates from Minnesota to project rates in the Southwest is unrealistic due to the very different industries.

Response: We recognize the differences and tried to take them into account in our projections and our expert survey, (see Box 4-3 and Appendix F). The data from Minnesota is very complete and considered by many experts to be relevant to other areas despite the different circumstances. In the grazing season in Minnesota, when the vegetation is thick and the animals are not tended regularly, livestock even in relatively small pastures are exposed and vulnerable to attack by the many wolves present.

Comment: Wolf recovery in Minnesota since 1979 has resulted in a great reduction in the number of farms and sheep in the wolf range.

Response: We disagree. Certainly, other socioeconomic factors have had a far greater contribution to reduction in farm numbers, a national phenomenon. There is no evidence of wolves putting cattle ranchers out of business. Wolves do depredate on sheep in Minnesota more than cattle and in a few cases sheep ranchers over the last 15 or so years have claimed they stopped raising sheep due to wolf predation (B. Paul, USDA ADC, pers. comm.). However, there is only one sheep allotment in the proposed wolf recovery areas in the Southwest.

Comment: “The figures presented as possible wolf kills are not correct. They are so high that the ranching public will be up in arms.” (547)

Response: The figures are consistent with experiences from other areas where wolves and livestock and ranchers co-exist, without excessive illegal killing of wolves by ranchers.

Comment: The depredation projections are realistic.

Response: Comment acknowledged. Thank you.

Response: As the wolf population grows and depletes the wild game it will turn more to livestock.

Response: This could occur to a minor extent, but the wolf is not projected to cause a major depletion of the wild game herds in the BRWRA, which is where the potential for livestock depredation is greatest, i.e., few livestock exist in the WSWRA.

Comment: Wolf reduction of big game herds will provide more grass for cattle.

Response: This is a possible, but uncertain, effect.

Comment: It will be hard for ranchers to tell whether a calf death resulted from wolves or natural causes. Lost newborn calves won’t be discovered at all.

Response: If wolves are suspected (and their presence in an area will usually be known through monitoring efforts), then a specially-trained ADC wolf specialist will assist in determining the cause of the kill, using evidence on the carcass and in surrounding areas as well as information from the wolf monitoring efforts. This approach has worked fairly well in Minnesota and the Northern Rockies. However, not all kills can be found and identified, especially newborn calves.

Comment: Cattle ranchers are already struggling economically and predation contributes to this; any wolf depredation will make it worse.

Response: The level of wolf depredation is not expected to be high enough to cause major economic effects, although if individual ranchers suffer uncompensated losses they may face economic problems.

Comment: The livestock impact focus is too much on cattle and not enough on other large and small livestock.
**Response:** The EIS does mention the potential for wolves to take other livestock, but we do not consider the potential impacts on them to be significant enough to attempt to make quantitative projections, which would be quite difficult. Only one sheep allotment exists within the BRWRA and no privately-owned sheep are in the WSWRA. Thus, while some sheep will likely be taken by wolves, the numbers should be small. Poultry and smaller livestock could be taken opportunistically by wolves, but the numbers should not be high due to the normal care taken to protect them from all kinds of predators.

**Comment:** Ranchers in the BRWRA are having their grazing allotments severely reduced; wolf recovery on top of this will cause major economic stress.

**Response:** Those reductions are not across the board and have not been finally implemented yet, as most are under appeal. We have mentioned this under Chap. 3, Livestock Grazing, and Chap. 4, Alt. A, Cumulative Impacts.

**Comment:** “I have lost livestock to predators....There are so many predators killing so much livestock that I cannot believe that the Mexican wolf can affect livestock production.” (2,995)

**Response:** We agree that the impact of wolf depredation will be relatively minor in comparison to the current rates of depredation from other predators and the effect on overall livestock production will be marginal.

**Comment:** “The ranching lifestyle is not economically viable, it will decrease over time, and the reintroduction of the wolf will not make a difference in that.” (Soc. p. 179)

**Response:** We have no opinion on the overall economic viability of ranching, but agree that wolf depredation will be a marginal factor in relation to other factors that affect the viability of ranching such as beef prices, grazing fees, cost of supplies, other predators (see response to previous question), government programs related to ranching, competing land uses, rancher demographics, climate, and so on.

**Comment:** The statement on p. 4-25 that ranchers probably would not place irreplaceable breeding stock out on the open range is wrong.

**Response:** The range livestock industry is aware of the existing depredation rates caused by predators other than wolves. “Irreplaceable” breeding stock is not often left on the open range subject to depredation, at least without insurance. Full-grown, healthy, breeding stock is less likely to be depredated upon than smaller stock, especially calves.

**Comment:** More discussion of federal grazing fees is needed and how the fee formula already takes depredation into account.

**Response:** We have mentioned this in Box 3-1 of the FEIS, but this is a very broad accounting of depredation rates nationally, which the limited wolf depredation described in this document will not affect.

**Comment:** Ranchers will need to spend their own time or money to hire someone to do “wolfwatching” to protect their herds.

**Response:** Ranchers may wish to take additional steps and spend additional funds to protect their herds, but we do not believe, based on experiences elsewhere in North America, that each herd will need a “wolfwatcher.”

**Comment:** Ranchers will need to implement more advanced herd protection techniques, like guarding dogs, which will defend not just against wolves but also against other predators, thus reducing overall losses; burying carcasses; using horned cattle; and so on.

**Response:** Guarding dogs have not yet been shown to be effective in large, open range, cattle operations; nevertheless, we agree that better techniques should be sought and that open dumping of carcasses encourages depredation.

**Comment:** Why not try using aversive baits, such as lithium chloride wrapped in sheep or cowhide, to negatively condition wolves to livestock?
Response: See response to a previous comment on aversive conditioning, above, under Release Techniques.

Comment: The mitigation measures suggested by the FWS to reduce depredation are unrealistic. Further, the costs of implementing such measures are not included in the reintroduction cost estimates.

Response: The measures suggested come from experts familiar with wolf depredation on livestock in Alberta (Bjorge and Gunson 1985). We concurred, on p. 2-24 of the DEIS, that some of the measures may not be suited for the Southwest. A learning process will be necessary to find which, if any, depredation mitigation measures will work. The cost estimates for this sort of “wolf extension” work are included in the estimates in Appendix B under the categories of Field Staff salaries and Information/education.

Comment: The FWS or Defenders of Wildlife should provide financial incentives to ranchers to undertake husbandry changes that will reduce depredation rates.

Response: This is outside the current authority of the FWS. However, the Defenders of Wildlife has provided some financial assistance to ranchers for depredation prevention measures in the northern Rocky Mountain area.

Comment: Livestock grazing should be reduced in the wolf recovery areas, which have been damaged by overgrazing. Wolf predation will help reduce cattle numbers that are too high anyway.

Response: Wolf depredation will not affect overall cattle numbers; any cattle lost to depredation could be replaced.

Comment: “The cowman who cleans his range of wolves does not realize he is taking over the wolf’s job of trimming the herd to fit the range.” (2,8 19)

Response: Comment acknowledged; see response to previous comment.

Comment: Public lands are not “leased” for grazing, grazing is a public land privilege that is “authorized.”

Response: We have made this correction.

Compensation for Livestock Depredation

Comment: The DEIS under-emphasizes the compensation fund and overemphasizes the impact of a small number of lost cattle.

Response: The EIS focuses on the federal aspect of wolf recovery, rather than on related private initiatives that are beyond federal control. The DEIS does mention the Defenders of Wildlife fund and the FWS recognizes this has been a valuable aid to wolf recovery in the northern Rockies.

Comment: Make sure enough money is available to cover losses. The Minnesota compensation program went bankrupt.

Response: The Defenders fund is a private program that the FWS does not guarantee. The amount currently in the fund appears adequate to cover projected depredation losses for several years and we understand more money may be raised for the fund. The Minnesota compensation program is funded by the state legislature with an annual appropriation of about $45,000, for a state with about 2,000 wolves. The fund has not gone “bankrupt”; every loss claimed and approved has been paid (B. Paul, USDA ADC, pers. comm.). During a few years, the claims have exceeded the appropriated amount. Thus, some claims had to wait until the following year for payment.

Comment: The compensation program should exist initially, but then the responsibility turned over to ranchers to protect their animals; the compensation program will be held out as bait to ranchers, but then cut back and eliminated; the compensation fund should be conditioned on ranchers not illegally shooting wolves; the fund should post a bond to cover losses; the fund should not apply if wolves are released or recolonize with full ESA protection; it should pay a flat percentage fee to ranchers based on the number of livestock they have in the wolf areas; the fund’s existence will encourage over-reporting of losses and discourage proper livestock protection through husbandry techniques.

Comment: Public lands are not “leased” for grazing, grazing is a public land privilege that is “authorized.”
Response: As a private fund, these matters are generally up to the Defenders of Wildlife to decide. Comments should be directed to this organization, headquartered in Washington, DC, or to its field representative in Tucson, AZ.

Comment: If the compensation fund runs out of funds, the project should be terminated.

Response: The FWS Mexican wolf recovery program is not conditioned on the existence of the private compensation fund.

Comment: The compensation program is unworkable.

Response: The same sort of program has proved reasonably workable in Minnesota and Montana.

Comment: Wolves may feed on carcasses of cows that died of other causes; all the dead cattle will be blamed on the wolves because of the financial incentive.

Response: Defenders of Wildlife requires the opinion of an animal damage control or wolf expert who has examined the carcass to determine whether wolves killed it, before compensation will be paid.

Comment: “I believe the wolves would displace other livestock predators that ranchers currently are not compensated for. Therefore, I see [the compensation program] as a net benefit to ranchers even if all losses cannot be verified.” (ALP-14)

Response: This could occur, although we lack sufficient evidence to project the ultimate impact of wolves on the overall predator make-up of a given area.

Impacts on Predator Control Programs

Comment: ADC activities should be completely eliminated in recovery areas.

Response: This has not proven necessary to accommodate gray wolf recovery elsewhere.

Comment: ADC is not an appropriate agency to be involved in recovering wolves as they helped eliminate them initially and still kill many predators.

Response: We disagree. ADC brings important predator control knowledge to the program and has been a key player in gray wolf recovery in Minnesota and the Northern Rockies.

Comment: Indiscriminate predator control methods should be removed.

Response: In occupied wolf range (see definition in Appendix G - Glossary), ADC use of M-44s and lethal snares would be restricted and there could be changes in trapping techniques.

Comment: A steel-jawed leghold trap can injure wolves even if it doesn’t hold them. We should consider eliminating them.

Response: Modified steel-jawed leghold traps have been shown to be one of the most efficient and humane ways to capture wolves for research and management purposes. Injury and mortality can occur, but the rates are very low.

Comment: The discussion on page 4-40 regarding restricting the private shooting of coyotes if wolves are “mistakenly shot” should be discussed for each alternative.

Response: This was discussed also under Alternative D for each potential natural recolonization area under Impacts on Predator Control Programs. It was not discussed under the experimental non-essential alternatives (A and B) because the FWS believes that hunter education would be a more effective approach than imposing restrictions. If hunters are on notice that wolves are in an area, then they are responsible for making sure of their target and could be prosecuted if they shot a wolf and unreasonably claimed they thought it was a coyote.

Comment: Not enough predator control is being done on coyotes now and adding the wolf will just make things worse. There should be no restriction of predator control methods.
**Response:** Some restrictions on non-discriminating predator control methods are necessary to ensure continued recovery of reintroduced Mexican wolves. Wolves will likely reduce the numbers of coyotes in an area themselves. While, it is true that wolf presence in an area would reduce the use of non-discriminating coyote control tools, the Proposed Rule does not restrict the use of traps, aerial gunning, non-choking-type snares, calling and shooting, and possibly other techniques which are effective in the control of coyotes. However, the use of some of these tools or techniques may be limited by mutual agreement between FWS and ADC if such limitations are determined necessary to protect Mexican wolves. We believe that effective control of coyotes, if necessary, could continue in areas that become occupied by wolves.

**Comment:** The White Mountain Apaches are using M-44s for coyote control adjacent to the BRWRA; allowing this does not make sense as the expensive wolf recovery program will be harmed by unnecessary wolf mortalities.

Response: EPA label restrictions prohibit the use of M-44's in areas known to be occupied by Mexican wolves. If reintroduction is authorized for the BRWRA, the FWS will attempt to enter into a cooperative management agreement with the White Mountain Apache Tribe for purposes including the capture and removal of wolves that enter their reservation.

**Comment:** On p. 4-49, Bednarz (1988) is incorrectly cited for the suggestion that wolves may displace lions into cattle-grazing areas outside White Sands Missile Range, possibly increasing predator control needs in these areas.

**Response:** While we agree that we incorrectly cited Bednarz, and have changed that reference, we do think that the competition from wolves could displace some of the mountain lions and not only into the more precipitous areas, which are already densely populated by lions. Inter-specific competition and aggression could result in some lions and coyotes leaving the area.

**Comment:** The proposed restrictions on predator control activities in wolf recovery areas would reduce the costs of ADC operations; this cost-saving should be reflected in the EIS.

**Response:** We question this conclusion. Wolf reintroduction should result in greater ADC costs, which the EIS reflects in the projected cost estimates in Appendix B. The reason for this is the need to hire a full-time wolf control specialist. While wolves may cause some reductions in other predator numbers in a given area, the presence of wolves will not eliminate the need for animal damage control actions against these other predators altogether. The presence of wolves will reduce the availability of neck snares and M-44's as a control measure, thus the lower availability of control tools may increase the cost of ADC efforts.

**Impacts on Other Predators**

**Comment:** Wolves will not necessarily displace lions.

**Response:** We agree that inadequate data exists to confidently project this effect and we have not done so in our calculations of overall effects on hunting, livestock, etc. We do occasionally point out the potential for this to occur.

**Comment:** Wolves will eliminate lions and bears.

**Response:** Evidence to support this is lacking from other areas. While anecdotal evidence exist of wolves displacing lions, wolves and bears clearly can co-exist without major conflicts.

**Comment:** The restrictions on predator control methods will cause other predator populations to increase, which will harm ranchers and wildlife.

**Response:** Limited restrictions on predator control programs will be imposed only in areas known to be occupied by wolves. It appears very unlikely that, in areas occupied by wolves, other predator populations would increase, given our current understanding of inter-specific aggression between wolves and other predators, and the fact that the presence of wolves would increase competition for food resources. Also, see our response in the previous section to the comment on inadequate predator control.
Wolves will reduce coyotes, which will thereby enhance the deer herd.

We agree that this may occur, but lack sufficient information to project this impact quantitatively.

Impacts on Other Endangered Species

Wolves will kill other endangered species. Wolves will eat many “candidates for federal protection. Specifically the Arizona black-tailed prairie dog, Organ Mountains Colorado chipmunk, White Sands woodrat, and the hot springs woodrat. How can there be ‘No Effect’?” (S-1).

Other than the possible impact on state-listed desert bighorn sheep in the San Andres, discussed above, no other impacts on populations of endangered species are foreseeable (see Appendix D - Section 7 Consultation). Small mammals collectively make up only a very small percentage of the Mexican wolf’s diet; and wolves would be more likely to catch common than rare small mammals. Wolves may reduce numbers of coyotes, which are more apt to prey on small mammals. Category 2 candidate species were not legally protected by the ESA; in fact, this classification has been eliminated by recent revisions to ESA procedures (Federal Register, Vol. 61, No. 40, February 28, 1966).

“Under the alternatives discussed, which endangered, threatened, or sensitive species would take precedent if wolves impact other T&E species.” (906)

Under Alternative A and B, management for all other T&E species could take precedence over management for the wolf. The only species actually projected to potentially require translocation of the wolf is the state-listed desert bighorn sheep in the San Andres. Under C and D, the agencies would be put in a multiple species management situation, with federally-listed species having priority over non-listed species if management conflicts actually occurred. As a federally endangered species, the wolf would take precedence over the state-listed San Andres desert bighorns.

Supposed conflicts with county laws is ridiculous and should not be recognized and certainly not entertained.” (21)

NEPA directs the FWS to consider conflicts with county laws resulting from federal programs and to discuss any federal preemption that occurs, which Chap. 4 of the EIS does.

The states and counties should have been included in any and all endangered species reintroduction programs and should be permitted to be cooperating agencies in all early planning and decision making. It is against Sierra and Catron Counties land use planning ordinances to leave the counties out of any land planning that concerns it citizens.” (TC-6).

The FWS has attempted to cooperate with the counties, however, we previously advised the potentially affected counties by letter that formal cooperating agency status was not considered appropriate. The counties may conduct their own wolf recovery planning if they wish - as some already have - and the FWS is willing to cooperate with them, if requested. See response to previous comment.

Implementation funds should be given to counties to assist in the reintroduction efforts and to defray costs imposed on the counties.

It is not clear now that funding county involvement would aid wolf recovery and the FWS does not normally defray county costs. Nevertheless, if wolves are released, the FWS would consider organizational arrangements for involving county and citizen
interests in wolf management decisions. See the discussion of this concept in the description of Alt. A, in Chap. 2.

Comment: Tribes should agree on the number of wolves in a designated area. Active involvement with affected tribes is needed to reduce management conflicts.

Response: Wolf recovery is not proposed on tribal lands therefore we do not think it is appropriate to seek agreement with tribes on allowable numbers. Because of the likelihood of some dispersal on to the White Mountain and San Carlos Apache reservations, if wolves are reintroduced, the FWS would pursue cooperative management agreements with the tribes.

Comment: “How can the FWS ‘compel’ a sovereign nation [the tribes] to develop wolf management plans that are approved by the “FWS” or even to compel a sovereign nation to enter into a cooperative wolf management plan directly with the FWS?” (906)

Response: The tribes would not be compelled by the FWS to do anything; nevertheless, if wolves are present on or near the reservations, the tribes may choose to work cooperatively with the FWS on wolf management.

Comment: “Proceed with the Mexican wolf releases irregardless of the level of cooperation you get from the states of Arizona or New Mexico.” (658)

Response: The ESA, implementing regulations, and FWS policies support our attempts to cooperate with the states on endangered species recovery efforts.

Comment: “The US Fish and Wildlife [should] consult with the new New Mexico Endangered Species Act, which requires coordination down at the count)- level on any type of plan.” (Soc. p. 149)

Response: While the wolf is listed as endangered under New Mexico law, this is not a New Mexico action that would be subject to the new Wildlife Conservation Act amendments. Nevertheless, we have consulted and coordinated with the New Mexico Game and Fish Department and with county officials.

Comment: The states will not want to become the primary wolf managers after delisting, if it occurs.

Response: It is hard to predict how the states will respond far into the future, if de-listing occurs. If the law remains the same as now, the non-endangered wildlife of the country generally will be subject to state management.

Comment: The DEIS is devoid of a “review of the land withdrawal that established White Sands Missile Range. Until a legal review is completed, the release of the Mexican wolf on White Sands Missile Range may be outside the authority of the Department of Defense.” (2,867)

Response: We have reviewed this issue in consultation with the Department of Defense and find no legal impediment to wolf reintroduction on WSMR.

Comment: The Bureau of Land Management should be involved as a cooperator in the DEIS; the BLM management plans for the lands to the west of the White Sands Missile Range have not been adequately considered.

Response: BLM was invited to be a cooperator, but declined. Not much BLM land is involved in the designated wolf recovery areas. BLM has cooperated in providing information on those BLM lands that are involved, including management plans. Impacts on these were discussed under Chap. 4, Alt. C. Impacts on Agency and Local Government Policies and Plans, for the WSWRA. This discussion has been dropped in the FEIS as the WSWRA has been dropped from Alt. C (see Appendix L). Impacts on BLM’s plans for the WSWRA are not anticipated under the other alternatives.

Comment: “At a time when the management agencies are attempting to embrace an ecosystem management approach to their management, refocusing on single species, such as the wolf, diminishes the ability of the [Forest Service in the BRWRA] in its attempt to practice more holistic management.” (1,745).

Response: Under the full-endangered reintroduction approach at least the potential would exist for the wolf conflicting with broader forest management goals. However, under the Proposed Action, the wolf would...
not impose any management conflict with existing or future management, except in the limited, temporary, closure areas. We think wolf recovery would generally benefit from ecosystem management (which is a somewhat loose term), but does not depend on it, and ecosystem management would benefit from the return of this native top predator.

**Comment:** A Sept. 30, 1994, Memorandum of Understanding [MOU] exists between the FWS and the Forest Service and other federal agencies in which they agreed to “conserve” listed species. Does this MOU obligate the Forest Service to use, for example, its discretionary permitting authority to deny rights-of-way or their renewal in the BRWRA?

**Response:** The intent of an MOU is to mutually agree on and define the parties’ responsibilities in a mutual action. No MOU supersedes law or other management requirements. Wolf reintroduction and recovery actions not addressed or covered by the final Record of Decision or the Mexican wolf experimental population rule, such as release pen siting, would need to undergo scrutiny and analysis for compliance with other applicable laws and regulations. Nothing in the Proposed Action, the Proposed Rule, or in the MOU, would support the denial of rights-of-way to protect the wolf. It is conceivable that such denial could be required if Alternative C was adopted in the Record of Decision and the Section 7 consultation process determined that the rights-of-way jeopardized the wolf.

**Comment:** The informal Section 7 comment process called for under the proposal is vague and could change to a formal consultation process.

**Response:** Formal consultation under provisions of Section 7 of the ESA is prohibited by the Section 10 provisions for nonessential, experimental populations, except on lands within the National Park System or the National Wildlife Refuge System.

**Impacts on Land Use**

**Comment:** The failure to define when the wolves are conflicting with a major land use, such that their removal would be justified, leaves too much of a loophole for terminating the recovery, e.g., if wolves conflict with livestock.

**Response:** We agree that the provision is vague and we also believe it is redundant with other provisions that give sufficient management flexibility, therefore we have deleted the provision from Alt.s A and B. We already have provisions for management of depredating and “problem” wolves (see Glossary), and for other purposes deemed necessary in the future; further, we do not anticipate that wolf recovery will conflict with other land uses.

**Comment:** Most of the public lands involved are multiple use lands and wolf recovery is an appropriate use; cattle grazing should not prevent other uses.

**Response:** We agree.

**Comment:** “Land use practices that promote diversity by the nature of their sustainability in relation to the overall health of the bioregion should be implemented in concordance with wolf reintroduction.” (45)

**Response:** We agree that such land use practices are favorable generally, but they are not a prerequisite for wolf reintroduction.

**Comment:** Wolf recovery in Montana, Idaho and Wyoming has demonstrated that no significant land use restrictions are needed.

**Response:** We agree.

**Comment:** The wolf will cause much public land and many land uses such as grazing, hunting, and logging to be closed down; the wolf is a vehicle for restricting land access and use.

**Response:** We disagree; no substantive land use restrictions have been necessary or imposed in other areas where endangered, threatened, and nonessential experimental populations of wolves are recovering. See previous comment and response.

**Comment:** The so-called limited closures are in fact not minor and will virtually shut down the denning and vaguely defined rendezvous areas to human use, such as logging for many months, at least for April
through October. This, together with possible backcountry road closures, could devastate the already threatened Southwest timber industry. Also, the closures around dens, etc., could result in road closures.

Response: We believe that proposed closures or use restrictions would be minor. They would be implemented only if deemed to be necessary to protect Mexican wolves from harm; no closure would exceed an area of about 3 square miles (i.e., a circle with a 1 mile radius which is about 2,000 acres); no closure would be in effect for more than 4 months, except possibly those around release pens; and release pen closures would only be necessary in the primary recovery zones when releases are actually being made. Only one active den site or one active rendezvous site would exist at any given time (except for a possible overlap of 1-2 weeks) in each active pack territory. Pack territories are expected to include about 250 square miles. Therefore, on average, no more than 3-6 square miles out of every 250 square miles (1.2-2.4%) of the total public land area would be closed or restricted at any time. Furthermore, no closures or use restrictions would be imposed on private or tribal lands without the consent of the owner or tribal government. Nevertheless, the level of concern expressed regarding this provision has caused us to define “disturbance-causing land use activities” as it is used in the Proposed Rule (see appendix G). The new definition specifically exempts certain land use activities from the closure provision. In addition, we have eliminated the “back-country road” closure provision from the rule because it is not clear that it would be effective in addressing the problem of illegal killing. Instead, more emphasis will be placed on public education and law enforcement.

Comment: The road and den and rendezvous site access closures would prevent Phelps Dodge from accessing wells and equipment on the Upper Eagle Creek and prevent other legitimate access to, and uses of, private property in the BRWRA.

Response: The road closure provision has been deleted. Closures around den and rendezvous sites would be flexible and on an as-needed basis. These would not occur in such a way as to prevent any private property owners access to any private property. See response to previous comment.

Comment: “Loss of use of back country roads has resulted in the lack of access to many areas of National Forest Land in Arizona in recent decades and is a trend which should be reversed not encouraged.” (10) Road closures would backfire and turn people more against the wolf. Any road closures should only be after a public comment period and consultations with affected agencies.

Response: The road closure provision has been deleted.

Comment: “The Draft EIS does not include an adequate analysis of the applicability of ESA sec. 7(a)(1) to federal agency permitting of land uses. For example, would the granting or renewal of a right-of-way across Forest Service lands be permitted if Mexican wolf habitat would be disturbed? Similarly, the Draft EIS does not include any analysis of whether modification of habitat by land uses in the recovery areas would be considered a ‘take’ of wolves under ESA sec. 9(a) and Babbit v. Sweet Home Chapter of Communities for a Greater Oregon et al.” (2,565)

Response: See response to the comment in previous section regrading the FWS/USFS Memorandum of Understanding and permitting rights-of-way. No formal ESA Section 7 consultation would be required regarding potential impacts of land uses on nonessential experimental Mexican wolves. Under the Proposed Action, there is no provision for preventing disturbance of Mexican wolf “habitat” and no critical habitat is designated. The proposed experimental population rule, under Section 1 O(j) of the ESA, already allows for (limited, temporary) restrictions on human access and disturbance-causing activities near occupied release pens, dens, and rendezvous sites. Enforcement of the experimental population rule would make enforcement of the Section 9 taking provisions redundant. Any harm to wolves resulting from pure habitat modification caused by authorized uses of public lands, i.e., not in violation of the closure provisions or other provisions regarding take or harassment, would be a legal take under the proposed rule. Illegal take could not result from habitat modifications occurring on private or tribal lands. Based on evidence from other areas, the FWS does not believe that Mexican wolves will be harmed by authorized land uses. This important point has been clarified in the FEIS, under Chap. 2, Alt. A, section 2.565.
on Management. With or without wolves, additional agency permitting actions (e.g., new mine, road construction, or timber sale) would require compliance with applicable laws, including the National Environmental Policy Act. A complete analysis of a proposal under NEPA may disclose potential effects - both direct and long-term - on wolves and their habitat and appropriate mitigation of such effects could occur.

**Comment:** Cumulative impact on population density and growth are specifically required by the rules, yet no such analysis is found in the report.” (2,677)

**Response:** Wolf recovery is not expected, alone or cumulatively, to impact human population density or growth.

**Impacts on Military Activities**

**Comment:** “To release wolves in White Sands would create a security nightmare. The biologists would have to have a security clearance and I’m sure they wouldn’t approve of any weapons tested anywhere near wolf habitat.” (619)

**Response:** Under the Proposed Action biologists would not have to “approve” weapons testing. Even under Alternative C it is unlikely that the testing that occurs on White Sands would jeopardize wolf recovery or vice versa. Getting a security clearance for biologists does not present a major problem; for ten years an intensive lion study has occurred on the missile range without major conflicts.

**Comment:** “The DEIS claims that impacts from testing in the WSWRA will not (or should not) affect the wolf. What about tests scheduled to be run during the denning season? Will wolf denning take precedence over such tests?” (906)

**Response:** Under Alternative C, if consultations showed that tests could jeopardize wolf pups then possibly such conflicts could occur. Under A and B, the testing or other activities on the range would not require consultations with the FWS. The Proposed Rule (Appendix C), par. (j)(3)(ii), states: “no Federal agency or their contractors will be in violation of the [ESA] for take of a wolf resulting from any authorized agency action.” The FWS believes that the probability of wolves being harmed by authorized activities on the White Sands Missile Range is very remote.

**Comment:** Isn’t there a lot of radioactive debris on the White Sands Missile Range that could affect the wolves’ long-term health?

**Response:** Some debris exists, but it has low levels of radioactivity. Testing activities are monitored to remove most debris, but some is widely scattered. The small amount of low level debris that exists is not considered a biological hazard, thus no areas have been closed to human access because of it.

**Impacts on Recreation**

**Comment:** The projection of increased recreational visitation is unsupported and overstated. The chances of seeing a wolf in the wild will be low. The people who see them the most will be the ranchers, who don’t want to see them.

**Response:** Actually seeing them may be uncommon, but in other areas such as northern Minnesota people can go on howling trips and the wolves frequently howl back. Many people are interested in looking for sign of wolves or just being in an area where they are present. Increased visitation associated with wolf reintroduction, visual sightings, and photography has been reported from Yellowstone National Park. Surveys from Arizona and New Mexico indicate the majority of people would enjoy seeing or hearing a wolf in the wild.

**Comment:** “If you close roads, recreation isn’t going to increase.” (388)

**Response:** The road closure provision has been deleted. The only restrictions on motorized public access now being proposed would be very limited, temporary, and site specific for the purpose of protecting wolves from disturbance or harm in release pens, at dens, and at rendezvous sites. The impact on recreation should be minor.

**Comment:** The minor closures around wolf dens and so on will not significantly impact recreation.
Response: We agree.

Comment: The primary focus of impact evaluation for recreation in the BRWRA should be on non-consumptive uses, because these uses constitute 75% of the recreational visitor days. Wolf recovery will enhance these.

Response: We do say that recreational visitation for the BRWRA could increase because of wolves, but we lack a basis for making quantitative projections. (Most of the WSWRA is closed to the public.)

Comment: Like bears, wolves will congregate around campsites and cause danger to campers, which will scare the campers away.

Response: We lack evidence that wolves have done this elsewhere.

Impacts on Regional Economies

Comment: The benefits of people coming to visit wolf areas, to buy wolf-related items, to study wolves, and to take tours and howling trips will offset the economic losses; this has been observed in the Yellowstone area after reintroduction there as well as in northern Minnesota.

Response: We agree that to some extent this is likely to occur, but did not make a quantitative projection of this in the DEIS. Additional information has been provided in the FEIS, in Appendix J.

Comment: The DEIS should have quantified the beneficial impacts of increased visitation and non-use values.

Response: See previous response. We do refer to the Yellowstone/Central Idaho wolf reintroduction EIS that does this sort of quantification but three main factors led to the FWS decision not to try to project such impacts in the Southwest: 1) conducting the necessary public surveys and analysis by professional economists was considered prohibitively expensive; 2) questions remain about the accuracy of these indirect quantification methods, and 3) NEPA regulations do not require a monetary cost-benefit analysis (see pages 4-1 and -2 of the FEIS).

Comment: Wolf recovery will have a negative economic impact. The wolf will threaten food production regionally and nationally.

Response: Some negative impacts are projected, largely due to lost value of hunting and lost hunting expenditures. Only a very marginal impact on livestock production regionally or nationally is projected.

Comment: Indirect and multiplier effects of the hunting expenditure losses have not been adequately considered; for some small rural retail establishments, hunter expenditures make the difference between profitability and closure.

Response: Effects were considered to the extent they were foreseeably and reasonably related to wolf reintroduction, based on advice from the FWS's economics consultant. A multiplier for hunting expenditure losses was not used for the following reasons. The large majority of deer and elk hunters in Arizona and New Mexico are residents of the two states (96% residents in Arizona and 74% in New Mexico). As a response to reduced deer and elk numbers in the recovery areas, these resident hunters may hunt other big game areas in their state, hunt the same areas with lower success rates, or spend the money they would have spent on hunting on some other purchase in the state. Changes in resident hunting expenditures likely would not result in appreciably less money being spent in the state, but could result in changes in the distribution of that money. The businesses that would likely feel the effects of this shift in spending most acutely are those closest to the recovery areas/hunting areas (and some of those businesses may obtain economic benefits from wolf-related visitation). These areas are very rural and sparsely populated, thus any multiplier of recreational expenditures in these areas likely would be very low (T. Power, Dep’t of Economics, U. of Mont., pers. comm.). U.S. Forest Service economists have not calculated recreational expenditure multipliers for rural areas of Arizona and New Mexico (W. Stuart, USFS, pers. comm.).

Comment: Less income for ranchers means higher unemployment and less tax payment to government.

Response: The private compensation program is designed to minimize lost income to ranchers, but to
the extent that losses are not fully compensated there could be income losses and related economic losses. It is unlikely that this would rise to a level that would result in job losses. Some job creation from the actual implementation of the project is expected, e.g., for field personnel.

Comment: The analysis in Chap. 4 of the economic impact on guides and outfitters of reduced hunting opportunities is inadequate, particularly with respect to Catron County, where this is an important industry

Response: The Regional Economic Impacts section of Chap. 4 does state that Catron County guides could be affected by reductions, but these could be mitigated by additional opportunities to guide people interested in hearing, seeing, and photographing wolves in the wild. There is little basis for concluding that the guide business would be significantly hurt. The EIS does cite to one economic study on the guide/outfitter business in Catron County (SW Center for Res. Analysis 1994). We believe that study overstates the magnitude of these businesses in Catron County by extrapolating based on a small survey response (20%). Further, the study does not establish any link between wolf recovery and harm to the industry.

Comment: Negative wolf impacts combined with spotted owl and other endangered species impacts will devastate rural economies.

Response: We have added more discussion to Chap. 4, Alt. A and C, Cumulative Impacts, regarding the impacts from these other endangered species. There is no basis for concluding that adding the wolf will devastate local economies. Most of the impacts of the spotted owl on the timber economy have already occurred.

Costs of Wolf Reintroduction

Comment: The cost estimates are too low; the cost estimates should be carried out for 30 years or so like Alternative D; the likely long-term costs will be several times the projected $7 million.

Response: Costs are reasonably projected to the estimated time of attainment of the reintroduction goal plus five additional years of monitoring to establish that the population is secure. The Alternative D costs estimates have been revised (see Appendix B). We agree that, if wolves are successfully reestablished, ongoing management costs will be incurred, but we cannot estimate those future costs now with reasonable confidence.

Comment: Wolf recovery is a waste of taxpayer money, particularly in times of massive public debt and in view of the fact that taxpayers paid for its eradication. All wolf related expenditures should end.

Response: Comment acknowledged.

Comment: All wolf related expenditures should continue; this is a small amount of money in comparison to other government expenditures.

Response: Comment acknowledged.

Comment: “Congress won’t support wolf reintro or wolf keeping, so where will the money come from?” (114)

Response: All FWS expenditures have come from Congressional appropriations; without them wolf recovery would probably not occur. Most of the costs of wolf keeping are borne by non-government entities, such as zoos.

Comment: Wolf recovery money would be better spent on beneficial wildlife.

Response: Recovery provisions of section 4 of the ESA do not set different requirements for “beneficial” and “non-beneficial” wildlife, which seem very subjective terms.

Comment: “Whatever [the cost] is estimated to be, we can expect that figure to be doubled because the government never stays within it’s budget.” (724) Yellowstone officials have already asked for larger wolf budgets than their EIS projected.

Response: Budget requests for the Yellowstone National Park reintroduction project have been within cost estimates presented in their EIS. The actual
appropriated budget for that reintroduction effort is less than the projected costs.

**Comment:** In reference to Appendix B: why are costs greater per year for less hands on management (Alt. C) than for Alt. A? Field staff salaries should be lower not higher.

**Response:** Wolf movements would not be restricted under Alternative C. We assumed that livestock depredation control activities would occur as they do in other areas with threatened and endangered wolf populations, thus higher ADC costs were projected. Wolves are expected to colonize the White Mountain, San Carlos, and Mescalero Apache Reservations, thus higher tribal staff costs were projected. Wolves would be distributed over a larger area, thus more field equipment and monitoring costs were projected.

**Comment:** The value of the wolf is not monetary.

**Response:** We agree that the benefits of wolf recovery defy easy quantification.

**Ecosystem Impacts**

**Comment:** Restoring a more natural balance to our wilderness areas is good and enhances long-term sustainability.

**Response:** Comment acknowledged.

**Comment:** Is the food chain broad and strong enough to support a new predator in these areas?

**Response:** Much of the food chain in these areas is relatively intact, except for the top predators.

**Comment:** There are other predators that have taken over the wolf’s ecological role that are less threatening to human interests.

**Response:** The wolf is the only large, coursing, pack-hunting, mammalian predator native to southwestern ecosystems. That role has not been filled by coyotes, lions, or black bears, although the wolf’s demise probably allowed these species to expand their distribution and increase their populations. Those species also cause some damage to human interests.

**Comment:** Wolf predatory behavior has a positive ecological effect by causing herbivores to congregate, thereby concentrating and facilitating the recycling of carbon in the environment.

**Response:** Comment acknowledged; we lack clear information to support or refute this idea.

**Comment:** “In the DEIS, the USFWS has created a new multi-predator system which may not be ecologically sound.” (906)

**Response:** We believe that restoring a native predator will make the area more “ecologically sound”, by most definitions of the term. The multi-predator system that would be created by the proposed action is one that previously existed in the proposed wolf recovery areas.

**Comment:** Before the wolf is restored, better understanding of the impacts of restrictions caused by other threatened and endangered species in the recovery areas is needed. To move toward ecosystem management, we need to understand the cumulative effects of all these recovery actions.

**Response:** We agree that continued analysis of the impacts of having multiple endangered species is needed (see Cumulative Effects discussion in chapter 4 for Alt.s A and C). We disagree that any potential conflicts of wolf management with the management of other species under Alt.s A or B, the nonessential experimental approaches would justify further delaying wolf reintroduction.

**Comment:** “Good range restoration could enable us to have healthier soils, better vegetation, more cows, more game, and wolves.” (Soc., p. 108)

**Response:** We agree that these are good goals; however, we also believe wolf recovery can occur as range restoration occurs and is not dependent on it.

**Comment:** “If we are able to successfully establish populations of this large carnivore, I think it will be an important demonstration that we can truly manage large, intact ecosystems.” (1088)

**Response:** Comment acknowledged.
Animal Rights and Welfare

**Comment:** It was injustice to exterminate Mexican wolves; reintroduction would make up for this.

**Response:** Comment acknowledged.

**Comment:** It will be cruel to reintroduce an animal that is used to captivity, and may violate anti-cruelty laws.

**Response:** We are not aware of any violations of anti-cruelty laws, but recognize there are humane issues involved and will try to avoid or minimize suffering of wolves prior to release and during any handling. The captive animals are expected to largely re-adapt to life in the wild although some will fail and those wolves may die.

**Comment:** It would be inhumane to reintroduce wolves in the very marginal White Sands habitat where they will starve or die of thirst.

Response: Our analyses predict that the habitat, water, and prey available on the WSWRA could sustain a population of about 20 wolves. However, recent concerns over the effects of prolonged drought conditions would cause us to reanalyze the status of prey populations before a reintroduction would occur there.

**Comment:** Wolf reintroduction involves so much handling, mortality, and harassment that it ultimately causes suffering and does not benefit the wolves. “They will be persecuted, slaughtered and tortured to death, exactly as they always were.” (2,997)

**Response:** Recovering populations in the wild may include as a cost the possible suffering or death of individual animals. We would implement handling protocols that support humane treatment of individual wolves, we would use the most humane trapping and management technologies available, and we would enforce laws against unauthorized killing or unnecessary harassment.

**Comment:** “Page 2-23 mentions euthanasia for control of problem wolves.... you can address animal welfare concerns by being sure to follow American Veterinary Medical Association (AVMA) guidelines on euthanasia.” (3,659)

**Response:** We have added a statement that any euthanasia would be done in accordance with the AVMA guidelines, where feasible.

**Comment:** The agencies plan “to train the wolves to hunt before they are released, by putting live animals into their cages for them to kill.” (2,997)

**Response:** Live animals regularly enter wolf enclosures with no assistance from humans providing some hunting opportunities for captive wolves. An ability to hunt is vital to released captive wolves’ chances for survival in the wild. If feasible, some trials in hunting skills may be conducted at the FWS’s captive wolf management facility. However, if conducted, it would be limited to small animals. Exposure to larger prey would be accomplished by providing dead carcasses (e.g., road kills) of deer and elk.

**Comment:** Keeping the wolves in captivity causes suffering and should be terminated promptly.

**Response:** We believe that the establishment of a captive population has probably prevented the extinction of the Mexican wolf and has made the re-establishment of wild populations possible. A goal of the captive population management program is to provide Mexican wolves an environment that is as natural and stress free as can be achieved in a captive setting. Pens are generally large and contain a variety of natural landscape features and hiding or escape cover. Any suffering by captive Mexican wolves serves the cause of long-term preservation of their subspecies.

**Comment:** Wolves cruelly hamstring their prey and often eat them while they are still living.

**Response:** We don’t dispute that this occurred, but we don’t know how much; hamstringing is not well documented in the scientific literature. It may occur incidentally as a result of attacking from behind rather than being an “intentional” hunting strategy. Characterizing long-established wild animal behavior as “cruel” seems debatable, i.e., a subjective judgement.
Social, Cultural, and Philosophical Issues

Comment: Public opinion polls show the majority of people surveyed support wolf recovery.
Response: We agree.

Comment: Wolf recovery is just to appease a few radical environmentalists.
Response: Wolf recovery is not to serve any group of citizens, rather it is to meet the goals of the Congressionally-approved ESA.

Comment: The majority of rural people are against it. Wolf recovery will have a negative impact on the custom and culture of the rural areas involved. The livelihoods of ranchers and the security of their children will be destroyed.
Response: Chap. 4 of the FEJS acknowledges that many rural people are against it and that some negative impact on their custom and culture may occur, although as suggested by the following comment, some positive effects could also result. According to polls, many rural people support wolf recovery. Wolves and ranchers (and their children) co-exist in other areas without severe impacts.

Comment: “Wolf recovery will have a positive effect on our Custom, Culture and the economy of Sierra County.” (690 et al.)
Response: See previous comment and response.

Comment: “If we can get through the first few years without a major ‘people problem’ I think everyone will be able to adapt (including the wolves!).” (712)
Response: We generally agree.

Comment: “Wolves are an important part of Arizona’s history.” (586)
Response: Comment acknowledged.

Comment: Eliminating wolves was necessary to allow settling of the west and their absence is an important aspect of the “custom and culture” and history of the rural areas involved.
Response: Comment acknowledged.

Comment: We should not let the Mexican wolf go extinct because it may have as yet undiscovered value. Future generations should not be deprived of this animal. As the ancestor of dogs we owe much to them and should preserve them for possible genetic enhancement of dog breeds.
Response: Comment acknowledged; we think the comment reflects some of the ESA’s goals.

Comment: Humans have dominion over the animals and that includes not restoring an animal that is detrimental to humans.
Response: The ESA does not limit restoration to so-called “beneficial” species, a subjective judgment. Indeed, the ESA supports the concept that restoration of viable populations of virtually all native species is a human benefit.

Comment: The only people who will benefit are the wolf breeders, government trappers, and bureaucrats.
Response: No commercial wolf breeders are involved in the Mexican Wolf Captive Breeding Program. This program is not to benefit government workers. There are many easier, less controversial, ESA recovery projects that these workers could do if they were not working on the wolf.

Comment: The major cost in terms of hate and human conflict is not worth it.
Response: Social conflict, while certainly present, has not proven to be excessive in other areas where wolves have been restored. Continuing public involvement and education, the depredation compensation fund, and responsive, professional, wolf management should help to reduce the conflict.

Comment: The wolf is important symbolically to show human willingness to control “development” and to share the earth with other species.
Response: Comment acknowledged.
Public Information and Education

Comment: Wolves should be restored so people can learn from them. Both public and scientific understanding would benefit from the opportunity to observe southwestern ecosystems with the top predator restored, and to compare these areas to those without wolves.

Response: We agree that recovery would provide educational and scientific opportunities.

Comment: The FWS should listen to local ranchers for suggestions and input, and should work closely with them to try to get their cooperation and support. An advisory committee could go a long way toward helping this.

Response: We agree. We have talked with many ranchers and are considering the establishment of some type of advisory committee. This concept has been incorporated into the description of the Preferred Alternative, in Chap. 2.

Comment: “The wolves’ only chance for a safe and successful return to the wild is through massive public education and support.” (548) Hunters, trappers, drivers and others need strong education programs to reduce unintentional killings.

Response: We intend that such efforts would be part of the reintroduction program.

Comment: The projected costs in Appendix B should have greater expenditure for public education to ensure wolf recovery.

Response: The projected costs for information/education are for actual materials development, printing, etc. Staff and administrative costs are included elsewhere in the cost tables. We believe these estimates are realistic.

Other Issues

Comment: “All agencies involved in this effort should be willing and ready to provide just compensation for physical and emotional pain if it is a result of the wolf reintroduction.” (41) The FWS should create a guaranteed right of indemnity for all losses that occur.

Response: This sort of “insurance” approach has not occurred with recovery of other species and is not planned here. The FWS would be subject to potential liability under this proposal in the same way it is for other governmental actions.

Comment: Domestic dogs will go “outlaw” and run with wolf packs.

Response: This might occur with some dogs, but little historical evidence exists of this phenomena (Young and Goldman 1944). Wolves are more likely to kill domestic dogs than to associate with them beyond brief encounters.

Comment: What veterinary measures will be taken?

Response: This has been explained in Chap. 2 of the Final EIS, under The Soft Release Approach, and in Appendix A.

Comment: “Many of the fears expressed by the northern tier of states in reintroducing the grey wolf have proven, in reality, to have little or no foundation. So, I believe, will be the case in our Southwest.” (588)

Response: We generally agree, but believe that those fears should not be ignored.

Comment: The reintroductions in Yellowstone and Central Idaho should be fully studied to be sure it is working before any reintroductions in the Southwest.

Response: We are closely monitoring the results of recent reintroductions of gray wolves to Yellowstone National Park and central Idaho (see Appendix J). Relevant knowledge gained from those projects and the red wolf reintroductions in North Carolina and Tennessee (see Phillips 1992) will be applied to the Mexican wolf reintroduction project, if it is approved.

Comment: The FWS already has released captive Mexican wolves in the Southwest.
Appendices
APPENDIX A
Mexican Gray Wolf Life History and Ecology

Introduction

This summary is adapted closely, without further citation from Appendix Two to the Final Environmental Impact Statement on the reintroduction of gray wolves to Yellowstone National Park and central Idaho (USFWS 1994c). Information specific to Mexican gray wolves, where available, is referenced separately. The Mexican wolf was not well studied in the wild prior to its extirpation. Therefore, many of the assertions herein are based on studies of northern populations. Topics covered are: pack organization, mortality, prey, influence on ungulate populations, influence on other predators, livestock depredation, attacks on humans, pathogens and parasites, hybridization, and wolf movements.

Pack Organization

The basic social unit in gray wolf populations is the pack. This usually consists of five to 15 individuals with strong bonds to each other. Bailey (1931) noted that the Mexican wolf was commonly found in groups of up to eight animals prior to the advent of intensive governmental control efforts; after that it appears that group size became smaller (McBride 1980, Bednarz 1988). Bednarz reviewed the range of wolf pack sizes in other areas in which deer are the primary prey, as probably would be the case for the Mexican wolf, and estimated the latter’s pack size would average 5.5 animals. McBride (1980) had followed many wolves in Mexico and never reported tracking a group larger than five individuals, with three being the most frequent group size.

New packs are formed when two lone wolves of the opposite sex find each other, develop a pair bond, breed, and produce a litter of pups. Central to the pack are the dominant (alpha) male and female. The remaining pack members are usually related to the alpha pair and constantly express their subordinate status through postures and expressions when interacting with the dominant animals. Changes can occur in each wolf's social position in the pack.

Breeding usually occurs only between the alpha male and female. Wolves become sexually mature at two years of age. Although courtship behavior occurs in varying degrees throughout the year, actual breeding takes place around February (McBride 1980). During the breeding season in late winter the pack may move extensively within its territory.

Pregnant alpha wolves complete digging of dens as early as three weeks before the birth of the pups. Mexican wolf dens are often dug under rock ledges (McBride 1980); or they may be dug under the roots of an upturned tree or, if in open country, under a bush (Bailey 1931). Water is usually nearby. Some dens are used by the same wolf pack year after year. Also, certain areas (on the order of 5 mi²) may contain several den sites which are used in different years by the pack. Some wolf packs can be sensitive to humans during this season and may abandon the den if disturbed. This poses a risk to younger pups that cannot regulate their body temperature.

Pups are born around April after a 63-day gestation period. Sizes of 16 wild Mexican wolf litters examined by McBride (1980) averaged 5.6 pups. With the denning area established in the spring, pack movements center around the den. However, adult pack members may travel long distances from the den for food. The maternal female is usually at the site more than other adults, but she may also range several miles away. All pack members may help feed the female and young. Pack members also provide play and protection for the growing pups. Pups are weaned at five to six weeks of age.

In northern regions, a pack will usually move from the den site (or occasionally from a second den site) to the first rendezvous site when the pups are six to ten weeks old, which is in late May through early July. The first rendezvous site is usually within one to six miles of the natal den site and often consists of open areas interspersed with timber, with water nearby. A succession of rendezvous sites are used by the pack until the pups are mature enough to travel with the adults, usually by September or early October. Each
successive rendezvous site is usually one to four miles from the previous site. Occupancy times vary from ten to 67 days. As with dens, rendezvous sites may be used by wolf packs year after year. Wolves appear less sensitive to human disturbance at later rendezvous sites than they do at the first one. It is not known whether, or to what extent, Mexican wolves use rendezvous sites. By about October pups are mature enough to travel with the adults and the pack wanders throughout the territory. As the pack travels, preying primarily on ungulates, the alpha wolves usually lead the pack and choose the direction. Wolves often travel along established routes including game trails, roads, and waterways, occasionally cutting across from one such route to another. Daily travel distances for packs are typically in the range of one to nine miles, while distances between successive kills vary from eight to 34 miles. Some Mexican wolves in southwestern New Mexico and southeastern Arizona followed “runways”, i.e., well-established loop routes of 70 to 100 miles along favored hilly terrain (Young and Goldman 1944).

In most wolf populations packs occupy exclusive territories. These range in average sizes from 80 mi$^2$, as in Minnesota, to over 660 mi$^2$ as in Alberta. Bednarz (1989) suggested Mexican wolf territories would average around 200 mi$^2$. Of course, actual territory size of Mexican wolf packs will vary with each pack and over time depending on numerous factors. Lone wolves may range over areas in excess of 1,000 mi$^2$.

As pack members are traveling they leave urine and scat markers which identify their territories. Foreign wolves entering established territories are occasionally killed.

Mortality

Wolves die from a variety of causes: disease, malnutrition, debilitating injuries, interpack strife, and human exploitation and control. In areas with little or no human exploitation the primary causes of mortality are disease and malnutrition in pups or yearlings. Deaths of adults often result from other wolves. Mortality rates in unexploited populations can average about 45% for yearlings and 10% for adults. Ten years is an old age for a wild wolf. Fall and winter are critical periods for wolf survival. Beginning in the fall, wolf mortality rates are most influenced by the degree of exploitation and control by humans. Overwinter (October-March) mortality rates within packs range from 0% to 33% for a minimally exploited population to 14% to 88% for a heavily exploited population. Established wolf populations apparently can withstand annual human-caused mortality rates of 28% to 35%.

Prey

The wolf was the primary predator of large ungulates in most of North America, a role it now shares with humans. No other predator in the western United States replaces its ecological role. Although the coyote occasionally preys upon young, old, and vulnerable ungulates, its main diet consists of rodents and rabbits. Other predators that regularly prey on large mammals in North America include mountain lions, black bears, and grizzly bears. The mountain lion’s methods of hunting (primarily “ambush”) and social organization (solitary) contrast sharply with the cooperative ways of the wolf. Bears, usually solitary by nature, sometimes stalk and kill ungulates, taking mostly calves, but occasionally taking vulnerable adults.

Wolves depend upon ungulates for food year-round, although smaller mammals can be important alternatives. On average northern wolves eat 9.0 pounds of meat per wolf per day during winter. The lighter Mexican wolf is estimated to eat an average of 6.1 pounds of meat per day (Parsons 1994). Although the wolf is capable of eating large quantities of food in a short time, such quantities are not always available. Thus, wild wolves may go for several days without eating. They appear able to fast for periods of two weeks or more while searching for vulnerable prey. When food is available, wolves can replenish themselves to prepare for another period of fasting. The frequency of kills by a pack varies, depending on many factors including: (1) pack size; (2) diversity, density, and vulnerability of prey; (3) terrain and snow conditions; and (4) degree of utilization of the carcasses.

The natural prey of the Mexican wolf are expected to be mule and white-tailed deer, elk, javelina, and, occasionally, pronghorn, bighorn
sheep, jackrabbits, cottontails, turkeys, and small rodents. They also may take two types of non-indigenous prey present in the ‘White Sands Missile Range area-feral horses and oryx. Because the wolf’s expected prey varies in size, the kill rate of each species varies according to the amount of food each provides. Smaller ungulate prey are preferred (Mech 1970). Wolves consume an average of 75% of the live weight of the ungulates they kill (Peterson 1977). About 5% of the ungulate weight consumed by wolves consists of scavenged carrion (Fuller and Keith 1980).

In Minnesota, where wolves eat white-tailed deer almost exclusively, estimated kill rates range from 15-19 deer per wolf per year. In areas where elk are the dominant prey, kill rates are generally lower. In Riding Mountain National Park, Canada, an average of 14 ungulates per wolf per year were killed, consisting of deer, elk, and moose. It has been estimated that the wolves reintroduced to Yellowstone National Park will each kill an average of twelve ungulates annually. The average Mexican wolf is expected to kill a combined live weight of 2,823 pounds of prey annually, which will be mostly deer and elk with roughly 15% to 25% consisting of alternate prey (Parsons 1994). The composition of prey species in the diet will vary depending on species availability and vulnerability.

**Influence on Ungulate Populations**

Wolf predation on larger ungulate populations usually reduces the fluctuations in ungulate numbers over time. Smaller die-offs from winter-kill may occur when wolves are present because wolves are preying on weakened animals before they die.

Predation is one component of total annual ungulate mortality. Wolves can, but typically do not, deplete their prey; but, they may keep some ungulate populations at low levels if the populations are already low and other limiting factors exist. Computer models predict that the wolves reintroduced into the Yellowstone National Park area will eventually cause ungulate reductions ranging from 5% to 30% for different populations, but they will not have devastating effects. (See Chap. 4 on Environmental Consequences for discussion of modelling of Mexican wolf impacts on ungulates.)

**Influence on Other Predators**

Wolf impacts on other predators can vary. Coyotes may be less abundant where Mexican wolves are present (Leopold 1959); however, historical anecdotes about Mexican wolves on this subject cited by Brown (1983) are contradictory (see also Paquet 1992). Ligon (1927) did indicate that the coyote’s range in New Mexico expanded markedly during the same period that the wolf was extirpated; this range expansion took place in the mountainous areas formerly favored by wolves. Red foxes and other small carnivores may benefit from increased scavenging opportunities created by wolves, although wolves may attack them opportunistically. Black bears and wolves usurp carcasses from each other and wolves occasionally prey upon black bears, but no published information suggests populations of either species are significantly affected. Bears and gray wolves coexist throughout much of Alaska and Canada.

Some evidence suggests the Mexican wolf’s demise lead to expansion of mountain lions into habitat formerly occupied by the wolf (Bednarz 1988). These two predators compete; researchers have observed several instances of wolves chasing lions, driving them off their kills, and even killing them (Hornocker Wildlife Research Institute 1993). Wolf re-establishment may compel lions to limit their activities to areas where they are relatively safe from wolf attacks.

None of the other large predatory mammals in the Southwest are threatened or endangered (although the grizzly bear is regionally extinct), except for the extremely rare ocelot and jaguar, which have been sporadically reported from southeastern Arizona (USFWS 1990). No information exists regarding historic interactions, if any, between these species and Mexican wolves.

**Livestock Depredation**

Accounts of depredation stress that in the late 1800s and early 1900s the Mexican wolf preyed heavily on cattle, causing intolerable losses to ranchers (Gish 1977, McBride 1980). Brown
(1983) asserted that, of 41 Mexican wolf stomachs examined by federal predator control agents in the early 1900s, 19—or 46%—contained livestock. Bednarz (1988) noted that Brown did not report the qualification made by Ligon included with the original summary of these data (Pred, Animal and Rod. Cont. Serv. 1918):

“Many trappers fail entirely to report stomach contents, while others are careless, and records that are made by them have little value.” These predator control agents had an incentive to exaggerate the extent of depredation to justify their programs (Dunlap 1988). Nevertheless, McBride (1980) also reported high proportional representation of livestock in wolf stomachs and scats he analyzed in Mexico from 1958 to 1968, while trapping on ranches where depredation was reported.

High historical depredation rates are inconsistent with the situation now in other areas where gray wolves and cattle co-exist, such as the northern Rocky Mountains and northern Minnesota, where depredation is quite uncommon relative to livestock numbers available (range: 0.004% to 0.09% of available cattle killed by wolves annually; Mack et al. 1992). One explanation offered for the apparently high historical depredation rates in the Southwest is that new settlers greatly reduced the natural prey base of wolves through overhunting and habitat degradation at the same time they introduced large numbers of livestock throughout the region (Brown 1983, Scudder 1977). Bednarz (1988) suggested other possible causes for the actual or perceived high wolf depredation rates, including, 1) overstocking of rangelands (see Ligon 1927) resulted in widespread cattle mortality and the availability of carcasses for scavenging (see USFWS 1993d); 2) extensive killing of wolves disrupted natural social units leading to a high proportion of lone wolves that depredated more heavily; and 3) livestock killed by coyotes and dogs were attributed to wolves. Also Gipson (quoted in McIntyre 1994) questions the validity of historic accounts of wolf depredation rates. (See Chap. 4 on Environmental Consequences and Appendix F for discussion of projecting future Mexican wolf depredation rates in the Southwest.)

In addition to cattle, wolves may kill sheep, horses, donkeys, turkeys, and other domestic animals, including household pets. They may also scavenge domestic animal remains.

**Attacks on Humans**

Very few reliable accounts exist of attacks by healthy wild gray wolf on humans, none involving death (USFWS 1987, Mech 1992). This is despite the fact that millions of people work and recreate each year in wolf range in Canada, Alaska, Minnesota, and other areas. Rabid wolves have, on extremely rare occasions, attacked people, who then died of rabies. Johnson (1992) refers to two cases from Alaska (the last one 53 years ago, in 1943) and one suspected case in the Lower 48 states, from Wyoming in 1833. (See discussion below under Pathogens and Parasites.)

No accounts exist of Mexican gray wolf attacks on humans. Nevertheless, humans should be aware and cautious when travelling in wolf range, as they should when near any wild predator.

**‘Pathogens and Parasites**

The Mexican wolf in the wild is not likely to transmit parasites or disease-causing pathogens that are not already carried by other canids (L. Munson, Univ. of Tenn., pers. comm.). The wolf’s contribution to the overall parasite or pathogen problems in any given area is expected to be slight because of the relatively small anticipated population size of the reintroduced wolves. Even so, the pathogens that wolves could potentially be exposed to in the wild will be addressed here. The pathogens include canine parvovirus, canine distemper, infectious canine hepatitis, leptospirosis, and rabies. No statistics on canine parvovirus or distemper in domestic or wild animals in the Southwest have been compiled; however, these pathogens do occur in canids, primarily in areas of dense human population. Cases of canine parvovirus are much more common in domestic dogs than canine distemper (K. Grants, Arizona State Veterinarian, pers. comm.). Canine parvovirus has been linked to the deaths of some captive Mexican wolf pups. Neither canine hepatitis nor leptospirosis is a concern in the Southwest. Nevertheless, the
protocol for Mexican wolves to be released into the recovery areas will be vaccination for rabies, parvovirus, distemper, hepatitis, and leptospirosis while in captivity and just before release (B. Snyder, Rio Grande Zoological Park, pers. comm.).

While rabies could infect wolves in some of the recovery areas, wolves are not likely to play a significant role in its spread (Johnson 1992). Reports from the lower 48 states of human exposure to rabies from wolves have been very rare throughout history (one documented case in Minnesota) (Ibid.). However, other canids in the Southwest, as well as potential prey animals, can carry rabies. In southeastern Arizona, a total of 280 wild animals were confirmed to have rabies from 1989 through the first half of 1994. These were mostly skunks and bats, and occasionally coyotes, foxes, and bobcats (Ariz. Dept. of Health Services 1994).

An outbreak of rabies in coyotes and domestic dogs has been occurring in 16 Texas counties south of San Antonio. Since 1988, 450 coyotes and dogs tested positive for rabies in these counties. Coyotes are believed to be the primary carriers of the disease there. However, of about 1,200 humans that received a rabies vaccination during this outbreak, 90% were exposed to domestic dogs that may have had rabies. Texas has initiated a program to stop the northern progress of the outbreak, involving public education and widespread vaccination of coyotes (G. Fearneyhough, Texas Dept. of Health, pers. comm.). In the event that captive-raised wolves would be reintroduced into the wild, the initial stock would be vaccinated for rabies. Wild-born wolves would not be routinely trapped for vaccination except in cases of serious outbreaks, but they could be opportunistically vaccinated when they were captured for other reasons.

Wild Mexican wolves may be susceptible to internal and external parasites, including mites, ticks, fleas, heartworm, tapeworm, and hookworm. None are considered a significant transmission threat to humans when carried by wild wolves because of the expected low wolf numbers.

Some significant pathogens and parasites that Mexican wolves are not expected to be exposed to include canine hepatitis, leptospirosis, echinococcus, whipworms, Lyme disease, plague, brucellosis, and scabies. Canine hepatitis and leptospirosis are rare in the Southwest. Neither echinococcus, which is transmitted via tapeworms, nor whipworms have been reported in Arizona, New Mexico, or Texas in recent years.

Lyme disease has been reported in wolves in Minnesota and Wisconsin (Thieking et al. 1992). Dogs are relatively severely affected by Lyme disease, thus, it is plausible that this disease could negatively influence wolf populations (Ginsberg 1994). However, Lyme disease has not been documented in domestic or wild animals in New Mexico or Arizona (J. Thilstead, NM Dep’t. of Agric. Vet. Diagnostic Ctr., pers. comm.). Further, the organism that causes Lyme disease has not been found in ticks from New Mexico or Arizona (T. Brown, NM Environment Dep’t Vector Control Div., pers. comm.).

Plague is not associated with wolves. Brucellosis has not been found to affect wolves, except canine brucellosis, which has not been reported in other canids in the Southwest. Canine brucellosis is primarily limited to domestic dog breeding kennels and is not associated with free-ranging canids (M. Johnson, Yellowstone NP, pers. comm.). No cases of scabies in canids have been reported in the Southwest for several years. Scabies is host-specific, meaning that canine scabies could affect wolves but could not be transmitted to other species such as wild prey, livestock, or humans (B. Snyder, Rio Grande Zoological Park, pers. comm.). Scabies outbreaks in desert bighorn sheep populations in parts of New Mexico such as White Sands Missile Range will not affect any wolves that may ingest infected sheep, nor can such wolves spread the scabies outbreak to other sheep.

Hybridization

Mexican wolves could potentially interbreed with domestic or feral dogs or coyotes. Past interbreeding between wild northern gray wolves and coyotes has been documented in Minnesota, Ontario, and Quebec (Lehman et al. 1991). Nevertheless, obviously hybrid phenotypic forms (that is, canids that appear intermediate between wolves and coyotes) are not found in the wild (L.D. Mech, Nat’l Biol. Survey, pers. comm.).
except possibly in southeastern Ontario (Kolenosky and Standfield 1975).

There are no records of Mexican wolves interbreeding with coyotes and, while the future potential exists, the likelihood is not considered great (Brown 1983). This potential will be further minimized by: (1) releasing mated pairs, (2) closely monitoring and studying released wolves and their offspring, (3) capturing and relocating wolves that disperse out of wolf recovery areas, and (4) re-establishing wolf populations in numbers sufficient that potential wolf mates are available for dispersing wolves.

Wolf Movements

Three key types of movements could be displayed by reintroduced Mexican wolves: homing, pack territory shifts, and dispersal from packs.

Homing

This is the movement of displaced wolves toward their place of origin. Mostly it has been observed in releases of translocated wild wolves (Fritts 1992). However, in a 1972 experimental release of five captive-raised wolves in Alaska, three of the animals travelled toward the town where they were raised, 175 miles away (Henshaw and Stephenson 1974). The animals used in this experiment were “hard released,” that is, they were let go without prior acclimation through holding them in pens in the release area. This is the only previous case of releasing captive-raised gray wolves on the mainland; two other releases occurred on islands, inhibiting any homing tendency.

In a review of all documented U.S. releases of both captive and wild-raised wolves, Fritts (1992) found that 10% of the wolves actually returned to their place of capture or prior holding facility. Several others apparently attempted to do so. Homing was least likely to occur under the following circumstances: the released animal was a pup; the release site was more than 40 miles or so from the animal’s place of origin; and the animal remained around the release site initially after release. If captive-raised Mexican wolves homed, they likely would head toward the eastern part of the Sevilleta National Wildlife Refuge, to the Mexican Wolf Captive Management Facility, where they came from. This is more than 40 miles north of the WSWRA primary recovery zone and more than 120 miles northeast of the BRWRA primary recovery zone.

Pack Territory Shifts

If, or when, a released group has settled into a definable territory, there is no assurance it will stay there. A newly colonizing wolf pack may shift its territory in response to climate, food availability, human disturbance, and other factors. A colonizing pack may have a larger, more fluid, territory than a pack surrounded by other wolf packs; also, some evidence suggests that wolf packs colonize in areas that were first “pioneered” by dispersing lone wolves (Ream et al. 1991).

Dispersal from Packs

This occurs when young wolves, often yearlings, disassociate from their natal pack and either move into a breeding vacancy in another pack or become lone wolves. Dispersal is a key process in wolf re-establishment. It leads to new pack formation, more breeding pairs, and wider areas of wolf occurrence. However, mortality rates during dispersal are high compared to when wolves are in packs (Mech 1977).

Wolves exhibit three main dispersal strategies: appropriating part of the territory of the natal pack, establishing a territory adjacent to the natal pack’s, and long-distance dispersal (Mech 1987). The latter can involve directional dispersal, in which the wolf moves on a relatively straight path, or nomadic dispersal, in which the wolf wanders in various directions.

Little is known about the dispersal patterns of Mexican wolves in particular, although gray wolf dispersal generally has been well-studied. Most of these studies have analyzed dispersal in the context of numerous wolf packs within a given area of established wolf range, e.g., northern Minnesota. These findings may not correlate to the situation of wolves being released into an area where no other wolf packs exist.
However, some researchers have studied dispersal from wolf packs that were naturally recolonizing a wolf-free area, a situation most comparable to releasing captive-raised wolves into a wolf-free area. Ream et al. (1991) studied dispersal from packs that were recolonizing the northern Rocky Mountains in the 1980s. They found all three types of dispersal behavior described by Mech (1987), including long-distance directional dispersal in which a few lone wolves travelled for hundreds of miles over several months. If released into the wild, Mexican wolves would likely display the types of movements discussed above.
APPENDIX B
Projected Total Costs of Implementing the Alternatives

Alternative A (Preferred Alternative): Nonessential experimental releases with dispersal allowed, first in the Blue Range Wolf Recovery Area (BRWRA) with the White Sands Wolf Recovery Area (WSWRA) as a back-up area.

Notes: Field project staff would include 1 field project leader (biologist), 1 wildlife biologist, 1 biological technician, 1 animal damage control specialist, and 1 or 2 part-time tribal wildlife biologists (if the tribes choose to cooperate in wolf management). The animal damage control position would be assigned to the USDA Animal Damage Control Division and funded by a transfer of FWS appropriations. The tribal biologist positions would be divided between the San Carlos and Apache Tribes and funded by FWS appropriations through cooperative agreements with the tribes. Other field positions would be assigned to designated lead and/or cooperating agencies and funded by FWS appropriations and state matching funds (if the states choose to cooperate in wolf management). This cost estimate for Alt. A assumes that population objectives will be reached in 9 years and intensive population monitoring will continue for an additional 5 years for a total project life of 14 years. The cost of operating the Sevilleta Wolf Management Facility has been included as an added cost for each alternative, reflecting the dual purposes for this facility of holding captive wolves in the absence of a reintroduction decision and acclimating wolves for release if reintroduction is approved.

Table B-1.

<table>
<thead>
<tr>
<th>Activity</th>
<th>Reintroduction Costs/Year 1997-2001</th>
<th>Management Costs/Year 2002-2010</th>
</tr>
</thead>
<tbody>
<tr>
<td>Field staff salaries</td>
<td>$203,600</td>
<td>$203,600</td>
</tr>
<tr>
<td>Administration/overhead</td>
<td>$151,000</td>
<td>$147,000</td>
</tr>
<tr>
<td>Equipment/maintenance</td>
<td>$20,000</td>
<td>$20,000</td>
</tr>
<tr>
<td>Release pen construction</td>
<td>$19,000</td>
<td>----</td>
</tr>
<tr>
<td>Wolf care and feeding</td>
<td>$5,000</td>
<td>----</td>
</tr>
<tr>
<td>Sevilleta facility O&amp;M</td>
<td>$60,000</td>
<td>$60,000</td>
</tr>
<tr>
<td>Information/education</td>
<td>$8,000</td>
<td>$6,000</td>
</tr>
<tr>
<td>Monitoring/research</td>
<td>$80,000</td>
<td>$65,000</td>
</tr>
<tr>
<td>Total Annual Cost</td>
<td>$546,600</td>
<td>$501,600</td>
</tr>
<tr>
<td>Total Cost of Alternative A</td>
<td>$7,247,400 (1996 dollars)</td>
<td></td>
</tr>
</tbody>
</table>
Alternative B: Nonessential experimental releases in the BRWRA and WSWRA with prevention of dispersal beyond the primary recovery zones.

**Notes:** Field project staff would include 1 field project leader (biologist), 2 wildlife biologists, 1 biological technician, 1 part-time animal damage control specialist, and 1 or 2 part-time tribal wildlife biologists. Staff agency affiliations and funding arrangements would be similar to those for Alt. A. Field staff needs are greatest for this alternative because reintroductions would take place simultaneously in the BRWRA and the WSWRA primary recovery zones and because intensive management will be necessary. This cost estimate for Alt. B assumes that population objectives will be reached in 5 years and intensive population monitoring will continue for an additional 5 years for a total project life of 10 years.

**Table B-2.**

<table>
<thead>
<tr>
<th>Activity</th>
<th>Reintroduction Costs/Year 1997-2001</th>
<th>Management Costs/Year 2002-2006</th>
</tr>
</thead>
<tbody>
<tr>
<td>Field staff salaries'</td>
<td>$261,000</td>
<td>$161,000</td>
</tr>
<tr>
<td>Administration/overhead³</td>
<td>$162,000</td>
<td>$158,000</td>
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<tr>
<td>Equipment/maintenance</td>
<td>$18,000</td>
<td>$18,000</td>
</tr>
<tr>
<td>Release pen construction</td>
<td>$14,000</td>
<td>----</td>
</tr>
<tr>
<td>Wolf care and feeding'</td>
<td>$7,000</td>
<td>----</td>
</tr>
<tr>
<td>Sevilleta facility O&amp;M</td>
<td>$60,000</td>
<td>$60,000</td>
</tr>
<tr>
<td>Information/education</td>
<td>$8,000</td>
<td>$6,000</td>
</tr>
<tr>
<td>Monitoring/research</td>
<td>$65,000</td>
<td>$65,000</td>
</tr>
<tr>
<td>Total Annual Cost</td>
<td>$610,600</td>
<td>$568,600</td>
</tr>
<tr>
<td>Total Cost of Alternative B</td>
<td>$5,890,000</td>
<td></td>
</tr>
</tbody>
</table>
Alternative C: Releases in the BRWRA only with full protection under the Endangered Species Act.

Notes: Field project staff would include 1 field project leader (biologist), 1 wildlife biologist, 1 biological technician, 1 animal damage control specialist, and 1 full-time or 2 or more part-time tribal wildlife biologists. Staff agency affiliations and funding arrangements would be similar to those for Alt. A. Tribal staff involvement is higher for this alternative because wolf dispersal would not be controlled. Estimated costs are less than in the draft EIS because reintroductions would be limited to just the BRWRA. This cost estimate for Alt. C assumes that population objectives will be reached in 5 years and intensive population monitoring will continue for an additional 5 years for a total project life of 10 years.

Table B-3.

<table>
<thead>
<tr>
<th>Activity</th>
<th>Reintroduction Costs/Year</th>
<th>Management Costs/Year</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1997-2001</td>
<td>2002-2006</td>
</tr>
<tr>
<td>Field staff salaries’</td>
<td>$224,000</td>
<td>$224,000</td>
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<tr>
<td>Administration/overhead’</td>
<td>$155,000</td>
<td>$151,000</td>
</tr>
<tr>
<td>Equipment/maintenance</td>
<td>$25,000</td>
<td>$25,000</td>
</tr>
<tr>
<td>Release pen construction</td>
<td>$11,400</td>
<td>$8,000</td>
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<tr>
<td>Wolf care and feeding’</td>
<td>$5,000</td>
<td>$10,000</td>
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<tr>
<td>Sevilleta facility O&amp;M</td>
<td>$60,000</td>
<td>$60,000</td>
</tr>
<tr>
<td>Information/education</td>
<td>$10,000</td>
<td>$800</td>
</tr>
<tr>
<td>Monitoring/research</td>
<td>$100,000</td>
<td>$0,000</td>
</tr>
<tr>
<td>Total Annual Cost</td>
<td>$590,400</td>
<td>$548,600</td>
</tr>
<tr>
<td>Total Cost of Alternative C</td>
<td>$5,692,000</td>
<td></td>
</tr>
</tbody>
</table>
**Alternative D - No action.**

Notes: For purposes of estimating costs, two possible scenarios are considered: (1) wolves fail to recolonize naturally and (2) wolves recolonize naturally. In both cases it is assumed that certain ongoing recovery activities would continue (the status quo), such as investigating sighting reports and maintaining a captive population at the Sevilleta facility. If Mexican wolves do not recolonize former habitats in the U.S., the Mexican wolf recovery staff would consist of 1 lead FWS biologist. This level of involvement could continue as long as the subspecies has status under the ESA, thus only annual costs are provided. Assuming that one population of wolves did naturally recolonize one area, the project staff would include 1 project leader (biologist), 1 biological technician, and 1 part-time animal damage control specialist. Because of the speculative nature of this scenario, only annual costs are estimated.

**Table B-4.**

<table>
<thead>
<tr>
<th>Activity</th>
<th>Reintroduction Costs/Year</th>
<th>Management Costs/Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Field staff salaries*</td>
<td>$ 60,500</td>
<td>$ 103,000</td>
</tr>
<tr>
<td>Administration/overhead</td>
<td>$ 18,000</td>
<td>$ 25,000</td>
</tr>
<tr>
<td>Equipment/maintenance</td>
<td>$ 8,000</td>
<td>$ 19,000</td>
</tr>
<tr>
<td>Release pen construction</td>
<td>$ ----</td>
<td>$ ----</td>
</tr>
<tr>
<td>Wolf care and feeding*</td>
<td>$ ----</td>
<td>$ ----</td>
</tr>
<tr>
<td>Sevilleta facility O&amp;M</td>
<td>$ 60,000</td>
<td>$ 60,000</td>
</tr>
<tr>
<td>Information/education</td>
<td>$ 1,500</td>
<td>$ 3,500</td>
</tr>
<tr>
<td>Monitoring/research</td>
<td>$ - - -</td>
<td>$ . 0 0 0</td>
</tr>
<tr>
<td>Total Annual Cost</td>
<td>$ 148,000</td>
<td>$ 217,500</td>
</tr>
</tbody>
</table>

**Footnotes:**

1 Includes five-year monitoring/research phase beyond attainment of recovery area objectives.

2 Includes all federal, state, and tribal staff costs directly related to wolf reintroduction and/or monitoring and protection of naturally recolonizing populations.

3 Includes full-time recovery program coordinator position.

4 Applies only to wolves in release pens.
NOTE: The attached proposed experimental population rule was published in the Federal Register on May 1, 1996. It is almost identical to the draft version printed as Appendix C to the DEIS in June of 1995, except that it updates the NEPA review process and is re-written in “plain English” in a few areas. As a result of the review processes for the DEIS and the internal agency draft of this FEIS, various changes have been made to Alternative A between the DEIS and this FEIS that are not yet reflected in the Proposed Rule. The Fish and Wildlife Service still is reviewing public and agency comments on this officially published proposed rule. A future decision to proceed with Alternative A, or any alternative that involves experimental reintroduction, would need to be followed by issuance of a final experimental population rule.
Endangered and Threatened Wildlife and Plants: Proposed Establishment of a Nonessential Experimental Population of the Mexican Gray Wolf in Arizona and New Mexico

AGENCY: Fish and Wildlife Service.

INTRODUCTION: The U.S. Fish and Wildlife Service (Service) proposes to reintroduce the endangered Mexican gray wolf (Canis lupus baileyi) into two designated recovery areas within the subspecies’ probable historic range. The Blue Range Wolf Recovery Area consists of the entire Apache and Gila National Forests in east-central Arizona and west-central New Mexico. The White Sands Wolf Recovery Area consists of all land within the boundary of the White Sands Missile Range in southern central New Mexico together with designated land immediately to the west. The wolves reintroduced into these areas are classified as one nonessential experimental population under section 10(j) of the Endangered Species Act (Act) of 1973, as amended. The proposed rule sets forth management directions and provides for limited allowable legal take of wolves within a defined Mexican Wolf Experimental Population Area.

DATES: Comments from all interested parties must be received by July 1, 1996.

ADDRESSES: Send comments and materials concerning this proposal to the Mexican Wolf Recovery Program, U.S. Fish and Wildlife Service, P.O. Box 1306, Albuquerque, New Mexico 87103-1306. Comments and materials received will be available for public inspection. By appointment, during normal business hours at the above address. Copies of the draft Environmental Impact Statement or its summary can be obtained at this address.

FOR FURTHER INFORMATION CONTACT: Mr. David R. Parsons (see ADDRESSES section) at telephone 505/248-6920; or facsimile 505/248-6922.

SUPPLEMENTARY INFORMATION:

Background

Legislative: The Endangered Species Act Amendments of 1982, Pub. L. 97-304, made significant changes to the Act, including the creation of section 10(j), which provides for the designation of specific populations of listed species as “experimental populations:” Under previous authorities of the Act, the Service was permitted to reestablish (reintroduce) populations of a listed species into unoccupied portions of its historic range for conservation and recovery purposes. However, local opposition to reintroduction efforts, stemming from concerns by some about potential restrictions, and prohibitions on Federal and private activities contained in sections 7 and 9 of the Act, reduced the effectiveness of reintroduction as a management tool.

Under section 10(j), a population of a listed species reestablished outside its current range but within its probable historic range may be designated as “experimental.” at the discretion of the Secretary of Interior (Secretary). If reintroduction of the experimental population furthers the conservation of the listed species, an experimental population must be separate geographically from nonexperimental populations of the same species. Designation of a population as experimental increases the Service’s management flexibility.

Additional management flexibility exists if the Secretary finds the experimental population to be “nonessential” to the continued existence of the species. For purposes of section 7 (except section 7(a)(1), which requires the States to use their authorities to conserve listed species), nonessential experimental populations located outside national wildlife refuge or national park lands are treated as if they are proposed for listing. This means that Federal agencies are under an obligation to confer (as if the species were only proposed for listing) as opposed to consult (required for a listed species) on any actions authorized, funded, or carried out by them that are likely to jeopardize the continued existence of the species. Nonessential experimental populations located on national wildlife refuge or national park lands are treated as threatened, and formal consultation may be required. Activities undertaken on private lands are not affected by section 7 of the Act unless they are authorized, funded, or carried out by a Federal agency.

Individual animals used in establishing an experimental population can be removed from a source population if their removal is not likely to jeopardize the continued existence of the species (see Findings Regarding Reintroduction, below), and a permit has been issued in accordance with 50 CFR Part 17.22.

The Mexican wolf was listed as an endangered subspecies on April 28, 1976 (41 FR 17742). The gray wolf species in North America south of Canada was listed as endangered (except in Minnesota where it was listed as threatened) without reference to subspecies on March 9, 1978 (43 FR 9607). The Mexican Wolf Recovery Plan was adopted by the Directors of the Service and the Mexican Dirección General de la Fauna Silvestre in 1982. The plan guides recovery efforts for the subspecies, laying out a series of recommended actions. The recovery plan is currently being revised, and the revised document will more precisely define the points at which downlisting and delisting will occur.

Biological: This proposed experimental population rule addresses the Mexican wolf (Canis lupus baileyi), an endangered subspecies of gray wolf that was extirpated from the southwestern United States by 1970. The gray wolf (C. lupus) is native to most of North America north of Mexico City. An exception is in the southeastern United States, which was occupied by the red wolf (C. rufus). The gray wolf occupied areas that supported populations of hooved mammals (ungulates), its major food source.

The Mexican wolf historically occurred over much of New Mexico, Arizona, Texas, and northern Mexico, mostly in or near forested mountainous terrain. Numbering in the thousands before European settlement, the Mexican wolf declined rapidly when its reputation as a livestock killer led to concerted eradication efforts. Other factors contributing to its decline were commercial and recreational hunting and trapping of wolves: killing of wolves by game managers on the theory that more game animals would be available for hunters; habitat alteration; and human safety concerns (although no documentation exists of Mexican wolf attacks on humans).

The subspecies is now considered extirpated from its historic range in the southwestern United States because no wild wolf has been confirmed since 1970. Occasional sightings of “wolves” continue to be reported from United States locations, but none have been confirmed through clear evidence. Recent field research has revealed no confirmed reports of wolves remaining in Mexico. Investigations are continuing.
When Mexican wolves were eradicated, their natural history was poorly understood. Appendix A to the draft Environmental Impact Statement provides life history and biological descriptions of Mexican wolves to the extent they are known or can be inferred from historical evidence. Observations of captive Mexican wolves, and studies of gray wolves in other geographic regions. (The draft Environmental Impact Statement should be referred to for background and supporting information and literature references on all aspects of this proposed rule: see ADDRESSES section.)

Recovery efforts: The Mexican Wolf Recovery Plan’s objective is to conserve and ensure survival of the subspecies by maintaining a captive breeding program and reestablishing a viable, self-sustaining population of at least 100 Mexican wolves in a 5,000 square mile area within the subspecies’ historic range. (The recovery plan is currently under revision.)

A captive breeding program was established in the 1970’s with two wild male Mexican wolves caught from 1977 to 1980 (from Durango and Chihuahua, Mexico) and one wild pregnant female wolf caught in 1978 (from Durango, Mexico). Two additional captive populations were determined in July 1995 to be pure Mexican wolves: each has two founders. The captive population has increased to 139 as of March 1996: 114 are held at 23 facilities in the United States and 25 at five facilities in Mexico. This population has been managed since 1990 for maximum reproduction to support the proposed reintroduction effort. The goal is to have at least 100 animals in the United States facilities prior to any releases into the wild.

On April 20, 1992, the Service issued a “Notice of Intent to Prepare an Environmental Impact Statement on the Experimental Reintroduction of Mexican Wolves (Canis lupus baileyi) into Suitable Habitat within the Historic Range of the Subspecies” (57 FR 14427). This notice also announced the time and place of public scoping meetings. The draft Environmental Impact Statement was released for public review and comment on June 27, 1995 (60 FR 33224). The location and times of 14 public meetings were also announced in this notice. In September of 1995, the Service announced that three public hearings would be held in October 1995 (60 FR 49628). All announced meetings and hearings were held. The public comment period closed on October 31, 1995. Approximately 18,000 people have commented or expressed an opinion on the draft Environmental Impact Statement. Following an analysis of the public comments, a final Environmental Impact Statement will be issued around July 1996.

The proposed Mexican wolf recovery actions and this proposed rule were developed by the Service after consultation with representatives of Federal, State, and other agencies, with potentially affected private parties, and with wildlife experts nationally. Public comments received at and after scoping meetings for the draft Environmental Impact Statement were considered. (See draft Environmental Impact Statement, Chapter 1 section on Scoping and Coordination.)

Mexican wolf recovery areas: The Service has determined that the proposed reintroductions in the White Sands Wolf Recovery Area and the Blue Range Wolf Recovery Area have the greatest potential for successfully achieving the current recovery objective for Mexican wolves. (See paragraph (j) (6) of the proposed rule and Figures 1 and 2 for precise boundaries of these areas. Chapters 2 and 3 of the draft Environmental Impact Statement describe the selection of these two areas and provide detailed descriptions of them.

The two wolf recovery areas are within the Mexican wolf’s probable historic range. Both contain vast, relatively remote, and isolated expanses of federally-managed land. Suitable wolf habitat containing relatively abundant prey such as deer and elk is available. As the Mexican wolf is considered extinct in the wild in the United States, both areas are wholly separate geographically from any known, naturally-occurring nonexperimental populations of wild wolves. A larger Mexican Wolf Experimental Population Area, which also is wholly separate geographically from any known, naturally-occurring nonexperimental populations of wild wolves, is defined in the rule, paragraph (j) (6), (see Figure J). Mexican wolf recovery is not proposed throughout this larger area. Its purpose is to establish that any wild wolf found in this larger area is a member of the nonessential experimental population, and therefore subject to the provisions of this rule, and not an “endangered” status wolf with full protection of the Act. Reintroduction procedures: Male and female pairs from the captive population will be selected for release based on genetics, reproductive performance, behavioral compatibility, response to the adaptation process, and other factors. Selected pairs will be moved to the Service’s captive wolf management facility on the Sevilleta National Wildlife Refuge in central New Mexico where measures will be taken to improve their adaptation to life in the wild.

Wolves will be reintroduced by a “soft release approach designed to reduce the likelihood of quick dispersal away from the release area. This involves holding the animals in pens on site for up to several months in order to acclimate them and to increase their affinity for the area. (The soft release approach is described in more detail in Chapter 2 of the draft Environmental Impact Statement.) The releases will begin in 1996 or as soon thereafter as feasible.

Approximately five family groups of captive raised Mexican wolves will be released over a period of 3 years into the White Sands Wolf Recovery Area, with the goal of reaching a long-term sustainable population of 20 wolves by 1998. In the Blue Range Wolf Recovery Area, approximately 14 family groups will be released over a period of 5 years, with the goal of reaching a long-term sustainable population of 100 wild wolves by 2004. The proposed action is flexible, using either the White Sands Wolf Recovery Area or the Blue Range Wolf Recovery Area, or both, and in the order of their use.

Management of the reintroduced population: The proposed nonessential experimental designation enables the Service to develop measures for management of the population that are less restrictive than the mandatory prohibitions that protect species with “endangered” status. This includes limited allowance of both governmental and private take of individual wolves under narrowly defined circumstances. Management flexibility is needed to make reintroduction compatible with current and planned human activities, such as livestock grazing and hunting, in the reintroduction area. It is also critical to obtaining needed State, tribal, local, and private cooperation. Thus, this flexibility will improve the likelihood of success.

Reintroduction will occur under management plans that allow dispersal by the new wolf subpopulations beyond the primary recovery zones where they will be released, into the secondary recovery zones of the two designated wolf recovery areas (see Figures 1 and 2). The Service and cooperating agencies will not allow the wolves to establish territories outside these wolf recovery area boundaries without landowner consent on private or tribal lands within the Mexican Wolf Experimental Population Area.
In the reintroduction efforts, the Service projects that the Blue Range Wolf Recovery Area subpopulation will achieve the 1982 Mexican Wolf Recovery Plan goal of 100 wolves occupying 5,000 square miles by 2004. The White Sands Wolf Recovery Area will support an estimated 20 wolves occupying 1,000 square miles by 1998. This likely would not an independently viable subpopulation. Nevertheless, a subpopulation in this size range could be maintained through supplemental releases (or, speculatively, by natural immigration of wolves from another nearby population if one existed, e.g., from a reintroduced subpopulation in the Blue Range Wolf Recovery Area). Even if the White Sands Wolf Recovery Area subpopulation is not viable, per se, the Service finds that, through monitoring and research, such a reintroduction would provide vital information about the ecology and behavior of wild Mexican wolves and about the ability of captive-reared gray wolves to survive in the wild. A reintroduction there would provide a valuable assessment of the soft release approach to reintroducing captive-reared wolves. Further, wolves successfully reintroduced into the White Sands Wolf Recovery Area could be used as release stock for future reintroductions elsewhere, which would increase the likelihood of success compared to using captive-reared wolves as release stock.

Some members of the experimental population are expected to die during the reintroduction efforts after removal from the captive population. The Service finds that even if the entire experimental population died, this would not appreciably reduce the prospects for survival of the subspecies in the wild. That is, future reintroductions still would be feasible even if the reintroductions proposed here failed. The individual Mexican wolves selected for release will be as genetically redundant with other members of the captive population as possible, thus minimizing any adverse effects on the genetic integrity of the remaining captive population. The Service has detailed lineage information on each captive Mexican wolf. The captive population is managed for the Service under the American Zoo and Aquarium Association’s Species Survival Plan program. The Association maintains a Studbook and provides an expert advisor for small population management.

Management of the demographic and genetic makeup of the population is guided by the SPARCS computer program. Kinship values, which range from zero to one, are a measure of the relatedness of an individual to the rest of the population. Wolves with higher kinship values are genetically well-represented in the population. Only those individuals whose kinship values are above the mean for the captive population as a whole will be used for release. In addition, the PEDPAC computer program will be used to identify suitable release candidates by examining the influence of removing an individual on the survival of the founders’ genes. This management approach will adequately protect the genetic integrity of the captive population and thus the continued existence of the subspecies. The United States captive population of Mexican wolves has approximately doubled in the last 3 years demonstrating the captive population’s reproductive potential to replace reintroduced wolves that die. In view of all these safeguards the Service finds that the reintroduced population would not be “essential” under 50 CFR 17.81(c)(2).

The Service finds that release of the experimental population will further the conservation of the subspecies and of the gray wolf species as a whole. Currently, no viable populations of the Mexican wolf subspecies are known to exist in the wild. No wild populations of the gray wolf species are threatened to exist in the United States south of Montana, Minnesota, Wisconsin, and Michigan. (The Service is in the process of reintroducing wild gray wolves from Canada into central Idaho and Yellowstone National Park in Wyoming.) The Mexican wolf is the most southerly and the most genetically distinct of all North American gray wolf subspecies. The Mexican wolf is also considered the rarest of the surviving (or, in fact) subspecies and has been accorded the highest recovery priority by international wolf experts.

Releasing captive-reared Mexican wolves furthers the objective of the Mexican Wolf Recovery Plan. The Plan, if fully implemented, will result in the reestablishment of a wild population of at least 100 Mexican wolves. Also, release of wolves into the wild will reduce the potential negative effects of keeping them in captivity in perpetuity. If a reintroduction into the wild from the captive population does not occur within a reasonable period of time, genetic, physical, or behavioral changes resulting from prolonged captivity could render the captive animals unsuited for reintroduction and devastate their prospects for recovery.

Designation of the released wolves as nonessential experimental is considered necessary to obtain needed State, tribal,
local, and private cooperation. This designation also allows for management flexibility to mitigate negative impacts of Mexican wolf recovery, such as livestock depredation. Without such flexibility intentional illegal killing of wolves would likely harm the prospects for successful recovery.

Potential for conflict with Federal and other activities: As indicated, considerable management flexibility has been incorporated into the proposed experimental population rule to reduce potential conflicts between wolves and the activities of governmental agencies, livestock operators, hunters, and others. No major conflicts with current management of Federal, state, or tribal lands are anticipated. Mexican wolves are expected to be able to tolerate most of the current land uses in the designated wolf recovery areas. However, temporary restrictions on human activities may be imposed around release sites, active dens, and rendezvous sites. Limited backcountry road closures may be necessary if illegal killings of wolves occur: this would not affect the White Sands Wolf Recovery Area. Also, the USDA’s Animal Damage Control Division will discontinue use of M-44’s and choking-type snares in “occupied Mexican wolf range” (see definition in proposed Section 17.84(j)(10)). Other predator control activities may be restricted or modified pursuant to a cooperative management agreement or a conference between the United States Department of Agriculture’s Animal Damage Control Division and the Service.

The Service and other authorized agencies may harass, take, remove, or translocate Mexican wolves under certain circumstances described in detail in the proposed rule. Private citizens also are given broad authority to harass Mexican wolves (for purposes of scaring them away from livestock) and they may take (including to kill or injure) them under narrow circumstances, that is, in cases of defense of human life or when wolves are in the act of attacking their livestock (if certain conditions are met). In addition, ranchers can seek compensation from a privately-funded depredation compensation fund if depredation on their livestock occurs.

The Service does not intend to change the proposed “nonessential experimental” designation to “essential experimental,” “threatened”, or “endangered” and the Service does not intend to designate critical habitat for the Mexican wolf. Critical habitat cannot be designated under the nonessential experimental classification, 16 U.S.C. 1539(j)(2)(C)(i). The Service foresees no likely situation which would result in such changes in the future. Nevertheless, to ensure that such changes do not occur, the following condition exists in the proposed rule, paragraph (j)(9): if legal actions or lawsuits compel a change in the population’s legal status to essential experimental, threatened, or endangered, or compel the designation of critical habitat for wolves within the experimental population area, then all reintroduced Mexican wolves will be removed from the wild and the experimental population rule will be revoked.

Public Comments Solicited

The Service solicits comments or suggestions on the proposed experimental population rule from the public. States, tribes, other concerned governmental agencies, the scientific community, industry, potentially affected landowners, or any other interested party. Comments must be received within 60 days of publication of this proposed rule in the Federal Register.

The Service will hold public hearings to obtain additional verbal and written information. The location, dates, and times of these hearings will be announced in a forthcoming issue of the Federal Register, in newspapers, and in a mailing to those persons on the Mexican Wolf Recovery Program mailing list.

Any final decision on this proposal will take into consideration the comments and any additional information received by the Service. These may lead to a final rule that differs from this proposal.

National Environmental Policy Act

A draft Environmental Impact Statement on the Service’s proposal to reintroduce the Mexican wolf in the southwestern United States has been prepared and is available to the public (see ADDRESSES section). The draft Environmental Impact Statement should be referred to for analysis of the Proposed Action and alternatives to it: also, the draft Environmental Impact Statement contains detailed references for the background information provided here.

Required Determinations

This proposed rule has been reviewed by the Office of Management and Budget under Executive Order 12866. The rule will not have significant economic impact on a substantial number of small entities under the Regulatory Flexibility Act (5 U.S.C. 601, et seq.). The final rule will not significantly change costs to industry or governments. Furthermore, the rule produces no adverse effects on competition, employment, investment, productivity, innovation, or the ability of United States enterprises to compete with foreign-based enterprises in domestic or export markets.

This proposed rule has been reviewed under Executive Order 12630, the Attorney General Guidelines, Department Guidelines and the Attorney General Supplemental Guidelines to determine the takings implications of the proposed rule. If it were promulgated as currently drafted, one issue of concern is the depredation of livestock by reintroduced wolves. However, such depredation by a wild animal would not be a “taking” under the 5th Amendment. One of the reasons for the experimental nonessential designation is to allow the agency and private entities flexibility in managing the wolves, including the elimination of a wolf when there is a confirmed kill of livestock.

This proposed rule has been reviewed under Executive Order 12612 to determine Federalism considerations in policy formulation and implementation. Evidently, one or more counties in the vicinity of the wolf reintroduction area have enacted ordinances specifically prohibiting the introduction of the wolf (among other species) within county boundaries. However, the United States Congress has given the Secretary of the Interior explicit statutory authority, in section 10(j) of the Act, to promulgate this rule, and under the Supremacy Clause of the United States Constitution, this has the effect of preempting State regulation of wildlife to the extent in conflict with this proposed rule. Nevertheless, the Service has endeavored to cooperate with State wildlife agencies and county and tribal governments in the preparation of this proposed rule.

Author

The primary author of this document is Mr. David R Parsons (see ADDRESSES section) at telephone 505/248-6920; or facsimile 505/248-6922.

List of Subjects in 50 CFR Part 17

Endangered and threatened species, Exports, Imports, Reporting and recordkeeping requirements, and Transportation.

Proposed Regulation Promulgation

Accordingly, the Service hereby proposes to amend part 17, subchapter B of chapter I, title 50 of the Code Of Federal Regulations, as set forth below:
PART 17--[AMENDED]

1. The authority citation for part 17 continues to read as follows:

2. In §17.11(h), the table entry for “Wolf, gray under MAMMALS is revised to read as follows:

<table>
<thead>
<tr>
<th>Species</th>
<th>Common name</th>
<th>Scientific name</th>
<th>Historic range</th>
<th>Vertebrate Populations endangered or threatened</th>
<th>Status</th>
<th>When listed</th>
<th>Critical habitat</th>
<th>Special rules</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wolf, gray</td>
<td>Canis lupus</td>
<td>Holarctic</td>
<td>U.S.A. (48 continental States, except MN and where listed as an experimental population)</td>
<td>E</td>
<td>1. 6. 13. 35.</td>
<td>17.95(a)</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>U.S.A. (MN)</td>
<td>T</td>
<td>35</td>
<td>17.95(a)</td>
<td>17.40(d)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>U.S.A. (special portions of AZ NM and TX—see 17.84(j))</td>
<td>XN</td>
<td>NA</td>
<td>17.84(j)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mammals</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

3. Section 17.84 is amended by adding paragraph (j) to read as follows:

§17.84 Special rules—vertebrates.

(j) Mexican gray wolf (Canis lupus baileyi).

(1) The Mexican gray wolf (Mexican wolf) subpopulations reestablished in the Blue Range Wolf Recovery Area and in the White Sands Wolf Recovery Area within the Mexican Wolf Experimental Population Area, identified in paragraph (j)(6) of this section, are one nonessential experimental population. This nonessential experimental population will be managed in accordance with these provisions.

(2) The Fish and Wildlife Service (Service) finds that reintroduction of an experimental population of Mexican wolves into the subspecies’ probable historic range will further the conservation of the Mexican wolf subspecies and of the gray wolf species. The Service also finds that the experimental population is not “essential” under 50 CFR 17.81(c)(2).

(3) You must not take any wolf in the wild within the Mexican Wolf Experimental Population Area except as provided in this rule. The Service may refer take of a wolf contrary to this rule to the appropriate authorities for prosecution.

(i) Throughout the entire Mexican Wolf Experimental Population Area, you will not be in violation of the Endangered Species Act (Act) for unavoidable and unintentional take (including killing or injuring) of a wolf when such take is non-negligent and incidental to a legal activity, such as hunting, trapping, driving, or recreational activities, and you report the take promptly (within 24 hours) to the Service’s Mexican Wolf Recovery Coordinator or to a Service appointed agency representative.

(ii) Also throughout the entire Mexican Wolf Experimental Population Area, excluding areas within the national park system and national wildlife refuge system, no Federal agency or their contractors will be in violation of the Act for take of a wolf resulting from any authorized agency action. This provision does not exempt agencies and their contractors from complying with section 7(a)(4) of the Act which requires a conference with the Service if they propose an action that is likely to jeopardize the continued existence of the Mexican wolf.

(iii) No land use restrictions will be imposed on private or tribal reservation lands for Mexican wolf recovery without the concurrence of the private owner or tribal government. On public lands, public and tribal agencies may temporarily restrict human access and disturbance-causing land use activities, such as timber harvesting and mining, within a 1-mile radius around release pens when wolves are in them, around active dens between March 1 and June 30, and around active wolf rendezvous sites between June 1 and September 30, as necessary. If documented illegal killing of a wolf occurs the United States Forest Service may, in consultation with the Service, close back-country roads on National Forest lands (except thoroughfares) for as long as necessary to protect the wolves.

(iv) In areas within the national park system and national wildlife refuge system, Federal agencies must treat Mexican wolves as a threatened species for purposes of complying with section 7 of the Act.

(v) On public lands leased for grazing anywhere within the Mexican Wolf Experimental Population Area, including within the designated wolf recovery areas, when and where livestock are legally present, livestock owners or their agents:

(A) May harass wolves, for purposes of scaring them away, in the general vicinity (within 500 yards) of livestock (i.e., cattle, sheep, horses, rules, and burros or as defined in State and tribal wolf management plans as approved by us) in an opportunistic, noninjurious manner (no temporary or permanent physical damage may result) at any
time: provided that wolves cannot be purposely attracted, tracked, waited for, or searched out and then harassed: and provided that such harassment is reported to the Service’s Mexican Wolf Recovery Coordinator or to a Service appointed agency representative within 7 days and.

(ii) May receive a written permit under the Act from the Service or an agency designated by the Service, valid for up to 45 days, to take including kill or injure) a specific number of wolves actually engaged in the act of killing, wounding or biting livestock: provided that prior to the issuance of such a permit, six or more breeding Mexican wolf pairs occur in the Blue Range Wolf Recovery Area, or three or more breeding Mexican wolf pairs occur in the White Sands Wolf Recovery Area; and provided that an authorized agent of the Service, the United States Department of Agriculture USDA Animal Damage Control Division, or the State has documented previous livestock loss or injury caused by wolves and agency efforts to resolve the problem are completed. Livestock owners or their agents must report take of wolves under such a permit to the Service’s Mexican Wolf Recovery Coordinator or to a Service appointed agency representative within 24 hours.

There must be evidence of freshly wounded or killed livestock by wolves.

(vi) On private or tribal land anywhere within the Mexican Wolf Experimental Population Area, property owners, livestock owners, tenants, or their designated agents:

(A) May harass wolves in the immediate vicinity (within 500 yards) of people, buildings, livestock, or domestic animals in an opportunist, noninjurious manner (no temporary or permanent physical damage may result) at any time: provided that wolves cannot be purposely attracted, tracked, or searched out and then harassed: and provided that such harassment is reported to the Service’s Mexican Wolf Recovery Coordinator or to a Service appointed agency representative within 7 days and.

(B) May take (including kill or injure) any wolf actually engaged in the act of killing, wounding, or biting livestock: provided that livestockalesly (less than 24 hours) wounded (torn flesh and bleeding) or killed by wolves is present: and further provided that the take is reported to the Service’s Mexican Wolf Recovery Coordinator or to a Service appointed agency representative within 24 hours.

(vii) Authorized Service. USDA Animal Damage Control Division, tribe, and State employees may capture and/or translocate any Mexican wolf in the nonessential experimental population consistent with the Service’s approved management plan or special management measure. Such plan or measure may include capture and/or translocation of wolves that prey on livestock. attack pets or domestic animals other than livestock on private land, impact game populations in ways which may inhibit further wolf recovery, prey on members of the desert bighorn sheep herd found on the White Sands Missle Range and San Andres National Wildlife Refuge, so long as the State of New Mexico lists it as a species to be protected. are considered problem wolves, are a nuisance, or are conflicting with a major land use, or are necessary for research. Authorized Federal. State, or tribal personnel may also carry out and/or translocation for other purposes the Service has authorized, such as genetic management, and may use lethal methods of take when reasonable attempts to capture wolves alive fail and the Service determines that removal of a particular wolf or wolves from the wild is necessary. Authorized Federal, State, or tribal personnel may carry out any management measure that is a part of a Service approved management plan. Also, the USDA Animal Damage Control Division will discontinue use of M-44’s and choking-type snares in “occupied Mexican wolf range” [see definition in proposed section 17.84(j)(10)]. The Service may restrict or modify other predator control activities pursuant to a cooperative management agreement or a conference between us and the USDA’s Animal Damage Control Division.

(viii) You may harass or take a Mexican wolf in self defense or defense of others, provided that you promptly report the harassment or take to the Service’s Mexican Wolf Recovery Coordinator or to a Service appointed agency representative. If the Service or an agency authorized through a cooperative management plan determine that a wolf presents a threat to human life or safety, the Service or the authorized agency may place it in captivity or euthanize it.

(ix) Intentional taking of any wolf in the Mexican Wolf Experimental Population Area, except as described above, is prohibited. The Service encourages individuals authorized to take wolves to use nonlethal means. You must immediately (within 24 hours) deliver all wolves (live or dead), pets, or parts taken to the Service’s Mexican Wolf Recovery Coordinator or to a Service appointed agency representative.

(4) You may not possess, sell, deliver, carry, transport, ship, import, or export by any means whatsoever, any wolf or wolf paws from the experimental population taken or possessed in violation of these regulations or in violation of applicable State or tribal fish and wildlife laws or regulations or the Act.

(5) You may not attempt to commit, solicit another to commit, or cause to be committed, any offense defined in this section.

(6) The two designated recovery areas for Mexican wolves classified as nonessential experimental that lie within the subspecies’ probable historic range are:

(i) The White Sands Wolf Recovery Area in south-central New Mexico, including all of the White Sands Missile Range, the White Sands National Monument, and the Santa Fe National Wildlife Refuge, and the area adjacent to and to the west of the Missile Range bounded on the south by the southerly boundary of the USDA Jornada Experimental Range and the not-them boundary of the New Mexico State University Animal Science Ranch on the west by the New Mexico Principal Meridian; on the north by the southwestern boundary of the USDA Wild Horse and Burro Management area and the Sierra-Socorro County line: and on the east by the western boundary of the Missle Range (Figure 1). Actual releases of captive-raised wolves will take place, generally as described in our draft Environmental Impact Statement on Mexican wolf reintroduction, within the White Sands Wolf Recovery Area primary recovery zone. This is the area within the White Sands Missile Range bounded on the north by the road from the former Cain Ranch Headquarters to Range Road 16, Range Road 16 to its intersection with Range Road 13, Range Road 13 to its intersection with Range Road 7; on the east by Range Road 7; on the south by Highway 70; and on the west by the Missile Range boundary. The Service will allow the wolf subpopulation to expand into the White Sands Wolf Recovery Area secondary recovery zone, which is the remainder of the White Sands Wolf Recovery Area not in the primary recovery zone.

(ii) The Blue Range Wolf Recovery Area, including all of the Apache National Forest and all of the Gila National Forest in east-central Arizona and west-central New Mexico (Figure 2). Actual releases of captive-raised Mexican wolves will take place, generally as described in our draft Environmental Impact Statement on Mexican wolf reintroduction, within the Blue Range Wolf Recovery Area primary recovery zone. This is the area within...
the Apache National Forest 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). The Service will allow the Blue Range Wolf Recovery Area to expand into the Blue Range Wolf Recovery Area secondary recovery zone, which is the remainder of the Blue Range Wolf Recovery Area not in the primary recovery zone.

(iii) The boundaries of the Mexican Wolf Experimental Population Area are the portion of Arizona lying north of Interstate Highway 10 and south of Interstate Highway 40; the portion of New Mexico lying north of Interstate Highway 10 in the west, north of the New Mexico-Texas boundary in the east, and south of Interstate Highway 40; and the portion of Texas lying north of United States Highway 62/180 and south of the Texas-New Mexico boundary (Figure 3). The Service is not proposing wolf recovery throughout this area, only within the White Sands and Blue Range Wolf Recovery Areas described in paragraph (j)(6)(i) and (j) (6) (ii) of this subsection. The purpose of the larger experimental population area designation is to distinguish the legal status of any wolf found there. After the first captive wolf release, wolves found in the wild in the Mexican Wolf Experimental Population Area will be subject to management under this rule. If a wolf is captured outside the Mexican Wolf Experimental Population Area after the first release but outside the designated wolf recovery areas, it will be returned and re-released or put into the captive breeding program. If a wolf is found in the United States outside the boundaries of the Mexican Wolf Experimental Population Area (and not within any other wolf experimental population area) the Service will presume it to be of wild origin with full endangered status (or threatened in Minnesota) under the Act. unless evidence, such as a radio-collar or identification mark, establishes otherwise. If such evidence exists, the Service or an authorized agency will attempt to promptly capture the wolf and return and re-release it or put into the captive breeding program. Such a wolf is otherwise not subject to this rule outside the designated Mexican Wolf Experimental Population Area.

(7) If Mexican wolves of the experimental population occur on public lands outside the designated wolf recovery areas, but within the Mexican Wolf Experimental Population Area, the Service or an authorized agency will attempt to capture any radio-collared lone wolf and any lone wolf or member of an established pack causing livestock depredations. The agencies will not routinely capture and return pack members that make occasional forays onto public land outside the designated wolf recovery areas and uncollared lone wolves on public land. However, the Service will capture and return to a recovery area or to captivity packs from the nonessential experimental population that establishes territories on public land outside the designated wolf recovery areas. If any wolves move onto private or tribal lands outside the designated recovery areas, but within the Mexican Wolf Experimental Population Area, the Service or an authorized agency will develop management actions in cooperation with the land owner including recapture if requested by the land owner or tribal government.

(8) The Service will continuously evaluate Mexican wolf reintroduction progress and prepare periodic progress reports, detailed annual reports, and full evaluations after 3 and 5 years that recommend continuation or termination of the reintroduction effort.

(9) The Service does not intend to change the "nonessential experimental" designation to "essential experimental," "threatened," or "endangered" and does not intend to designate critical habitat for the Mexican wolf. Critical habitat cannot be designated under the nonessential experimental classification. 16 U.S.C. 1539(j)(2) (C)(ii). The Service foresees no likely situation which would result in such changes. The Service would remove from the wild all reintroduced Mexican wolves designated as nonessential experimental and revoke the experimental status and regulations if legal actions or lawsuits compel a change in the population's legal status to essential experimental, threatened, or endangered or compel the designation of critical habitat within the Mexican Wolf Experimental Population Area, or if within 90 days of the initial release date, the Service discovers a naturally occurring population of wild wolves. consisting of at least two breeding pairs that for 2 consecutive years have each successfully raised two offspring. off to the White Sands Wolf Recovery Area or Blue Range Wolf recovery Area boundaries. The Service would manage and protect any such naturally occurring wolves as endangered species under the An (10) Definitions-Key terms used in the rule have the following definitions.
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.

**Occupied Mexican wolf range** (1) Area of confirmed presence of resident breeding packs or packs of wolves or area consistently used by at least one existing wolf over a period of at least one month. The Service must confirm or corroborate wolf presence. Exact delineation of the area will be described by:

1. Five-mile radius around all locations of wolves and wolf sign confirmed as described above (nonradio-monitored);
2. Five-mile radius around radio locations of resident wolves when fewer than 20 radio locations are available (for radio-monitored wolves only);
3. Three-mile radius around the convex polygon developed from more than 20 radio locations of a pack, pair, or single wolf taken over a period of at least 6 months (for radio-monitored wolves)

(2) This definition applies only within the Mexican Wolf Experimental Population Area.

**Opportunistic, noninjurious harassment** (see "harass"). This is the only type of harassment the Service permits under the experimental population rule. Opportunistic means as the wolf presents itself (i.e., the wolf travels onto and is observed on private land or near livestock). You cannot track a wolf and then harass it or harass it by aircraft. You cannot chase and harass a wolf for an extended period of time (over 15 minutes). Any harassment must not cause bodily injury, maiming, or death.

Population of naturally occurring wild wolves. At least two breeding pairs of wolves successfully raising at least two young each year (until December 31 of the year of their birth), for 2 consecutive years in the Mexican Wolf Experimental Population Area.

**Primary recovery zone.** An area where the Service proposes to release Mexican wolves, and where the Service may return and re-release them if necessary, and where managers will actively support recovery of the reintroduced population.

Problem wolves. Wolves that have depredated on lawfully present domestic livestock or wolves from a group or pack including adults, yearlings, and young-of-the-year that were directly involved in the depredations; or fed upon the livestock remains that were a result of the depredation: or were fed by or are dependent upon adults involved with the depredations (because before these young animals mature to where they can survive on their own, they will travel with the pack and learn the pack’s depredation habits). Wolves that have depredated on domestic animals other than livestock, two times in an area within 1 year. Wolves that are habituated to humans, human residences, or other facilities.

**Secondary recovery zone.** An area adjacent to a primary recovery zone which the Service does not propose for Mexican wolf releases, but in which the Service allows released wolves to disperse, and where managers will actively support recovery of the reintroduced population.

**Take.** The Act defines "take" as "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(9)). See above definition of Harass which includes definition of permitted harassment, and see definition of Unavoidable and unintentional take below.

Unavoidable and unintentional take. Accidental, nonnegligent take (see above definition of "Take") which occurs despite reasonable care, is incidental to an otherwise lawful activity and without the purpose to do so. Examples would include striking a wolf with an automobile or capturing a wolf in a trap set obviously for another species. Note—Shooting a wolf when the individual states he or she believed it to be an animal other than a wolf does not qualify as unavoidable or unintentional take. Shooters have the responsibility to be sure of their targets.

**Wolf recovery area.** A designated area where managers will actively support reestablishment of Mexican wolf populations.

Figures to §17.84(j)

NOTE: Fig.s 1, 2, and 3 (pages 19245 through 19247) of the Federal Register notice are not reproduced here, in order to save space, as they are all the same as Fig.s 2-3, 2-2, and 2-4, respectively, in this FEIS. Also, all of the last page of the Federal Register notice, p. 19248, is reproduced below.
APPENDIX D
Section 7 Consultation on Preferred Alternative

Intra-Service Section 7
Biological Evaluation Form
Consultation/Conference/Concurrence

Originating Person: David R. Parsons
Date: February 24, 1995

I. Region: 2

II. Service Activity (Program): Mexican Wolf Recovery

III. Pertinent Species and Habitat:

A. Listed species and/or their critical habitat within the action area:

White Sands Wolf Recovery Area:

Endangered
Black-footed ferret Mustelainigipes
American peregrine falcon Falco peregrinus anatum
Bald eagle Haliaeetus leucocephalus
Northern aplomado falcon Falco femoralis septentrionalis
Whooping crane Grus americana
Todsen's pennyroyal Hedeoma todsenii
Kuenzler hedgehog cactus Echinocereus fendleri var. kuenzleri

Threatened
Mexican spotted owl Strix occidentalis lucida

Blue Range Wolf Recovery Area:

Endangered
Black-footed ferret Mustela nigripes
American peregrine falcon Falco peregrinus anatum
Bald eagle Haliaeetus leucocephalus
Gila topminnow Poeciliopsis occidentalis
Gila trout Oncorhynchus gilae
Northern aplomado falcon Falco femoralis septentrionalis
Whooping crane Grus americana
Todsen's pennyroyal Hedeoma todsenii

Threatened
Mexican spotted owl Strix occidentalis lucida
Loach minnow Tiaroga cobitis
Beautiful shiner Cyprinella formosa
Chihuahua chub Gila nigrescens
**B. Proposed species and/or proposed critical habitat within the action area:**

**White Sands Wolf Recovery Area:**

**Proposed Endangered with Critical Habitat**
Southwestern willow flycatcher  
_Empidonax traillii extimus_

**Proposed Nonessential Experimental Population**
Mexican gray wolf  
_Canis lupus baileyi_

**Blue Range Wolf Recovery Area:**

**Proposed Endangered**
Arizona willow  
_Salix arizonica_
Pari's alkali grass  
_Pucinellia parisi_

**Proposed Endangered with Critical Habitat**
Southwestern willow flycatcher  
_Empidonax traillii extimus_

**Proposed Nonessential Experimental Population**
Mexican gray wolf  
_Canis lupus baileyi_

**C. Category 1 and 2 candidate species within the action area:**

**White Sands Wolf Recovery Area:**

**Category 1 Candidates**
Goodding's onion  
_Allium gooddingii_
Mimbres figwort  
_Scropbularia macrantba_
Mountain plover  
_Charadrius montanus_

**Category 2 Candidates**
Arizona black-tailed prairie dog  
_Cynomys ludovicianus arizonensis_
Organ Mountains Colorado chipmunk  
_Eutamias quadrivittatus australis_
White Sands woodrat  
_Neotoma micropus Leucopoba_
Hot Springs cotton rat  
_Sigmobon fulvents goldmani_
Swift fox  
_Vulpes velox_
Occult little brown bat  
_Myotis lucifugus occultus_
Greater western mastiff bat  
_Eumops perotis californicus_
Spotted bat  
_Euderma mculatum_
Ferruginous hawk  
_Buteo regalis_
Apache northern goshawk  
_Accipiter gentilis apache_
Western snowy plover  
_Charadrius alexandrinus nivosis_
Loggerhead shrike  
_Lanius Ludovicianus_
White-faced ibis  
_Plegadis cbihi_
'Texas horned lizard  
_Pbrynosoma cornutum_
Bonita diving beetle
Anthony Blister beetle
Los Olmos tiger beetle
White Sands pupfish
Alamo beardtongue
Grama grass cactus
Mescalero milkwort
Night-blooming cereus
Guadalupe valeria
Kerr’s milk-vetch
Nodding cliff daisy
Organ Mountains evening primrose
Organ Mountains figwort
Sand prickly pear
Standley whitlow-wort
Sierra Blanca cliff daisy

Blue Range Wolf Recovery Area:

Category 1 Candidates
Goodding’s onion
Mimbres figwort
Gila springsnail
New Mexico hotsspring snail
Chiricahua leopard frog

Category 2 Candidates
Southwestern otter
Greater western mastiff bat
Occult little brown bat
Spotted bat
Allen’s big-eared bat
Pale Townsend’s big-eared bat
Big free-tailed bat
Long-legged myotis
Fringed myotis
Yuma myotis
Long-eared myotis
Cave myotis
Silky pocket mouse
Hot Springs cotton rat
Organ Mountains Colorado chipmunk
White Sands woodrat
White-sided jackrabbit
Apache northern goshawk
Northern goshawk
Ferruginous hawk
Northern gray hawk
Mountain plover
Western snowy plover

Deronecetes neomexicana
Lyttamirifica
Cicindela nevadica olmosa
Cyprinodon tularosa
Penstemon alamosensis
Pedicactus papyracantbus
Polygala rimalicola var. mescalerorum
Greggi var. greggi
texana
Astragalus kerri
Perityle cernua
Scrophularia laevis
Opuntia arenaria
Draba standleyi
Cbaetopappa elegans
The U.S. Fish and Wildlife Service Region 2 Regional Office proposes to reintroduce nonessential experimental populations of Mexican wolves (*Canis lupus baileyi*) into (1) the Blue Range Wolf Recovery Area (BRWRA), which comprises the Apache and Gila National Forests in their entirety (see DEIS Fig. 2-3); and (2) the White Sands Wolf Recovery Area (WSWRA), which encompasses the White Sands Missile Range (WSMR) and lands belonging to the Bureau of Land Management and private parties adjacent and to the west of WSMR to the New Mexico Principal Meridian (see DEIS Fig. 2-2). Geographic boundaries are described in detail in Chapter 2 - Proposed Action.

V. Location (See Figs. 2-2 and 2-3):

A. County and state: Apache and Greenlee counties, Arizona; and Catron, Dona Ana, Grant, Lincoln, Otero, Sierra, Socorro counties, New Mexico.

B. Section, township, and range (or latitude and longitude): NA
C. Distance (miles) and direction to nearest town: Several towns occur within or near the project areas (see Figs. 2-2 and 2-3).

VI. Description of DEIS proposed action:

The Service proposes to reintroduce 3 family groups of Mexican wolves per year for 5 years into the BRWRA primary wolf recovery zone (see Fig. 2-2) and allow population expansion throughout the wolf recovery area, which encompasses the entire Apache and Gila National Forests. The total area of the BRWRA is 7,055 mi². The Service also proposes to reintroduce 2 family groups per year for 3 years into the WSWRA primary wolf recovery zone (San Andres Mountains) allowing population expansion throughout the wolf recovery area (see Fig. 2-3). The total area of the WSWRA is 4,050 mi². Reintroduction would be initiated on one of the two areas and, if determined to be appropriate, progress to the second area 2 to 4 years later.

A “soft release” technique would be used, with wolves being held in on-site release pens for 4-6 months. Mexican wolves “surplus” to the captive population would be selected for release, removed from the zoo environment, and placed in an isolated Service-owned holding facility at least one year prior to being placed in on-site release pens.

All released wolves will have radio transmitters: collars for adults and implants for pups. Monitoring will be frequent, evaluation continuous, and formal assessments of project success will occur at 3- and 5-year intervals. Each assessment will result in a determination to either continue, modify or terminate the project. The initial reintroduction could take place as early as 1996.

Reintroduced populations would be designated “nonessential experimental” under Section 10(j) of the ESA. Mitigation would be accomplished through provisions of the special rule, which would authorize take of Mexican wolves under specified circumstances.

If reintroduction occurs in the BRWRA, it is anticipated that a population of 102 wolves occupying 5,000-7,000 mi² would be established in 8 years. In the WSWRA, a population of 20 wolves occupying 2,000-4,000 mi² would be established in 3 years.

See Chapter 2 for a more detailed description of the proposed action.

VII. Explanation of effects of the action on species and critical habitat listed in item III A, B, and C:

The principal prey of all gray wolves, including Mexican wolves, is large ungulates (Mech 1970). In seven extensive investigations of the contents of wolf droppings (see Mech 1970: 175) animals the size of beavers or larger composed 59 to 96% of the food items identified. Most prey species were ungulates. Remains of mice, mink, muskrats, squirrels, rabbits, birds, fish, lizards, and snakes as well as invertebrates and vegetable matter have been found in wolf droppings. However, Mech (1970) states that “predation on small animals is seen to play only a minor role in the life of the wolf.” Bednarz (1988), in his review of the biology of Mexican wolves, concludes that, while small rodents and vegetable matter are not of primary importance in the wolf’s overall diet, they may be important for short periods of time when larger prey species are not available.

Historically, Mexican wolves were typically associated with montane forests and woodlands and intervening or adjacent grasslands above 4,500 feet in elevation (Brown 1983). There are few records of wolves inhabiting desert, desertscrub, or semidesert grassland habitats.

Gray wolf packs occupy large territories and wolf densities ranging from 1 per 10 square miles to 1 per 500 square miles have been reported (Mech 1970). Historic densities of Mexican wolves were never documented; however, Bailey (1931) estimated wolf densities on the Gila National Forest in 1906 at “not more than one to a township” (36 square miles). The Service predicts that restored wolf densities will be about one per 50 square miles.

The re-establishment of wolves in the BRWRA and/or WSWRA could affect other wildlife species in the following ways: (1) by killing them for food, (2) by competing with other predators for food, (3) by interspecific aggression resulting in the killing or territorial exclusion of other predators, (4) by the transmission of...
diseases, (5) by providing additional sources of carrion for scavengers, and (6) by changing wildlife management programs in ways that affect other species.

No change in existing management practices is required under the Service’s proposed action for Mexican wolf reintroduction. However, land managing agencies may chose to enhance habitat for wolves. The most effective management strategy for wolves is to increase populations of their principal ungulate prey species and to provide protection from illegal killing by humans. Prescribed fire, logging, and development of permanent water are the most commonly used methods for improving ungulate habitat in areas being considered for Mexican wolf reintroduction. Some restrictions to traditional animal damage control activities will be imposed in areas occupied by wolves. The use of M-44’s and choking-type snares will be eliminated, and trap size may be limited and/or trap check frequencies may be specified.

**Black-footed Ferret** - No effect. Wolves do not regularly prey on mammals smaller than beavers. No known populations of black-footed ferrets exist within the proposed wolf recovery areas. The consumption of prairie dogs (the principal prey of black-footed ferrets) by wolves has not been documented and is not considered likely. Wolves can contract and transmit diseases, such as canine distemper, rabies, and plague, which can seriously impact ferrets. However, wolf densities are expected to be low and these types of diseases already occur within existing populations of coyotes, foxes, skunks, and other species in the WSWRA and BRWRA. Management actions that may be undertaken to benefit the Mexican wolf will not affect black-footed ferrets.

**American Peregrine Falcon** - No effect. Wolves do not prey on American peregrine falcons nor do wolves prey substantially upon the principal prey of this falcon—birds taken in flight (S. Williams, personal communication, Bent 1938).

**Bald Eagle** - No effect, possible beneficial effect. Wolves do not prey on eagles nor do they prey substantially upon the principal prey of eagles—fish, waterfowl, rabbits. Bald eagles are known to feed upon carrion (S. Williams, personal communication, Bent 1937). Wolves may increase the amount of large ungulate carrion available to bald eagles.

**Northern Aplomado Falcon** - No effect. Wolves do not prey on aplomado falcons nor do wolves prey substantially upon the principal prey of this falcon—birds, small mammals, and insects (S. Williams, personal communication, Bent 1938).

**Whooping Crane** - No effect. Whooping cranes are not expected to occur in proposed wolf recovery areas. Whooping cranes occur in the Southwest only in winter, and at that time they prefer habitats (cultivated fields and wetlands) that are not present in proposed Mexican wolf recovery areas.

**Mexican Spotted Owl** - May effect, not likely to adversely effect. Certain habitats will be occupied by both Mexican spotted owls and Mexican wolves. While some small mammals will be taken by both spotted owls and wolves, there is no overlap among the principal prey of these two predators. The Service’s proposed action requires no special management measures to improve habitat for Mexican wolves. If land managing agencies choose to implement habitat improvement actions for the benefit of Mexican wolves, the Section 7 consultation process would adequately protect the Mexican spotted owl.

**Southwestern Willow Flycatcher** - No effect. Wolves do not prey on small songbirds nor do wolves prey upon insects, the principal prey of this flycatcher.

**Mexican Gray Wolf** - May effect, beneficial effect. No wild Mexican wolves are known to exist in the United States portion of the subspecies’ historical range (Girmendonk 1994, Wolok 1994). The last confirmed wild wolf in Mexico was live-captured in 1980 (McBride 1980). McBride (1980) estimated that less than 50 Mexican wolves remained in Chihuahua and Durango and that no more than 50 adult breeding pairs were present.
in the entire Republic of Mexico. Today, very few, if any, wolves are believed to remain in Mexico (Julio Carrera, personal communication). The objective of the proposed action is to restore two populations of Mexican wolves to the wild to promote the recovery of the subspecies. A captive population of 88 Mexican wolves is held in 20 zoos or captive breeding centers in the U.S. and 5 facilities in Mexico. There are 75 animals in the U.S. population and 13 in the Mexican population. These are the only Mexican wolves known for certain to exist. The potential exists to adversely affect the genetic integrity and viability of the captive population if animals removed from the captive population for reintroduction to the wild subsequently die. Up to 50% of reintroduced Mexican wolves can be expected to die (Phillips et al. In Press). However, despite relatively high mortality of reintroduced, captive-reared wolves, wild populations can be established, as has been demonstrated in the red wolf recovery program (Phillips et al. In Press).

Mexican wolves selected for reintroduction will be as genetically redundant with members of the captive population as possible. The captive population is managed for the Service under the American Zoo and Aquarium Association’s (AZA) Species Survival Plan (SSP) program. The AZA maintains a Studbook and provides a small population management advisor. Management of the demographic and genetic makeup of the population is guided by the SPARKS computer program. Only those individuals whose kinship values are above the mean for the captive population as a whole will be used for reintroduction. Kinship values, which range from 0 to 1, are a measure of the relatedness of an individual to the rest of the population. Wolves with higher kinship values are genetically well represented in the population. In addition, the PEDPAC computer program will be used to identify surplus animals by examining the influence on founder gene survival of removing an individual animal from the population. These protocols will adequately protect the genetic integrity of the captive population and, thus, the continued existence of the subspecies (E. Spevak, New York Zoological Society-Bronx Zoo; and I? Miller, Species Survival Commission-The World Conservation Union, personal communications). The U.S. captive population of Mexican wolves has approximately doubled in the last three years, demonstrating the existing reproductive potential to replace Mexican wolves that may die following reintroduction.

Under the draft proposed rule for the experimental population, lethal take would be permitted in defense of human life and during an actual attack on livestock by wolves (on public lands, the latter provision applies only after nonlethal control actions have failed). Since wolves have a strong tendency to avoid humans (Mech 1992) and attack less than 1 percent of available livestock (Mack, et al. 1992), negligible take is predicted under these provisions. Generally, management-related take will be conducted by proven nonlethal methods. Successful reintroduction, monitoring, and management techniques developed by the red wolf and northern Rocky Mountain wolf reintroduction projects will be used in the Mexican wolf reintroduction project.

The potential exists for a relatively a high level of initial mortality among reintroduced, captive-reared Mexican wolves. This mortality level is expected to decrease as the proportion of wild-born wolves increases. Lethal take authorized by the special rule for the experimental population is predicted to be negligible. Over the long term, the combined mortality associated with the adaptation of captive wolves to a wild environment and authorized lethal take are not expected to preclude the reestablishment of a viable wild population of Mexican wolves. Therefore, while the proposed action may contribute to increased short-term mortality of Mexican wolves, it will ultimately result in the reestablishment of wild populations of Mexican wolves (where none currently exist) and, thus, beneficially contribute to the long-term recovery and conservation of this endangered subspecies.

Todsen’s Pennyroyal, Kuenzler Hedgehog Cactus, Goodding’s Onion, Mimbres Figwort, Arizona Willow, and Parish’s Alkali Grass - No effect. Mexican wolves will not directly affect plants. The Service’s proposed action requires no special management measures to improve habitat for Mexican wolves. If land managing agencies choose to implement habitat improvement actions for the benefit of Mexican wolves, the Section 7 consultation process would adequately protect threatened and endangered plants.

Gila Topminnow, Gila Trout, Loach Minnow, Beautiful Shiner, Chihuahua Chub, Spikedace, Little Colorado Spinedace, and Apache Trout - No effect. While the consumption of fish by wolves has been
documented (Mech 1970), fish are not a principal prey species of wolves. The Service’s proposed action requires no special management measures to improve habitat for Mexican wolves. If land managing agencies choose to implement habitat improvement actions for the benefit of Mexican wolves, the Section 7 consultation process would adequately protect threatened and endangered fish species.

**Gila Springsnail and New Mexico Hotspring Snail** - No effect. No direct or indirect effects to snails as a result of wolf reintroduction are expected.

**Category 2 Candidates** - The list of category 2 candidate species provided by the New Mexico Ecological Services Office has been reviewed and none are expected to be adversely affected by the reintroduction of Mexican wolves.

### VIII. Effect determination and response requested:

#### A. Listed species/critical habitat:

<table>
<thead>
<tr>
<th>Determination</th>
<th>Response requested</th>
</tr>
</thead>
<tbody>
<tr>
<td>no effect</td>
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<tr>
<td></td>
<td>(species: black-footed ferret, American peregrine falcon, bald eagle, northern aplomado falcon, whooping crane, <em>Gila</em> topminnow, <em>Gila</em> trout, Todsen’s pennyroyal, Kuenzler hedgehog cactus, loach minnow, beautiful shiner, Chihuahua chub, spikedace, and Apache trout)</td>
</tr>
<tr>
<td>may effect, is not likely to adversely affect</td>
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</tr>
<tr>
<td>(species: Mexican spotted owl)</td>
<td><strong>X</strong> concurrence</td>
</tr>
<tr>
<td></td>
<td>_ formal consultation</td>
</tr>
<tr>
<td>may effect, is likely to adversely affect</td>
<td></td>
</tr>
<tr>
<td>(species: None)</td>
<td><strong>X</strong> concurrence</td>
</tr>
<tr>
<td></td>
<td>_ formal consultation</td>
</tr>
<tr>
<td>may effect, undetermined effect</td>
<td></td>
</tr>
<tr>
<td>(species: None)</td>
<td><strong>X</strong> concurrence</td>
</tr>
<tr>
<td></td>
<td>_ informal consultation</td>
</tr>
</tbody>
</table>

#### B. Proposed species/proposed critical habitat:

<table>
<thead>
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<tr>
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<td></td>
</tr>
<tr>
<td></td>
<td>(species: southwestern willow flycatcher, Arizona willow, and Parish’s alkali grass)</td>
</tr>
</tbody>
</table>
may effect, is not likely to adversely affect
(species: Mexican gray wolf)  X concurrence

may effect, is likely to adversely affect
(species: None)  X concurrence

is likely to jeopardize/adverse modification of
critical habitat
(species: None)  X concurrence

may effect, undetermined effect
(species: None)  X concurrence

C. **Category 1 and 2 candidate species:**

**Determination**  **Response requested**

no effect
(species: goodding’s onion, Mimbres figwort, Gila springsnail, New Mexico hotspring snail, Arizona black-tailed prairie dog, Organ Mountains Colorado chipmunk, White Sands woodrat, hot springs cotton rat, swift fox, occult little brown bat, greater western mastiff bat, spotted bat, ferruginous hawk, Apache northern goshawk, western snowy plover, mountain plover, loggerhead shrike, white-faced ibis, Texas horned lizard, Bonita diving beetle, Anthony blister beetle, Los Olmos tiger beetle, White Sands pupfish, Alamo beardtongue, grama grass cactus, Mescalero milkwort, night-blooming cereus, Guadalupe valeria, Kerr’s milk-vetch, nodding cliff daisy, Organ Mountains evening primrose, Organ Mountains figwort, sand prickly pear, Standley whitlow-wort, Sierra Blanca cliff daisy, southwestern otter, silky pocket mouse, white-sided jackrabbit, northern goshawk, northern gray hawk, Gila chub, Gila roundtail chub, Sonora sucker, desert sucker, Arizona southwestern toad, Yavapai (lowland) leopard frog, Chiricahua leopard frog, Mexican garter snake, narrow-headed garter snake, Gila groundsel, Hess’ fleabane, rock fleabane, Alamo beardtongue, Duncan’s pincushion cactus, Pinos Altos flameflower, three-nerved scurfpea, slender spiderflower, San Carlos wild buckwheat, Mogollon clover, Nutrioso milkvetch, and White Mountain paintbrush.)  X concurrence

may effect, is not likely to adversely affect
(species: None)  X concurrence

may effect, is likely to adversely affect
(species: None)  X concurrence
may effect, undetermined effect
(species: None)

\[ \text{X concurrence} \]
\[ \text{informal consultation} \]

IX. Reviewing office evaluation:

A. Concur \[ \text{X} \] Nonconcurrence

B. Formal consultation required

C. Conference required

D. Remarks (attach additional pages as needed):

X. References


### APPENDIX E

Arizona Game and Fish Department's Twelve-Step Procedure for Reestablishment of Nongame and Endangered Species (AGFD 1987)

<table>
<thead>
<tr>
<th>Activities for Project Originators</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Assess status of species/population and available resources.</td>
<td>Determine feasibility of re-establishment project.</td>
</tr>
<tr>
<td>2. Complete re-establishment scorecard, submit it to Nongame Branch.</td>
<td>Facilitate priority ranking and preliminary review from programmatic perspective.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Activities by Nongame Branch</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>3. Prepare proposal abstract, distribute it and scorecard throughout AGFD.</td>
<td>Elicit broad review of project and of possible conflicts or effects on other programs, projects, etc.</td>
</tr>
<tr>
<td>4. Submit briefing memo to AGFC through AGFD Director. No general press release.</td>
<td>Provide AGFC with background on potential project.</td>
</tr>
<tr>
<td>5. Review AGFD comments and develop project checklist. Submit summary to AGFD Director.</td>
<td>Identify and address any specific concerns and actions necessary to mitigate them; determine whether to proceed with or to reject the projects.</td>
</tr>
<tr>
<td>6. Solicit comment on project concept from public and appropriate agencies, organizations.</td>
<td>Communicate goals, provide early awareness of intent.</td>
</tr>
<tr>
<td>7. Discuss project and public input and AGFD recommendations with AGFC.</td>
<td>Determine appropriate action; terminate project or proceed. Inform public of decision.</td>
</tr>
<tr>
<td>8. Prepare re-establishment proposal. Distribute for review both inside and outside AGFD, and submit to AGFC.</td>
<td>Document specifics of proposal project. Elicit philosophical, technical review.</td>
</tr>
<tr>
<td>9. Summarize comment, revise proposal and complete AGFD Environmental Checklist. If necessary, draft Environmental Assessment or Impact Statement.</td>
<td>Ensure NEPA compliance and requisite coordination with existing programs, projects.</td>
</tr>
<tr>
<td>10. Submit final draft project proposal for outside review and to AGFC.</td>
<td>Provide for peer, agency and public comment.</td>
</tr>
<tr>
<td>11. Summarize comment, review proposal. Submit final project proposal to AGFD Director for action.</td>
<td>Ensure policy review, compliance with procedures and determine final approval or denial of proposal.</td>
</tr>
<tr>
<td>12. Notify AGFC and public of decision.</td>
<td>Provide information on decision and notice of project implementation schedule.</td>
</tr>
</tbody>
</table>
Wolf depredation on livestock other than cattle is low in Alberta, primarily because other types of livestock are not exposed to depredation within wolf range (M.J. Dorrance, Alberta Agriculture, pers. comm.). Sheep (including adults and lambs) killed or injured by wolves in Alberta ranged from 1-127, or an average of 31 per year from 1974 to 1990. Numbers of sheep in wolf range are not available but are roughly estimated at around 10,000 head.

From 1974 to 1980, swine, goats, and poultry comprised 4% of the total livestock killed by wolves for which farmers were compensated (J.R. Gunson, Alberta Fish and Wildlife, unpubl. data) and 1% of total livestock killed by wolves from 1981 to 1990 (M.J. Dorrance, Alberta Agriculture, unpubl. data). Coyotes were responsible for 99.98% of the losses of these classes of livestock (primarily poultry) during 1990-1991 (M.J. Dorrance, Alberta Agriculture, pers. comm.).

Livestock operators are compensated for livestock killed by wild predators. Losses are compensated up to 100% of commercial value for confirmed kills and up to 50% of commercial value for probable kills. From 1972 through 1989 the number of approved claims for the entire Province ranged from 22 in 1972 to 79 in 1975 with an annual average of 53 claims. Compensation paid under this program during the same period ranged from $14,993 in 1972 to $115,296 in 1982 with an annual average of $46,227 (Alberta Forestry, Land and Wildlife 1991). During this time the wolf population averaged about 1,500 animals.

The Simonette River experimental area involved remote wooded grazing leases on provincial lands in west central Alberta. Moose, elk, white-tailed and mule deer were common, as were coyotes, black bear and wolves. Pastures were small and isolated and were in, or adjacent to, territories of four wolf packs. The evaluation was conducted from 1975 through 1980. There was no wolf control during the first 4 years and livestock operators were compensated for 100% of value for livestock killed by predators and 80% for missing cattle. Government wolf control was resumed in the winter of 1979-1980. Estimated wolf numbers were 14-15 in 1975 and 39-40 wolves.
in 1979-1980; wolves were reduced to 12-13 in the winter of 1979-80.

Total cattle deaths from all causes (including missing animals), from an average of about 2,000 cattle present, increased from 2.9% in 1976 to 3.7% in 1979; total cattle mortality was 2.5% in 1980 following wolf control. Of 38 cases where cause of death was known, 42% was due to wolf depredation, 11% from black bear depredation, and 47% from non-predator causes. Deaths and injuries due to wolf depredation ranged from one to 27 per year with an annual average of eleven. Loss rates, due to wolf depredation ranged from 0.55 to 17.33/1,000 head of livestock available with an annual average of 0.59%.

**Minnesota**

Wolves frequently encounter livestock in Minnesota without depredations occurring (Fritts and Mech 1981). In Minnesota, the USDA Animal Damage Control division administers a wolf control program in response to complaints of wolf depredation on domestic livestock. Wolves are controlled on a reactive site-specific basis where complaints of livestock depredation by wolves are verified (Fritts 1982). The estimated population of wolves in Minnesota is about 1,500-1,750 (Fuller et al. 1992).

From 1979 to 1991, an average of 23 calves and four adult cattle were killed or injured by wolves each year (Mack et al. 1992). Calves comprised 85% and adults 15%. Depredation rates for cattle ranged from 0.04/1,000 to 0.18/1,000 with an annual average of 0.12/1,000 or 0.012% of those available.

Sheep losses from 1979-1991 ranged from 1 to 112/year and averaged 50/year in Minnesota. The rate of sheep killed or injured ranged from 0.03/1,000-7.04/1,000 with an annual average of 2.11/1,000 or 0.211% of those available. A higher proportion of lambs than adults were killed. Compensation payments averaged 22.5/year for adult sheep versus 5.15/year for lambs or a 1:2.3 adult to lamb ratio (Fritts et al. 1992).

Depredations varied widely among years. Annual variation in verified livestock losses in Minnesota ranged from one to nine adult cattle and eight to 35 calves with an average of four adults and 23 calves. Annual variation for sheep was greater.

Average number of animals killed or wounded per verified complaint was 1.2 for cattle and 4.4 for sheep. Annual variation in the number of cattle reported killed by wolves ranged from one to 17 adults and twelve to 98 calves with an annual average of 27 cattle killed or injured per year. Reported sheep losses ranged from one to 242 with an annual average of 50 sheep verified as killed by wolves. On average, 55% of the reported claims of losses to wolves could be verified (Fritts et al. 1992).

Verified complaints of depredations average 30 per year and affected an average of 21 farms (0.33% of producers) annually. Conflicts were highly seasonal and involved primarily cattle (mainly calves), sheep, and turkeys. Number of operators affected also varied considerably from year to year.

Livestock producers in Minnesota are compensated for verified complaints of wolf depredation on livestock by the Minnesota Department of Agriculture. From 1977 through 1989, compensation payments have ranged from a low of $8,668 in 1977 (the first year of the program) to a high of $43,664 in 1989 with an annual average of $23,715 (Fritts et al. 1992). During 1990, 1991, and 1992, $42,739, $32,266, and $17,922 ($11,340 pending) were paid in compensation, respectively. During 1989, 1990, and 1991, turkeys comprised large portion of the losses (as discussed above) with 1,866, 1,170 and 1,075 turkeys confirmed dead as a result of wolves in those years (often turkeys mass in corners of pens and many suffocate). The wolf population averaged about 1,460 animals during this time.

**Northwestern Montana**

A small population of wolves has been recolonizing northwestern Montana since the early 1980s. The first reproduction was documented in 1986 within Glacier National Park, Montana. From 1987 to 1992 wolves killed an average of three cattle and two sheep per year. Depredation rates on cattle ranged from 0 to 0.08/1,000 with an average of 0.04/1,000 or 0.004% of those available. Depredation rates on sheep ranged from 0 to 0.88/1,000 with an average of 0.18/1,000 or 0.018% of those available (Mack et al. 1992). The wolf population averaged about 44 animals during this time.
Summary

A review of several areas in North America (Mack et al. 1922) indicates that wolf depredation is highly variable among years and within areas. Overall, the rate of wolf depredation on domestic livestock across large geographic areas is very low, averaging usually less than 0.1% of livestock within wolf range.

Cattle and sheep are the species most affected in Alberta, Montana, and Minnesota (with the exception of turkeys in Minnesota). Recent development of large free ranging turkey growing operations within wolf range in Minnesota has resulted in turkeys constituting about 75% of the livestock losses to wolves in some recent years and accounting for most of the increase in losses (Fritts et al. 1992). In all areas, losses of adult cattle are much lower than that of calves. The loss of adult sheep versus lambs varies by area and by year, and ranged from 42% lambs in Alberta (Gunson 1983) to 70% lambs in Minnesota (Fritts et al. 1992). Losses of sheep per capita available are higher than cattle losses.

On average, wolf depredation affects a small number of available livestock and a small percentage of livestock operators, usually less than 1% of the livestock operators in an area each year. In most areas where livestock live with wolves few operators actually lose livestock to wolves. However, while on an industry-wide basis the loss of livestock to wolf depredation is very small, a few individual operators may be quite adversely affected in any one year because these few operators may sustain a large portion of the annual loss within a large geographic area.

Wolf Depredation on Domestic Dog

Wolves on rare occasions kill domestic dogs. Tompa (1983) indicated that in British Columbia from 1978-1980 there were 13 wolf/dog related complaints with 29 dogs killed or injured by wolves. During the three years, all 29 dogs killed or injured were attacked between October and March.

Fritts and Paul (1989) reported on wolf/domestic dog interactions in Minnesota. Generally, rural residences and those at the edge of small communities in areas of high wolf populations seemed most likely to experience problems. No seasonal pattern was evident in Minnesota. In an area with about 68,000 households with dogs that may be exposed to wolves, 47 complaints of wolf-dog interaction were received from 1979 through 1987. In 60% of the reports, wolf killing or wounding of dogs was verified. In all other incidents it was verified that either no damage resulted or wolves were not involved. Verified complaints ranged from one to six reports per year with an annual average of 3.1. This is a rate of 0.04 incidents per 1,000 households or one incident per 22,000 households per year.

Summary of Livestock Depredation Survey Responses

A written survey was conducted in late 1993 with 20 experts who were chosen for their knowledge of livestock, wolves, or of the proposed Mexican wolf recovery areas (USFWS 1994b). The subject was projecting rates of future livestock depredation by Mexican wolves. The focus question was whether some multiplier should be applied when projecting likely depredation rates in the Southwest based on comparison with known depredation rates from northern areas where wolves and livestock co-exist, i.e., Alberta, Minnesota, and Montana. If the respondents felt a multiplier was appropriate they were asked to be as quantitative as possible in describing how it should be determined. If they did not feel a multiplier was appropriate, they were asked to explain why. The FWS had suggested a “length-of-grazing-season” multiplier to account for differences in grazing seasons and the respondents were asked to comment on it.

Seven of the 20 respondents stated it was unfeasible or inappropriate for them to propose a particular multiplier or a method to determine one; three of these felt that the FWS’s proposed multiplier resulted in depredation projections that were far too low. One respondent stated he lacked evidence that a multiplier was necessary and he lacked evidence that depredation rates would be higher or lower in the Southwest than in the northern comparison areas. No respondents believed that depredation rates would be lower in the Southwest.

Three respondents stated the FWS’s suggested “length-of-grazing-season” multiplier was basically appropriate. Eight other respondents (plus one concurring verbally) suggested their own methods to determine an appropriate multiplier, with various
caveats. Two of these made suggestions on determination methods but did not propose a particular multiplier or range. Six respondents proposed particular multipliers or ranges. Most of these multipliers were higher than the basic length-of-grazing-season multiplier FWS had initially suggested. The multipliers proposed ranged from 1.2 to 3.5 times the northern area rates.

Specific factors cited by the six respondents as justifying their particular multipliers for livestock depredation in the Southwest, besides the FWS proposed length-of-grazing-season adjustment, included: more calving on the open range, higher cattle density, lower wild prey availability, difficulty of locating missing livestock, the “startup” effects of having a small wolf population with exposure to a small number of cows and not having rates that can be averaged over larger areas and over several years, the effect of non-fatal wounding of livestock by wolves, and the lack of feeding pastures in the Southwest.

Based on these survey responses, the FWS has calculated low and high range depredation estimates for each designated wolf recovery area (Box 4-3; Table 4-3 summarizes the calculations in Tables F-1 and F-2, below.) Because there are no livestock in the WSWRA primary recovery zone (Alt. B), no calculations are presented for that area, as the estimated depredation is zero.

### Low and High Range Estimates of Mexican Wolf Depredation

**Table F-1.** Low range of estimated annual number of cattle killed after Mexican wolf re-establishment based on comparison with Alberta, Minnesota, and Montana study areas.

Notes: Estimates are calculated by using the livestock depredation comparison equation developed for the Yellowstone/Central Idaho wolf reintroduction EIS (USFWS 1994), modified by using a length-of-grazing-season multiplier (abbreviated as LOGSM) for each potential reintroduction area (see Box 4-3).

<table>
<thead>
<tr>
<th>Mexican Wolf Recovery Area</th>
<th>Comparison Area</th>
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<tbody>
<tr>
<td></td>
<td>Alberta</td>
<td>Minnesota</td>
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<tr>
<td><strong>BRWRA Primary and Secondary Recovery Zones combined (Alt. A and C)</strong></td>
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</tr>
<tr>
<td>82,617 cattle</td>
<td>7.5</td>
<td>1.0</td>
</tr>
<tr>
<td>1,000 wolves</td>
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<tr>
<td>LOGSM = 1.5</td>
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<tr>
<td><strong>BRWRA Primary Recovery Zone (Alt. B)</strong></td>
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<tr>
<td>10,494 cattle</td>
<td>0.2</td>
<td>0.03</td>
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<tr>
<td>20 wolves</td>
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</tr>
<tr>
<td>LOGSM = 1.5</td>
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</tr>
<tr>
<td><strong>WSWRA Primary and Secondary Recovery Zones combined (Alt. A)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3,220 cattle</td>
<td>0.08</td>
<td>0.01</td>
</tr>
<tr>
<td>20 wolves</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LOGSM = 2</td>
<td></td>
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Table F-2. High range of estimated annual number of cattle killed after Mexican wolf reestablishment based on comparison with Alberta, Minnesota, and Montana study areas.

Notes: Estimates are calculated by using the livestock depredation comparison formula developed for the Yellowstone/Central Idaho wolf reintroduction draft EIS (USFWS 1994c), modified by the use of a multiplier. The multiplier is derived by adding 3.0 to the area's length-of-grazing-season multiplier (abbreviated as LOGSM) (see Box 4-3).

<table>
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<th>Mexican Wolf Recovery Area</th>
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<tr>
<td></td>
<td>Alberta</td>
<td>Minnesota</td>
<td>Montana</td>
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<tr>
<td>BRWRA Primary and Secondary Recovery Zones combined (Alt.s A and C)</td>
<td>82,617 cattle</td>
<td>22.5</td>
<td>3.0</td>
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<td>- 100 wolves</td>
<td>LOGSM + 3.0 = 4.5</td>
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<td>BRWRA Primary Recovery Zone (Alt. B)</td>
<td>10,494 cattle</td>
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<td>- 20 wolves</td>
<td>LOGSM + 3.0 = 4.5</td>
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<tr>
<td>WSWRA Primary and Secondary Recovery Zones combined (Alt. A)</td>
<td>3,220 cattle</td>
<td>0.2</td>
<td>0.03</td>
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<td>- 20 wolves</td>
<td>LOGSM + 3.0 = 5.0</td>
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**APPENDIX G**

**Glossary**

Alternatives Different ways that the Mexican wolf could be re-established and managed within its former range in the southwestern United States. Four alternatives are developed and analyzed in depth in the Mexican wolf FEIS.

**Breedingpair** An adult male and an adult female wolf that have produced at least two pups that survived until December 31 of the year of their birth, during the previous breeding season.

**Compensation** Payment to owners of livestock that had livestock killed or maimed by wolves to compensate for the market value of the livestock.

Control Deliberate planned management of wolves to minimize human-wolf conflict. This includes establishing barriers (i.e., noise makers, guard dogs, moving and herding livestock, or building fences), harassing wolves, aversive conditioning of wolves, capturing problem wolves and releasing and monitoring them on site, capturing problem wolves and relocating them to other areas, placing problem wolves in captivity, or euthanizing problem wolves.

**Critical habitat** The specific areas within the geographical areas occupied by a species at the time it is listed on which are found the physical or biological features essential to the conservation of the species and which may require special management considerations or protection. By law, critical habitat can not be designated for nonessential experimental populations and it is not proposed for the Mexican wolf.

**Delist** To remove a species, subspecies, or population from the federal list of threatened species and endangered species and subsequent protection of the Endangered Species Act (ESA). This action, in effect, places the species, subspecies or population under management authority of the states or tribes.

**Depredation** The confirmed killing or maiming of lawfully present domestic livestock on federal, state, tribal, or other public lands, or private lands by one or more wolves. The Fish and Wildlife Service (FWS), Animal Damage Control (ADC), or FWS-authorized state or tribal agencies will confirm killing or maiming of domestic livestock.

**Disturbance-causing land use activity** Any land use activity that could adversely affect reproductive success or any other natural wolf behavior in a way that may reduce the affected wolf’s chances of survival and may, therefore, be temporarily restricted within a one-mile radius of release pens, active dens, and rendezvous sites. Such activities may include, but are not limited to: timber or wood harvesting, management-ignited fire, mining or mine development, camping outside designated campgrounds, livestock drives, off-road vehicle use, hunting, and any other use or activity with similar potential to disturb wolves. The activities specifically excluded from this definition are: legally permitted livestock grazing and use of water sources by livestock; livestock drives if no reasonable alternative route or timing exists; vehicle access over established roads to private property and to areas where legally permitted activities are ongoing if no reasonable alternative route exists; use of lands within the national park or national wildlife refuge systems as safety buffer zones for military activities; prescribed natural fire except in the vicinity of release pens; and any authorized, specific land use that was active and ongoing at the time wolves chose to locate a den or rendezvous site nearby.

**Domestic animals** Any animal purposely raised (fed, cared for, and sheltered) by humans and usually dependent upon humans for its survival. This would include livestock, food/fiber animals, captive game animals, fowl, working animals, guarding animals, and pets.
**Downlist** A change of the classification of wolves from “endangered” to “threatened.”

**Endangered species** Any species which is in danger of extinction throughout all or a significant portion of its range and which is formally listed as endangered under the ESA.


**Engaged in the act of killing, wounding, or biting livestock** To be engaged in the act of killing, wounding, or biting livestock that are alive. If wolves are observed feeding on livestock carcasses it cannot be assumed that wolves killed the livestock until investigation by proper authorities has confirmed that wolves were responsible for that or other livestock losses in the immediate area (1-mile radius).

**Experimental population** A 1982 amendment to the ESA established the experimental population designation (Section 1 O(j)) and defined an experimental population as: “... any population (including any offspring arising solely therefrom) authorized by the Secretary for release under paragraph (2), but only when, and at such times as, the population is wholly separate geographically from nonexperimental populations of the same species.” The term applies to populations that are derived from endangered or threatened species for which the Secretary of Interior has determined that a release will further the conservation of that species. The experimental population designation allows for more flexible management for introduced endangered species or threatened species.

**Experimental population area** Designating an experimental population must include a description of the area in which such population will be found and where it will be identified as experimental. This establishes the area within which the experimental population rule applies. Outside those boundaries the gray wolf (except in Minnesota) is protected as an endangered species. The experimental population area must be geographically separate from areas containing existing wolf populations.

**Experimental population rule** Designation of an experimental population includes the development of a special rule to identify geographically the location of the experimental population and identify, where appropriate, procedures to be utilized in its management. A special rule for each experimental population is developed on a case-by-case basis. Development of the special rule includes publication of the proposed regulation in the Federal Register, public comment on the proposed regulation, and publication of the final regulation prior to reintroduction of experimental populations. The proposed Mexican wolf experimental population rule is in Appendix C of the FEIS.

**Harass** According to the ESA implementing regulations, harass is defined as “intentional or negligent act or omission which creates the likelihood of injury to the 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” (50 CFR 17.3). For the purposes of this EIS and the proposed experimental population rule, only “opportunistic, noninjurious harassment” (see definition below) is permitted and it is limited to approaching wolves on foot, horseback, or nonmotorized or motorized vehicle (no closer than 20 feet); discharging firearms or other projectile launching devices in proximity to but not in the direction of wolves; throwing objects in the general direction of but not at wolves; or making any loud noise in proximity to wolves. The basic intent is to scare or chase wolves from the immediate area without causing physical injuries. The circumstances under which members of the experimental population of Mexican wolves may be harassed are described in the Proposed Action in Chap. 2 of
the FEIS and in Appendix C, the proposed experimental population rule.

**Hard release** The immediate and direct release of wolves into a new environment.

**Impact on game populations in ways which may inhibit further wolf recovery** States and tribes are encouraged to describe unacceptable impacts on game populations in their management plans subject to FWS approval. Until such time the term will mean the following: 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 five-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.

**Incidental take** (see below for full definition of “take” for this EIS) The taking (killing, wounding, maiming, injuring, or physically harming) of wolves, under permit or conditions established by the FWS in an experimental population rule, that occurs accidentally and despite reasonable care during otherwise legal activities (e.g., as the result of legal activities and in conjunction with ADC control activities for other species). Within an experimental population area all wolves taken under the conditions permitted by the experimental population rule by agencies or the public will not be considered take under the ESA. All wolves taken outside the provisions of the experimental population rule will be considered take under the ESA.

**Land use restrictions** Restrictions on human activities on land. Such restrictions are used for a wide variety of purposes. Relatively few such restrictions are required to successfully recover wolf populations unless human-caused mortality of wolves is unusually high. Examples of the types of restrictions that have been used by natural resource managers to assist in wolf population management are closures to reduce human access to wolf dens or rendezvous sites or prohibition on certain types of motorized access. Land-use restrictions also include restrictions on certain human activities in the habitat of an endangered or threatened species in order to comply with Section 7 of the ESA. That section requires that “Each Federal agency shall, in consultation with and with the assistance of the Secretary, ensure that any action authorized, funded, or carried out by such agency is not likely to jeopardize the continued existence of any endangered species or threatened species or result in the destruction or adverse modification of habitat of such species which is determined by the Secretary, after consultation as appropriate with affected States, to be critical, unless such agency has been granted an exemption for such action...” In nonessential experimental population areas the section 7 requirements of ESA only apply inside national parks and national wildlife refuges.

**Livestock** Cattle, sheep, horses, mules, and burros. The states and tribes may better define and possibly expand the definition of livestock in their wolf management plans given the criteria that the FWS has established that livestock must be large enough to be capable of sustaining wounds that can be determined to be caused by wolves and must be reasonably likely to be prey items for wolves.

**M-44 cyanide devices** A 3-component, spring-activated ejector device developed specifically to kill coyotes and other canine predators. Components consist of (1) a capsule holder wrapped with fur, cloth, or wool, (2) ejector mechanism, and (3) a hollow tube (to be driven into the ground) for holding the ejector mechanism. When the capsule holder...
is pulled, a spring-activated device propels sodium cyanide into the animal’s mouth causing its death. The EPA registration and ADC policy do not allow the use of these devices in areas known to be occupied by listed species that may be killed by them.

**Mexican Wolf Recovery Plan** A document prepared by the Mexican Wolf Recovery Team, a group of individuals with expertise regarding the biological and habitat requirements of the Mexican wolf, outlining the tasks and actions necessary to recover the subspecies within parts of its former range. The original plan was completed in 1982. The revised Recovery Plan is under preparation.

**National Environmental Policy Act (NEPA)** An Act passed by Congress in 1969 which is the basic national charter for protection of the environment. NEPA established a process that requires consideration of environmental consequences for federal actions. Procedures ensure that high-quality environmental information is available to public officials and citizens before federal decisions are made and actions are taken. Specifically, the responsible federal official must submit a detailed report on “major federal actions significantly affecting the quality of the human environment” prior to taking such actions. The EIS process is a primary means of meeting NEPA requirements.

**Nonessential** Under the provisions of the 1982 amendment of the ESA (Section 10(j)) which authorizes reintroductions of experimental populations, experimental populations must be designated either “essential” or “nonessential.” “Nonessential” refers to an experimental population whose loss would not be likely to appreciably reduce the likelihood of the survival of the species. Except in national wildlife refuges or national parks, “nonessential” populations are treated under Section 7 of the ESA as “proposed species.” Thus, federal agencies must only confer with the FWS on activities that the agencies believe might jeopardize the species. Moreover, the agencies would be under no obligation under Section 7(a)(2) to avoid actions likely to jeopardize the species. In national parks and national wildlife refuges they are treated as threatened species. Congress expected that most experimental populations would be considered “nonessential.”

**Nonexperimental wolves** Wolves receiving all protections accorded an endangered species under the ESA as distinguished from wolves that are members of an experimental population.

**Occupied Mexican wolf range** Area of confirmed presence of resident breeding packs or pairs of wolves or area consistently used by at least one resident wolf over a period of at least one month. Confirmation of Mexican wolf presence is to be made or corroborated by the FWS. Exact delineation of the area will be described by: (1) 5-mile radius around all locations of wolves and wolf sign confirmed as described above (non radio-monitored), (2) 1-mile radius around radio locations of resident wolves when fewer than 20 radio locations are available (for radio-monitored wolves only), or (3) 3-mile radius around the convex polygon developed from more than 20 radio locations of a pack, pair, or single wolf taken over a period of at least six months (for radio-monitored wolves). This definition applies only within the Mexican wolf experimental population area.

**Opportunistic, noninjurious harassment (see “harass”)** This is the only type of harassment permitted under the proposed experimental population rule. Opportunistic means as the wolf presents itself (i.e., the wolf travels onto and is observed on private land or near livestock). A wolf could not be tracked through snow or by dogs and then harassed or harassed by aircraft. A wolf could not be chased and harassed for an extended period of time (over 15 minutes). Any permissible harassment must not cause bodily injury, maiming, or death.
Pack A group of wolves, usually consisting of a male, female, and their offspring from one or more generations.

Population (of non-reintroduced wild wolves) At least two breeding pairs of wild wolves successfully raising at least two young each year (until December 31 of the year of their birth), for two consecutive years in an experimental population area.

Potential natural recolonization area U.S. areas considered most suitable for possible natural wolf immigration from Mexico in the event that remaining source populations exist in Mexico.

Preferred Alternative The alternative which the agency believes would fulfill its statutory mission and responsibilities, giving consideration to economic, environmental, technical and other factors.

Primary recovery zone An area in which wolves are proposed for release, and to which they may be returned and re-released if necessary, and where managers will actively support recovery of the reintroduced population.

Problem wolves Wolves that have depredated on lawfully present domestic livestock or other members of a group or pack of wolves including adults, yearlings, and young-of-the-year that were directly involved in the depredations; or fed upon the livestock remains that were a result of the depredation; or were fed by or are dependent upon adults involved with the depredations (because before these young animals mature to where they can survive on their own, they will travel with the pack and learn the pack’s depredation habits). Wolves that have depredated on domestic animals other than livestock, two times in an area within one year. Wolves that are habituated to humans, human residences, or other facilities.

Proposed Action The action put forth by the Fish and Wildlife Service, after considering input from the public, experts, and affected agencies, as the most reasonable way to re-establish and manage the Mexican wolf within its former range in the southwestern United States. It is one of the alternatives developed in the DEIS.

Public Land Land under administration of federal agencies including, but not limited to, the USDI National Park Service, USDI Bureau of Land Management, USDI Fish and Wildlife Service, USDA Forest Service, US Department of Energy, and US Department of Defense. For purposes of Mexican wolf management, public land also includes portions of state lands that are interspersed within the boundaries of federal public land.

Recovery The act or process of restoring threatened or endangered species to a non-threatened and non-endangered status.

Reintroduction The release of animals into an area that was part of their probable historic geographic range, but from which they have declined or disappeared, for the purpose of establishing a new wild population.

Remove from the wild Capture and placement into captivity or euthanasia of wolves.

Rendezvous site A gathering and activity area regularly used by a litter of young wolf pups after they have emerged from the den. Typically, the site is used for a period ranging from about one week to one month in the summer. Several sites may be used in succession.

Secondary recovery zone An area adjacent to a primary recovery zone which is not proposed for wolf releases, but to which released wolves are allowed to disperse (except under Alternative B, herein), and where managers will actively support recovery of the reintroduced population.

Soft release The release of wolves to the wild from a temporary confinement facility where they were held to acclimate them to the general area of the release. Soft release is a relative term depending largely on the duration of
holding at the release site and the freedom of the wolves to conduct basic biological activities.

Take The ESA defines “take” as: “to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct” (16 USC sec. 1532(19)). See above definition of Harass which includes definition of permitted harassment, and see definition of Unavoidable and Unintentional Take below.

Threatened species Any species which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.

Toxicants A poison or poisonous substance.

Unavoidable and unintentional take Accidental, non-negligent take (see above definition of take) which occurs despite reasonable care, is incidental to otherwise lawful activity and without the purpose to do so. Examples would include striking a wolf with an automobile or capturing a wolf in a trap set obviously for another species. NOTE: Shooting a wolf when the individual states they believed it to be an animal other than a wolf, does not qualify as unavoidable or unintentional take. This is consistent with most state laws where killing of wild animals or domestic animals because of mistaken identity is illegal. Shooters have the responsibility to be sure of their targets.

Viable population or minimum viable population of wolves (population viability) The number, distribution, and persistence of wolves considered necessary for a population to have a reasonable likelihood of survival for the foreseeable future. Population goals are being formulated in the revision of the Mexican Wolf Recovery Plan.

Wolf Recovery Area A designated area where managers will actively support re-establishment of wolf populations.
APPENDIX H
Literature Cited


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Schlickeisen, R., President, Defenders of Wildlife.


# APPENDIX I
List of Scientific Names

<table>
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<th>Scientific Name</th>
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Gila chub
Gila monster
Gila spring snail
Gila topminnow
Gila trout
Gila woodpecker
Golden-mantled ground squirrel
Gould’s turkey
Gray vireo
Gray wolf
Green rat snake
Grizzly bear
Ground squirrel
Hare
Ibex
Jackrabbit
Jaguar
Jaguarundi
Javelina
Kit fox
Least tern
Lesser long-nosed bat
Little Colorado River spinedace
Loach minnow
Lowland leopard frog
Meadow jumping mouse
Mexican gray wolf
Mexican long-nosed bat
Mexican spotted owl
Moose
Mountain lion
Mule deer
Narrowhead garter snake
New Mexico hotspring snail
New Mexico ridgenose rattlesnake
Northern aplomado falcon
Northern goshawk
Ocelot
Oreohelix
Oryx
Porcupine
Pronghorn
Raccoon
Razorback sucker
Red fox
Red wolf
Ringtail
Rio Grande silvery minnow
Rock squirrel
Rocky Mountain bighorn sheep

Gila inter-media
Heloderma suspectum
Fonteliceps gilae
Poeciliopsis occidentalis occidentalis
Oncorhynchus gilae
Melanerpes uropygialis
Spermophilus lateralis
Meleagris gallopavo mexicana
Vireo vicinor
Canis lupus
Senticolis triaspis
Ursus arctos horribilis
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Lepus spp.
Capra spp.
Lepus spp.
Panthera onca
Felis yagouaroundi
Dicotyles tajacu
Vulpes macrotis
Sterna antillarum
Leptonycteris curasoae
Lepidodema vittata
Tiaroga co bitis
Ranayavapaiensis
Zapus budsonius
Canis lupus baileyi
Leptonycteris nivalis
Strix occidentalis lucida
Alces alces
Felis concolor
Odocoileus hemionus
Thamnophilus rufipunctatus
Fonteliceps thermolepis
Crotalus willardi obscurus
Falco femoralis
Accipiter gentilis
Felis pardalis
Oreohelix spp.
Oryx gazella
Erethizon dorsatum
Antilocarpa americana
Procyon lotor
Xyrauchen texanus
Vulpes vulpes
Canis rufus
Bassariscus astutus
Hybognathus amarus
Spermophilus variegatus
Ovis canadensis
Scientific Names

Roundtail chub
Sierra del Carmen white-tailed deer
Skunk
Sonora chub
Sonora ocelot
Southern pocket gopher
Southwestern willow flycatcher
Spikedace
Spotted bat
Tree squirrels
Vole
Water shrew
Western snowy plover
White-sided jackrabbit
White-tailed deer
Whooping crane
Wild turkey
Wood rat
Yaqui catfish
Yaqui chub
Yaqui topminnow

Plants

Alder
Apache plume
Arizona walnut
Arizona cypress
Arizona sycamore
Ash
Aspen
Big tooth maple
Black grama grass
Black walnut
Blue grama grass
Boxelder
Broom snakeweed
Buffalo grass
Ceanothus
Corkbark fir
Cottonwood
Creosote bush
Desert willow
Douglas fir
Emory oak
Engelmann spruce
Fir
Fremont cottonwood
Galleta

Gilarobusta
*Odocoileus virginianus carmini*
*Mephitis* spp. and other genera
*Gila ditaenian*
*Felis pardinisonoriensis*
*Thomomys umbrinus*
*Empidonax traillii*
*Meda fugida*
*Euderma maculatum*
*Rhynchositta pacbyrbyncba*
*Tamiasciurus* and *Sciurus* spp.
*Microtus* spp. and other genera
*Sorex palustris*
*Cbaradrius alexandrinus*
*Lepus callootis*
*Odocoileus virginianus*
*Grus americana*
*Meleagris gallopavo*
*Neotoma* spp.
*Ictalurus pricei*
*Gila purpurea*
*Poeciliopsis occidentalis sonoriensis*

*Alnus* spp.
*Fallugia paradoxa*
*Juglans major*
*Cupressus arizonica*
*Platanus wrightii*
*Fraxinus* spp.
*Populus tremuloides*
*Acer grandidentatum*
*Bouteloua eriopoda*
*Juglans niger*
*Bouteloua gaclilis*
*Acer negundo*
*Xanthocephalumsarotbrae*
*Buchloe dactyloides*
*Ceanotbus fendleri*
*Abies lasiocarpa*
*Populus* spp.
* Larrea* spp.
*Chilopsis linearis*
*Pseudots plugmenziesii*
*Quercus emoryi*
*Picea engelmanni*
*Abies* spp.
*Populus fremontii*
*Hilaria jamesii*
Gambel oak
Grama grass
Gray oak
Hackberry
Honey mesquite
Jojoba
Juniper
Lechuguilla
Live oak
Maple
Mesquite
Mountain mahogany
Narrowleaf cottonwood
Oak
Pine
Pñón pine
Ponderosa pine
Prickly pear
Red osier
Redberry juniper
Sand sage
Snakeweed
Sot01
Spruce
Sycamore
Tarbush
Texas madrone
Tobosa
Torrey yucca
Walnut
Wheeler sot01
White pine
White fir
Whitethorn acacia
Willow

Quercus gambelii
Bouteloua spp.
Quercus grisea
Celtis spp.
Prosopis glandulosa
Simmondsiachinensis
Juniperus spp.
Agave lecheguilla
Quercus virginiana
Acer spp.
Prosopis spp.
Cercocarpus montanus
Populus angustifolia
Quercus spp.
Pinus spp.
Pinus cembroides
Pinus ponderosa
Opuntia spp.
Cornus stolonifera
Juniperus pinchotii
A rtensia filiformis
Gutierrezia saro tbrae
Dasylirion wheeleri
Picea spp.
Platanus spp.
Flourensia cernua
Arbutus texanus
Hilaria mutica
Yucca torreyi
Juglans spp.
Dasylirion wheeleri
Pinusstrobus
Abies concolor
Acacia constricta
Salix spp.
APPENDIX J
Update on Yellowstone and Central Idaho
Gray Wolf Reintroductions and Economic Benefits of Wolf Recovery

Since spring, 1995, both the Yellowstone and Central Idaho reintroductions have exceeded expectations. Some key numbers: 29 wolves released altogether in 1995; nine pups produced; four wolves known killed (two shot, one clearly illegally, resulting in one successful prosecution; one wolf hit by a vehicle; one still under investigation); significant increases in tourism and related businesses near the Lamar Valley; two sheep confirmed killed by one wolf, two sheep missing, compensation paid; one hunting dog killed; no land use restrictions; two lawsuits against the project, so far unsuccessful. The movements, mortality, and behaviors of the wolves have generally been as expected. The second phase in Yellowstone and Central Idaho is underway now, with 37 more wolves to be released. If this year’s efforts go as well as last year’s, and population growth rates continue to be good, then the FWS may not need to reintroduce in future years, as was previously thought.

Central Idaho

- Twelve wolves released in 1995 are being monitored and five pairs have formed. Two 1995 wolves have died and one disappeared. No domestic animals have been killed. No land use restrictions have been needed.

- In 1994 the Nez Perce Tribe entered into a cooperative agreement with the FWS and manages wolves in Idaho.

- Twenty wolves were released in January 1996. Several are traveling together and have moved northward. Most wolves remain on Forest Service lands, but cross private land regularly.

- Controversy is expected to increase as wolves have pups and as livestock are put on allotments this spring.

Yellowstone National Park

- Fourteen wolves, representing three packs were released in 1995. They produced nine pups in two litters. They were seen by about 40,000 visitors. They prey primarily on elk. No land use restrictions have been needed.

- Two 1995 wolves have been illegally killed and another was hit by a truck. One is recently listed as missing. A man who shot a wolf illegally was convicted by a local jury and received 3 months in jail, 3 months at a half-way house, a $10,000 fine, and 1 year of supervised probation.

- Two sheep were killed and two are missing north of the Park. A lone 1995 male wolf was moved once and then killed under FWS orders when it attacked sheep a second time. The producer was compensated by Defenders of Wildlife (100 percent for the two killed and 50 percent for the two missing).

- Four pairs have formed in 1996 from 1995 wolves. Three of the pairs remain in the Park. Another pair (Soda Butte) is north of the Park on a mix of Forest Service and private land. The FWS has rejected requests to move them at this time. This pack killed a hunting dog in December 1995.

- Seventeen wolves were put into four pens in the Park in January 1996. They will be released in early April. By May 1996 there could be 8 breeding pairs and up to 40 pups in the area.

Overall Wolf Recovery

- The 1996 reintroductions from British Columbia were successful beyond expectations. In 1996, reintroduction efforts, excluding salaries, cost about $200,000. Of
that, $80,000 was from private sources. If the 1996 wolves are as successful as those released in 1995, no further reintroductions will be necessary. Budgets have been less than estimates presented in the FEIS.

**Economic Benefits**

According to Yellowstone National Park Service’s Norman Bishop, the Bioeconomics projections in the FEIS (USFWS 1994c) of millions of dollars of economic benefits from wolf recovery are now being largely borne out. Adding up food, lodging, fuel, and wolf souvenirs reveals a positive impact on local economies because of people’s desire to see, hear, or photograph them and to have a memento of that experience.

Cooke City, the small town just outside the remote northeast gate of Yellowstone Park, reports a booming business for motels, restaurants, and gift shops. It is inside this entrance where wolves are thriving after being reintroduced. According to Marsha Karle, Chief of Public Affairs for the Park Service, there was a 12.9 percent increase in traffic at the entrance over 1994. Looking at the month of August, the numbers just coming through the gate were up 17.1 percent over the previous year, a figure Karle called “substantial.” Karle described the month of August as “a good month for sighting a wolf” The month of June, traditionally part of the slow season at the Park, showed an even greater number of visitors, up 22 percent from the previous year. According to ranger Rick McIntyre, “anyone on the ground can see this is a major thing.” The traditionally slow season was this year’s peak viewing season. He estimated that 40,000 people saw wolves from May 13 to July 6.

While no quantitative study exists, Karle said information from Cooke City merchants indicates the presence of wolves supported the local economy. “We do know that businesses in Cooke City were doing extremely well this year,” she said. Motels were filled. Business at restaurants and souvenir business increased dramatically. Also, the park concessionaire sold huge numbers of wolf-related products. “Anything with a wolf on it was selling like hotcakes this year,” said Steve Tedder, vice-president for TW Recreational Services at Yellowstone. “Any items which had anything to do with wolves were just really popular.” Meanwhile, ranger Rick McIntyre said that the Roosevelt Lodge Gift Shop, the store closest to the wolves in Yellowstone, reported a 44 percent increase in sales in 1995, an increase the manager attributed mainly to the presence of wolves. The manager of the Yellowstone Institute bookstore reported increased sales and a gift shop in Lamar Valley, in the vicinity of where the wolves are, reported sales 126 percent over the previous year.

In northern Minnesota, the small town of Ely (population 5,000) has boomed since the launching there, in 1993, of a wolf educational facility. According to International Wolf Center Board President, Dr. L. David Mech, the Center contributes roughly one million dollars annually to the Ely economy; the Center would not be there if the wolf were not there. The Center draws many thousands of visitors annually. Mech says Ely has put in new motels and introduced a special flight from the Twin Cities during the summer because of the Center. “This was one of the best summers for our lodging establishments, especially the large increase in the two-nighters, which I directly attribute to the Wolf Center,” said Linda Friar, Executive Director of the Ely Chamber of Commerce. Her assessment was based on comments by resort owners.

At Glacier National Park, Amy Vanderbilt, public information officer, reported that quantifying the benefits of wolves in dollars would be difficult because the presence of wolves here is due to their decade-long recolonization of northern Montana rather than rapid intentional reintroduction. She did report, however, a 30 percent increase in backcountry visitation and that the curio and gift shops around the park are adding and selling wolf-related books, videos, artwork, and other items because of visitor demand.
APPENDIX K
Response to Mr. Dennis Parker’s Comment on the DEIS

A lengthy, detailed, unpublished, undated paper entitled, “Reintroduction of the Mexican Wolf: Instrument of Recovery or Instrument of Demise?”, was submitted as a comment (Tu-4) on the DEIS by Mr. Dennis Parker, a biologist. The paper was also attached, referred to, or incorporated in several other public comments received, especially from county governments. By way of response to the numerous biological issues raised, particularly related to genetics and captive breeding, the FWS sent the paper out for review by a number of experts, many of whom had written the scientific papers cited by Mr. Parker. Their responses to key issues raised by Mr. Parker were compiled by David R. Parsons, Mexican Wolf Recovery Coordinator, in November 1995. Their responses provide background information on the captive population and wolf recovery generally. Complete copies of Mr. Parker’s comment and the responses are available for review at the FWS Regional office in Albuquerque.

Reviewers:

Ms. Norma Ames - Former Leader, Mexican Wolf Recovery Team
Dr. Jonathan D. Ballou - Smithsonian Institution
Dr. Mike Bogan - National Biological Service
Dr. Steve Chambers - U.S. Fish and Wildlife Service
Dr. Phil Hedrick - Arizona State U., Mexican Wolf Recovery Team
Dr. L. David Mech - National Biological Service
Dr. Patricia Mehlhop - University of New Mexico
Dr. Philip S. Miller - The World Conservation Union
Mr. David Parsons - Leader, Mexican Wolf Recovery Team
Dr. Rolf Peterson - Michigan Technological University
Mr. D. Peter Siminski - Mexican Wolf Species Survival Plan Coordinator, Arizona Sonora Desert Museum, Mexican Wolf Recovery Team
Dr. Michael E. Soulé - University of California, Santa Cruz
Dr. Edward M. Spevak - Wildlife Conservation Society
Dr. Robert Wayne - University of California at Los Angeles
Dr. Robert J. Wiese - American Zoo and Aquarium Association

General Heading: Will reintroduction conserve the Mexican wolf?

Parker’s Statement: “... there are no examples of Grey wolf restoration achievement via the use of captive-raised and released animals. . . . the release of ... grey wolves on Alaska’s Coronation Island in 1960 (Ames 1986) . . . has . . . proven to be inadequate for the purpose of affirmative reintroduction argument with the subsequent extinction of this island population.”

Review Comments:


Wolf decline on Coronation Island had nothing to do with reintroduction technique. Rather, prey supply was exhausted because the island was so small. (Peterson)

Do note that these captive-raised wolves [the ones introduced to Coronation Island] did learn to take appropriate prey and reproduced successfully. (Siminski)

Parker chooses to not mention the very successful reintroduction from captive-raised animals of another large North American canid, the red wolf. Although not a gray wolf, the successful red wolf reintroduction presents a reasonable model for a successful gray wolf reintroduction. (Siminski)

The citation for the Coronation Island example should be “(Ames 1987).” Examples of restoration attempts using captive-raised wolves were too few in 1987 to base a condemnation now of future attempts on the failures. A tabulation of such attempts and their results-now including results for the red wolf releases-might be more informative. (Ames)

The answer to the question of whether reintroduction will “conserve the Mexican wolf” seems to me
to be that we cannot know for sure. We can, however, be fairly sure that keeping Mexican wolves only in captivity will not achieve that end. (Ames)

Parker ignores the highly successful red wolf reintroduction using captive-raised wolves in North Carolina and the Great Smokies. (Mech)

The author cites several instances, and there are others, of successful reintroductions of other species which provide some reason to believe that reintroduction of wolves is a feasible alternative to maintaining the few remaining individuals in zoos until they expire. (Bogan)

The use of captive bred animals for reintroduction has also shown itself to work in a number of cases, e.g., Arabian oryx, golden lion tamarin, American bison, Andean condor, and the red wolf. The argument that because one small isolated wolf introduction eventually failed no further attempts should be made is ludicrous. (Spevak)

The proposed Mexican wolf reintroductions would not be to islands and would have a greater number of individuals in each starter population. I do not accept Parker’s implication that because it hasn’t been done before except in a very limited way, we should not do it. (Mehlhop)

**General Heading:** Is the genetic base of the captive population sufficient for the establishment of the isolated, viable and self-sustaining population of Mexican wolves called for by both the ESA and the Mexican Wolf Recovery Plan?

**Parker’s Statement:** “The genetic base of the official captive population of Mexican wolves is limited to a sole, founding female and 2 founding males (Ames, 1986),…”

**Review Comments:**

Parker does not reference the recent molecular genetic analysis done by myself [Dr. Robert Wayne] and colleagues (accepted for publication in Conservation Biology) that specifically addresses the genetic relationships of the three Mexican wolf captive lineages and their suitability for reintroduction. Our analysis used advanced molecular techniques and showed that the three captive lineages are likely drawn from the same source population and are distinct from other North American wolves. (Wayne)

This is no longer the case, now that the Ghost Ranch and Aragon lines have been deemed to be Mexican wolf following molecular studies by Robert Wayne et al. (Wiese)

The certified captive population now has 7 founders. (Parsons)

**Parker’s Statement:** “Current recommendations call for the retention of 90% of initial quantitative genetic variation for 200 years (Ralls and Ballou, 1986).”

**Review Comments:**

The general guideline of maintaining 90% of the genetic variation for 200 years is just that, a general guideline for maintaining genetic diversity in captive populations. It is not in any way a critical level or threshold that indicates the dividing line between viable and unviable populations. (Ballou)

This simply is outdated information. In 1990 the AZA [American Zoo and Aquarium Association] abandoned this rigid, single goal for all species and moved to make SSP [Species Survival Plan] goals species specific (Hutchins and Wiese, 1991; Wiese and Hutchins, 1994; Wiese, et al. 1994). Many SSPs now have goals which call for the retention of less than 90% gene diversity and/or for far less than 200 years. (Wiese)

If we look at the proportion of founder alleles retained as of 1994 under the three-founder scenario, the estimated number of founder alleles retained is 5.41 out of 6.0 or 90.2% retention (Hedrick, 1995) which is coincidentally at the level that Parker quotes as a target from Ralls and Ballou. (Hedrick)

The management of the Certified line has been excellent and professional in all respects and has only resulted in an average inbreeding coefficient of 0.184 (Hedrick, 1995) for the living animals after
nearly twenty years (approximately five generations) of captive breeding. With a small number of founders, this is a very impressive record and is probably as small an increase as could be possible. (Hedrick)

Although the recommendations of Ralls and Ballou are reasonable targets for a captive management program, Parker’s implication that a program that does not meet these goals is doomed to failure is without support. He treats these values as a threshold, whereas their theoretical basis consists of continuous functions of rate of loss of genetic variability and accumulation of inbreeding depression. (Chambers)

The cheetah is a case in point. This species shows less genetic variability than Mexican wolves and survives in large numbers in the wild where there is habitat protection and no human persecution. There is presently nothing to indicate that this would not also be true for the Mexican wolf. (Spevak)

As a comparison, the Przewalski’s horse (the only wild species of horse and an animal that is also extinct in the wild and until recently existed only in captivity), has an average inbreeding coefficient of 0.25 (Ballou, 1994), even though there are 13 founders for this captive population. It is now being reintroduced into both China and Mongolia and both of these reintroductions appear to be unaffected by any genetic problems in the horse. (Hedrick)

Parker presents several misunderstandings, misinformation, old information and false conclusions in this section. (Siminski)

**Parker’s Statement:** “A measure often used to quantify the degree to which an individual is inbred is “Wright’s Inbreeding Coefficient,” ... . Inbreeding coefficients for captive Mexican wolves born in 1989 consistently average .188 (Mexican Gray Wolf International Studbook, 1989), or nearly double the maximum allowable for retention of sufficient genetic variability.”

**Review Comments:**

Mr. Parker makes another error in his comparison of the gene diversity to be retained in the captive breeding program and Wright’s Inbreeding Coefficient. When an AZA SSP speaks of retaining a specific amount of “gene diversity”, we are referring to “gene diversity” as defined by Weir (1990). This type of gene diversity is also referred to as “expected heterozygosity” by some authors. This is a much different type/measure of genetic variation than Wright’s Inbreeding Coefficient for small, captive populations. In effect Mr. Parker is comparing apples and oranges in this section. This error makes me question his genetic expertise throughout the entire document. (Wiese)

A metric commonly used to assess the severity of inbreeding depression is the number of lethal equivalents contained within the population. An analysis by Ralls et al. (1988) of 40 captive mammal populations revealed that the number of lethal equivalents ranged from 0 to 30, with a median of 3.14. I have performed a similar analysis of inbreeding depression in the current Mexican wolf captive population (Miller and Hedrick 1995) and concluded that, with respect to both survival to 180 days and to individual weight, inbreeding depression is not detectable. The number of lethal equivalents in the pedigree, calculated using a method identical to that used by Ralls et al. (1988), was found to be 0.136. Statistical analysis shows this value to be indistinguishable from zero. (Miller)

The degree of inbreeding in the [Certified] population has been kept to near the minimum possible for a pedigree initiated with only three founders. (Miller)

The introduction of animals from the ASDM-GR and Aragon lineages into the Certified lineage will result in a great reduction in the inbreeding coefficient. Crosses between the lineages will have an inbreeding coefficient of 0.0. (Hedrick)

The [inbreeding] coefficient can be lowered by introduction of new stock (and documented genetic variation) from the other two lineages. In my opinion, Hedrick (1995) presents good justification for doing so. (Mehlhop)
Parker's Statement: “Study by Laikre and Ryman (1991) also provides clear evidence against the conception that Grey wolves are resistant to close inbreeding and therefore do not suffer from inbreeding depression.”

Review Comments:

Laikre and Ryman (1991) showed only that, in captivity, inbreeding depression can afflict wolves. In the wild, the Isle Royale study suggests that apparently deleterious gene combinations are selected out, thus cleansing the population and allowing the better combinations to survive and maintain the population. (Mech)

Inbreeding in one population (i.e., Laikre and Ryman, 1991) can not be taken as absolute evidence that it will occur in a different population, even of the same subspecies. The most recent work on inbreeding has shown that inbreeding is closely related to the individual founders of the population, rather than which species or subspecies is being considered (Lacy et al. 1995). Therefore, one population of wolves may show significant inbreeding depression and another population of the same subspecies may show little or no inbreeding depression. (Wiese)

Inbreeding depression in the Fennoscandic wolf captive population does not by necessity imply the existence of inbreeding depression in the Mexican wolf captive population. (Miller)

Parker fails to distinguish between cumulative inbreeding coefficients and the per generation rate of increase in the inbreeding coefficient. Genetic risk to the captive population will greatly depend on how rapidly the population expands after founding. A population that has expanded very rapidly from a population bottleneck, as has the Mexican wolf population, may avoid or overcome significant effects of inbreeding depression despite relatively high inbreeding coefficients. The very fact that the population has demonstrated the vigor to expand rapidly is a positive sign. (Chambers)

The Scandinavian wolves, however, were not bred following the type of systematic, scientifically based plan that is being followed for Mexican wolves. (Chambers)

The management of the Scandinavian zoo population increases the chance of inbreeding and reducing genetic variability by maintaining breeding pairs for years and preventing others from breeding. This has led to inbreeding coefficients up to .574 almost twice the maximum found in the certified Mexican wolf population. The Mexican wolf population is managed to reduce the chances of this situation. (Spevák)

The inbreeding coefficient in the Scandinavian wolf study cited by Parker (Laikre and Ryman, 1991) was almost twice as high (0.34 vs. 0.184) as that in the Mexican wolves. (Hedrick)

For inbreeding depression to happen, the increased homozygosity caused by inbreeding needs to result in an increased expression of deleterious recessive traits. This has not happened [in the captive population of Mexican wolves]. (Siminski)

Parker's Statement: “Of 11 pairs of captive Mexican wolves mated for the 1994 breeding season, only 7 produced young. Of the young produced (23), fully 39% (9) succumbed either at or within a short time of birth. 8 of the 9 deceased pups were killed and/or eaten by either their parents or other wolves. The ninth pup was killed when it was struck by lightning.”

Review Comments:

That year’s 1994 reproductive performance is within the normal range of Mexican wolf annual reproductive performance. There is not a pattern of decreasing reproductive performance in the captive population. That all pups do not survive or that all pairs do not reproduce is likely due to individual wolf differences, the captive environment and chance. No pattern indicating inbreeding depression exists. (Siminski)

Detailed study of the Mexican wolf studbook fails to assign a specific genetically-based cause of death for any of the pups born in 1994. (Miller)
In a recent study to find the extent of inbreeding depression in the Certified lineage of Mexican wolves, Miller and Hedrick (1995) did not find any inbreeding depression for either survival to 180 days or for weight from all the data currently available (as of July. 1994). Miller and Hedrick found that most of the mortality was not due to obvious genetic causes but was attributed to various environmental factors. In specific response to the comments of Parker about 1974, there is no evidence of mortality due to genetic causes among the 1994 pups. Further, because of the excellent management of the certified lineage, the level of inbreeding is relatively low and there have been very few highly inbred individuals. This is in contrast to the Scandinavian wolf study cited by Parker and the Przewalski’s horses mentioned above. (Hedrick)

The pups having been killed by wolves is more probably related to the captive conditions than to inbreeding. We have had this happen with unrelated captive wolves. (Mech)

He does not give the comparable numbers for the wild or even for other captive populations. I find it interesting that none of the nine deaths can be attributed to inbreeding. Cannibalism can not be automatically attributed to inbreeding; neither can lightning strikes. (Wiese)

The failure of 4 of the 11 pairs mated in 1994 to produce young cannot be laid to inbreeding without further information on management practices at the facilities involved. (Ames)

Based on the information in Mr. Parker’s paper, none of the 29 pups born in captivity died from causes that can be linked, in any statistical or pathological way, to inbreeding. (Soulé)

The argument that of the 11 pairs mated only 7 produced young indicates reduced fecundity has no bearing in fact. (Spevak)

Parker’s Statement: “Monorchidism and cryptorchidism . . . are conditions known to occur within the captive Mexican wolf population. The presence of one or the other of these conditions results in either reduced viability . . . or the non-viability . . . of the animals so afflicted.”

Review Comments:

The discussion of monorchidism and cryptorchidism is confused. Cryptorchidism (monorchid or bilateral) is not a classic indicator of inbreeding depression, although it has been noted in Mexican wolves. I am not aware of any evidence of Parker’s assertion that cryptorchidism results in reduced viability of afflicted animals; he may be confusing viability with fecundity. I am also not aware of any evidence that monorchids even suffer reduced fertility, although one can assume that bilateral cryptorchids would be infertile. (Chambers)

This condition is known from a small number of individuals and has to date shown no discernible inheritance pattern. Consequently, it cannot be used as evidence for inbreeding depression in the population. (Miller)

There is presently no evidence of genetic determination of these traits and the current prevalence of cryptorchidism and monorchidism is very low. (Hedrick)

There is no pattern of increasing cryptorchidism in the captive population. (Siminski)

General Heading: Are claims of captive Mexican wolf population viability and suitability for reintroduction purpose substantiated by the best scientific information available, as required by the Endangered Species Act?

Parker’s Statement: “... the totality of journal-published and peer-reviewed literature pertaining to Grey wolf genetics is of the unanimous consensus that a population of Grey wolves founded from a genetic base as restricted as that which characterizes the captive Mexican wolf population is not viably suited for reintroduction purposes (Ralls and Ballou, 1986; Laikre and Ryman, 1991; Wayne, Lehman, Girman, Gogan, Gilbert, Hansen, Peterson, Seal, Eisenhawer, Mech and Krumenaker, 1991; Shields, 1983; Theberge, 1981; among many others).”
Review Comments:

I think the credentials of the Genetics committee and that of Wayne and Fain are excellent. Six professional geneticists or wolf biologists, all with PhDs, evaluated or carried out this research. The research by Wayne and his group (Garcia-Moreno et al., 1995) is in press in Conservation Biology, the research by Fain (Fain et al., 1995) has been submitted to the Journal of Heredity for publication, and the research by Miller and Hedrick is in preparation for submission to Zoo Biology. (Hedrick)

I am in strong disagreement with the assumption that the conservation utility of the population is nonexistent simply because the population is quite inbred. (Ballou) [Note: Ballou’s response assumed only 3 founders and accepted Parker’s assessment of levels of inbreeding.]

Our recent results show that the genetic variability (heterozygosity) of the captive certified Mexican gray wolves is not significantly less than that in wild populations of gray wolves. Another component of genetic variation, allelic diversity, is lower than an average population of gray wolves but together these results do not warrant the grave concern about the “genetic base” of Mexican wolves voiced by the author [Parker]. Moreover, because our results suggest that all three captive populations should be interbred, the genetic diversity of the captive breeding program should be significantly increased. (Wayne)

My reading of the literature does not agree with his. Regardless of the accuracy of the inbreeding estimates for the captive group, most conservation geneticists are pragmatists, and the papers he quoted do not say that animals should never be reintroduced if they have inbreeding coefficients above some threshold. (Soulé)

This discussion relies on very theoretical and unproven considerations and assumes that no outbreeding would ever take place. (Mech)

The Wayne et al. (1991) study, of which I am a co-author, made no such pronouncements about reintroductions. (Mech)

The fact that the three lines were inbred in the past has little relationship to the total combined population. The offspring from a sire and dam from different lines will not be inbred. Inclusion of the Ghost Ranch and Aragon lines to the population will increase the population’s gene diversity (as defined by Weir, 1990). If future breeding is managed correctly and the three lines are crossed cautiously to maximize gene diversity, long-term inbreeding can be minimized as well (Ballou and Lacy, 1995). (Wiese)

While additional founders are preferable for almost any small captive population, a low amount of genetic variation can not accurately predict failure as Mr. Parker suggests. At this time the captive population is doing well and, in fact, reproduction has to be limited due to captive space constraints. (Wiese)

Reintroduction efforts are justified as a legitimate recovery process based on both pedigree analysis and molecular genetic studies. (Miller)

This is an unwarranted statement. None of these authors presented conclusive data on reproductive failure of wild wolves that demonstrated a genetic problem. (Peterson)

I underscore the importance of release in the wild if the current captive stock is to serve a useful purpose; their potential contribution diminishes with each generation. (Peterson)

Parker does not include in his citations those that contradict his apparently negative response. In addition, careful reading of some of the studies he does cite show they do not completely support that response. (Ames)

The literature that Parker cites recognizes that with a smaller genetic base there are more barriers to success, but none of these papers states that a population with the founder base of the Mexican wolf is unsuitable for reintroduction. (Chambers)
The use of hyperbole about “the entirety of journal published and peer reviewed work pertaining to Gray wolf genetics and limited founder population viability” detracts from any serious argument. It is valid that small populations with limited founder representation have lower chances of long term survival but it is also valid that many small founder events have become viable, e.g., island colonization. (Spevak)

From Parker’s discussions of wolf genetics, I cannot conclude, as he does, that reintroduction will not conserve the species. (Mehlhop)

I think that Parker is confusing the term viability with variability in page 3, line 2 and 10. (Hedrick)

Parker’s Statement: “According to the USFWS, . . . the wild male wolf which was caught with the lone, wild female founder in Mexico, back in 1978, was not the sire of the litter she subsequently birthed in captivity, after all. . . . [this] claim, is objected to by the person who actually caught these wolves in Mexico.”

Review Comments:

The adult male founder (#4), captured with the pregnant female founder (#5) in March 1978 in Durango, Mexico, never bred in captivity and has never been counted as a founder. The unknown sire of #5’s wild-conceived litter is referred to in the Mexican Wolf Studbook as #9000. This animal could have been male #4, but the point is moot because neither #4 or #9000 made any further contribution to the captive population. Number 5’s wild mate (whoever he is) is one of the founders of the Certified captive population. (Parsons)

General Heading: What is the present status of the Mexican wolf in the wild?

Parker’s Statement: “In 1994, Dr. Julio Carrera, who is leading wolf surveys in Mexico, documented wolf howls . . . and recorded reports of wolves . . . .”

Review Comments:

The statement is correct; however, Dr. Carrera has yet to confirm the existence of a wild wolf in Mexico. (Parsons)

Several errors exist, however, in Parker’s presentation. (Ames)

General Heading: Can inbreeding questions be resolved by the addition of ASDM-GR line and Aragon Zoo line wolves to the official captive Mexican wolf breeding program?

Parker’s Statement: “. . . this animal [male founder of the ASDM-GR line] may have actually been a wolf-dog hybrid (Woody, 1986).” . . . ‘Skulls of animals born to the line [ASDM-GR] show definite dog, as well as wild canine characteristics.’ (Woody, 1986).”

Review Comments:

This section needs reconsideration in the light of our genetic evidence showing that the two uncertified lines are likely drawn from the same populations as the certified Mexican wolves and have no evidence of a dog ancestry. (Wayne)

What Woody (1986) actually wrote in 1986 was: “The records also recorded undocumented statements that the animal was actually a dog-wolf hybrid.” [emphasis added]; and: “Skulls of animals born to the line show definite dog, as well as wild canine characteristics. It has not been determined if the dog characters in the skulls are due to a dog heritage or the result of successive generations raised in captivity.” [emphasis added] (Parsons)

The molecular evidence from microsatellite loci (Hedrick, 1995; Garcia-[Moreno] et al., 1995) show no indication that the male founder of the ASDM-GR line had ancestry from a dog or a wolf-dog hybrid. (Hedrick)

The information from the skulls is not as definitive as that from microsatellites [DNA] for determining ancestry from dogs or other taxa. The phenotype of the skull can be strongly influenced by captive
breeding conditions so that the phenotype may appear more *doglike* due entirely to environmental factors. However, DNA information from microsatellites will not be influenced by any such environmental affects resulting from captivity. In other words, the skull morphology should be given much less weight in determining ancestry than DNA evidence. (Hedrick)

**Parker’s Statement:** “...findings of Bogan and Mehlhop (1983), whose taxonomic analysis of ASDM-GR specimens had previously confirmed the presence of pronounced dog tendencies within this line.”

**Review Comments:**

The study by Bogan and Mehlhop (1983) did not “confirm” the presence of pronounced dog tendencies within this breeding line. To the contrary, they state (1983:18) “most captive individuals from both the ASDM and WCSRC lines showed affinities with the southern wolf groups (i.e., *C. l. baileyi*) rather than with coyotes, dogs, or wolves from northern New Mexico.” (Bogan)

Bogan and Mehlhop (1983) did not confirm the presence of pronounced dog tendencies within this line, as Parker states. To the contrary, they concluded that eight of nine animals showed affinities to southern wolves and the ninth to northern wolves (*youngi*) and that none of the ASDM and WCSRC animals showed affinities to dogs or coyotes. In that study, Bogan and Mehlhop presented evidence that captive rearing may have brought about some of the morphological changes detected, such as shortening of the rostrum. (Mehlhop)

While bones are shaped by environmental factors as well as by genes, DNA analysis now offers a means to identify an animal by its genes, a factor far less immediately malleable than its bones. (Ames)

**Parker’s Statement:** “Verification of this line’s [the Aragon line] lineage is lacking at the present time, and its value as a contributor to the captive Mexican wolf population is currently suspect.”

**Review Comments:**

The Aragon lineage has been shown to be characteristic of the Mexican wolf using microsatellites. There is no evidence of dog ancestry from the molecular analysis in the Aragon lineage (Hedrick, 1995; Garcia-[Moreno] et al., 1995). (Hedrick)

Recent molecular work by Robert Wayne (USFWS report) establishes the ASDM-GR lineage and the Aragon lineage as Mexican gray wolves with no apparent infusion of other *canid* genes. USFWS has just [July 1995] agreed to incorporate these wolves into the captive breeding program. (Spevak)

These additional lineages [ASDM-GR and Aragon] are unrelated to the certified lineage and even though there have been a number of incidences of inbreeding in these lineages the offspring produced from their crossing will have a zero inbreeding coefficient. The initial separation of these lineages may actually have preserved genetic variability. Each lineage would tend to become fixed for different alleles through genetic drift and thereby maintain overall levels of genetic diversity. (Spevak)

**Other Comments by Reviewers:**

The paper appears to have been written not as an objective analysis but to try to discredit the proposed Mexican wolf reintroduction. I say this because the paper misinterprets or misconstrues the literature it cites, and it ignores other salient studies, all in ways that lead to a conclusion against Mexican wolf reintroduction. (Mech)

Because of the manner in which the material I am familiar with has been slanted, I feel that the overall paper was more an attempt to support a preconceived notion than to provide a dispassionate analysis. (Mech)

I would characterize the document as an “opinion piece” that would not be suitable in its present form for publication in the scientific literature although I can envision it appearing in a newspaper in some form. (Bogan)
Scientific contradiction or controversy alone is insufficient reason for not proceeding with a carefully planned and reviewed action. (Bogan)

As an aside, I noted that of the 16 articles listed under “Citations,” no more than ten could have been peer-reviewed. (Bogan)

Many other assertions of the author that the USFWS “stands alone” or his reference to all scientists having a contrary opinion are incorrect or at best distortions of statements made by one or a few scientists. (Wayne)

Clearly, the author is trying to overstate and misstate the support for particular points. (Wayne)

If peer-reviewed publication is to be a prerequisite for considering new information, I must point out that Parker’s paper does not meet the standard. (Chambers)

If his real reasons for opposing reintroduction are socio-economic in origin, then he should have written a report on the socio-economics of wolf reintroduction. In my opinion, the biological studies and discussions support reintroduction. (Mehlhop)

It appears that D. Parker has not seen the recent report by Hedrick (1995) of the Genetics Committee of the Mexican Wolf Recovery Team (P. Hedrick, R. Nowak, [G. Lopez] and M. Ashley) which was based on an extensive review of the published literature and new molecular genetics data from Robert Wayne (UCLA) (Garcia-Moreno et al., 1995) and Steven Fain (USFWS Forensics Laboratory) (Fain et al., 1995). (Hedrick).

In conclusion, the arguments presented by Parker concerning the genetic aspects of Mexican wolf management and reintroduction are not supported by detailed analysis of the captive population. (Miller)